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Health Technology Assessment

A Needs-Based Approach

Edited by
Yves Bergevin

The International Development Research Centre
Le Centre de recherches pour le développement international
El Centro Internacional de Investigaciones para el Desarrollo

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INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
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PARTICIPATING ORGANIZATIONS

International Development Research Centre
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The International Development Research Centre (IDRC) is funded by the Parliament of Canada but reports to an International Board of Governors. IDRC's mandate is to support research for development through building indigenous capacity for such research in developing countries. IDRC therefore works predominantly through direct financial and technical support to developing country researchers in universities, government, business and nonprofit organizations. IDRC-supported projects are designed to alleviate poverty, maximize use of local resources, and strengthen human and institutional capacity. Through funding of scientific research in Africa, Asia, Latin America, the Caribbean, and Canada, IDRC helps communities in the developing world find solutions to social, economic, and environmental problems.

Canadian Coordinating Office for Health Technology Assessment
110–955 Green Valley Crescent, Ottawa, ON, Canada, K2C 3V4
Tel 613-226-2553; Fax 613-226-5392

The Canadian Coordinating Office for Health Technology Assessment (CCOHTA) was created by the Ministers of Health (Federal, Provincial, and Territorial) in December 1989, and has been in operation since August 1990. CCOHTA is a nonprofit corporation, wholly funded by the federal, provincial, and territorial governments.

CCOHTA's mission is to encourage the appropriate use of health technology by influencing decision makers through the collection, analysis, creation, and dissemination of information concerning the effectiveness and cost of technology and its impact on health."

Canadian Society for International Health
170 Laurier Avenue (Suite 902), Ottawa, ON, Canada, K1P 5V5
Tel 613-230-2654; Fax 613-230-8401

The Canadian Society for International Health (CSIH) is committed to the promotion of international health and development. Through the mobilization of Canadian resources, CSIH advocates and facilitates research, education, and service activities in international health. The Society seeks further progressive health and programming in all fields where global and domestic health concerns meet. Building on the past work of Society members and colleagues, CSIH actively contributes to the evolving global understanding of health and development.

CSIH's goals are

- To facilitate and strengthen communication and networking regarding international health and development issues, activities, and opportunities among health-related personnel and the public;
- To promote increased education (knowledge, awareness, and skills) of Canadians and overseas partners related to international health;
- To advocate recognition of the importance of health in development activities among Canadian policy makers, the public, and health-related professions; and
- To facilitate exploration of new ideas in education, research, and services in international health and development with Canadian policy makers, the public, and health-related personnel.

Canadian University Consortium for Health in Development
170 Laurier Avenue (Suite 902), Ottawa, ON, Canada, K1P 5V5
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The Canadian University Consortium for Health in Development (CUCHID) aims to strengthen academic capacity for contributing to the solution of important global problems related to health in development, and to bring together Canadian and partner university resources in this process.

Clinical Epidemiology Unit of the University of Ottawa
Dr Peter Tugwell, Chairman, Department of Medicine, 501 Smyth Road,
Ottawa, ON, Canada, K1H 8L6
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The main interest of the Clinical Epidemiology Unit of the University of Ottawa group is to study the determinants and consequences of clinical decisions and healthcare delivery. The members of the Clinical Epidemiology Unit focus on various areas of investigation, including the design and execution of clinical trials, studies of quality of life, technology assessment, health economics, and health policy. Resources for the Unit include state of the art computer facilities. The Clinical Epidemiology Unit is the latest addition to the Loeb Medical Research Institute. Its academic faculty currently include clinicians with training in epidemiology, biostatisticians, health economists, and anthropologists.

PATH Canada: Program for Appropriate Technology in Health Canada
170 Laurier Avenue (Suite 902), Ottawa, ON, Canada, K1P 5V5
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PATH's mission is to improve health, especially the health of women and children in developing countries. To accomplish this mission, PATH focuses on the appropriateness, effectiveness, safety, and availability of technologies for health and family planning.

PATH defines technology to include *equipment, drugs, devices, vaccines, and procedures* used to prevent, diagnose, and treat illness and to meet health needs. Technology also includes the *systems* through which health care is delivered and the *information* that must necessarily accompany each technology.

To accomplish its Mission, PATH

- Assesses technology-related health needs;
- Identifies, develops, adapts, and assesses health and family planning technologies that address these needs;
- Tests, produces, advances, and introduces affordable technologies in partnership with local private and public sector agencies;
- Assures that these technologies are widely available for the benefit of the public sector through intellectual property protection;
- Develops culturally appropriate communication strategies, capabilities, and programs that strengthen the technology introduction process;
- Develops and disseminates objective information on primary health care technologies and reproductive and child health;
- Strengthens local capabilities for technology assessment, development, production, and introduction; and
- Collaborates with national and international agencies and institutions that share a common purpose.

CONTENTS

FOREWORD

This conference was the result of a collaboration between the Canadian Coordinating Office for Health Technology Assessment (CCOHTA), the Canadian Society for International Health (CSIH), the Canadian University Consortium for Health in Development (CUCHID), the Clinical Epidemiology Unit of the University of Ottawa, the Program for Appropriate Technology in Health Canada (PATH Canada), and the International Development Research Centre (IDRC).

Conference purpose and goals

Intended primarily for the key stakeholders of needs-based health technology assessment, including consumer groups and community representatives, policy makers, researchers, industry and professional organizations, etc., the Conference was designed to

> ***Provide a global and multidisciplinary forum for the debate on promoting needs-based technology assessment within a needs-based agenda.***

Conference goals were to

- Strengthen international networks of stakeholders who will have a positive impact on health decisions regarding needs-based technology assessment and to develop a mechanism for the exchange of information amongst those working in technology assessment; and
- Facilitate discussions of the recommendations of the 1993 World Development Report pertaining to Health Technology Assessment.

The goals were to be achieved by

- Identifying common issues around needs-based health technology assessment;
- Sharing international experience in needs-based health technology assessment;
- Developing strategies for improving international linkages and collaboration among key stakeholders and for implementing needs-based technology assessment in the Essential National Health Research (ENHR) framework;
- Facilitating the development of national research agendas in support of needs-based technology assessment as a component of the ENHR strategy; and
- Identifying potential areas of future collaboration and linkages.

Conference Participants

There were over 100 participants from 14 countries (see Appendix — Participants). Developing countries from Asia, Africa, and Latin America were represented. Participants included senior officers of international organizations, faculty members and graduate students from many universities, health managers, and health-care providers.

Organization of the Proceedings

The Proceedings are organized in three sections:

- ***Part I — Overview of Needs-Based Technology Assessment*** presents three key papers which set the Conference on a solid theoretical foundation
- ***Part II — The Case Studies*** includes six cases from different countries; each case study covers specific aspects of technology assessment
- ***Part III — Opportunities and Challenges for Collaboration*** presents a needs-based technology assessment tool kit (presentation of the concept and key ideas emerging from group discussions). The attention is then focused on working in different policy environments. This section then concludes with synthesis and recommendations for action.

ACKNOWLEDGEMENTS

This Conference would not have been possible if it were not for the hard work of members of the Organizing Committee and the support of the organizations they represented: Devidas Menon and Edie Clark for the Canadian Coordinating Office for Health Technology Assessment, Chuck Shields for the Canadian Society for International Health, Vic Neufeld for the Canadian University Consortium for Health in Development, Andreas Laupacis for the Clinical Epidemiology Unit of the University of Ottawa, Allan Ronald for PATH Canada (Program for Appropriate Technology in Health Canada), and Janet Hatcher Roberts for the International Development Research Centre. Finally, a special thank you to Peter Tugwell, Conference Chair, University of Ottawa, whose contagious smile, vision, patience, and hard work kept everyone working together to ensure the success of the Conference.

Thank you to Flora MacDonald, Chairperson of the Board of IDRC, and to Keith Bezanson, the President of IDRC, for joining the Conference on the opening evening, for their warm welcome, and for offering IDRC's hospitality for this event.

Thank you to Chitr Sitthi-Amorn of the College of Public Health, Chulalongkorn University, Bangkok, for such a clear and thought-provoking opening keynote address and his Synthesis and Recommendations for Action at the end of the Conference. Thank you also to Helen Saxenian of the World Bank and to Peter Tugwell for their superb presentations. These three initial presentations set the Conference on a solid theoretical foundation.

Going from theory to practice would not have been possible without the help of the case presenters: thank you to Yunkap Kwankum of the University of Yaounde; to Janet Hatcher Roberts of IDRC who graciously agreed to replace Ana Rita Gonzalez, of PAHO, who unfortunately could not attend; to Tessa Tan Torres of the University of the Philippines; to John Darmawan of the Seroja Arthritis Center, Semarang, Indonesia; to Marcos Bozi Ferraz, Escola Paulista de Medicina, Sao Paulo; to Ronald Wilson of the Aga Khan Foundation; and to Donald W. Juzwishin of the Greater Victoria Hospital Society, Victoria, BC, Canada.

Thank you to the plenary Chairs: Jorge Peña-Mohr, Allan Ronald, Jane Sisk, Vic Neufeld, and Davidson R. Gwatkin; and to the Cochairs: Don de Savigny, Pran Manga, Andreas Laupacis, Renaldo N. Battista, Arminée Kazanjian, and Santiago Lastiri.

A special thank you to the rapporteurs for tackling the difficult task of capturing the essence of the discussions: to Jeea Saraswati, Kerry Rhoades, Kameshwar Prasad, Julie Delahanty, Matthew Hodge, and Christine Whalen.

A special thank you to Elizabeth McGregor, of the Office of the President of IDRC, for sharing with us her experience on the use and development of tool kits.

Thank you to Davidson R. Gwatkin of the International Health Policy Program, the World Bank, for his insightful advice on working in different, and at times difficult, policy environments.

To Judith Maxwell of the Queen's–University of Ottawa Economic Projects, a special thank you for the relevance of her closing remarks.

Thank you to all participants who, through their thoughtful contributions and team work, made this Conference a success.

To Linda Russell, the conference coordinator who was responsible for the entire event running as smoothly as it did. To the staff who contributed to the coordination of the conference at IDRC, CCOHTA, and the University of Ottawa: Lyse Lavictoire, Susan Warren, Angie Anton, Hutoxi Noble, Vepe Percival, and Philipp Baker.

Last, but not least, this Conference was made possible through generous contributions from the Canadian International Development Agency, the Canadian Society for International Health / Pan American Health Organization, the International Development Research Centre, the Rockefeller Foundation, and the Aga Khan Foundation.

SUMMARY

The Conference was designed:

- First, to provide a global and multidisciplinary forum for the debate on promoting needs-based technology assessment within a needs-based agenda;
- Second, to strengthen international networks of stakeholders who will have a positive impact on health decisions regarding needs-based technology assessment and develop a mechanism for the exchange of information amongst those working in technology assessment; and
- Third, to facilitate discussions of the recommendations of the 1993 World Development Report pertaining to Health Technology Assessment.

There were over 100 participants from 14 countries.

Part I of the Proceedings, **Overview of Needs-Based Technology Assessment**, presents three key papers which set the Conference on a solid theoretical foundation. Part II, **The Case Studies**, includes six cases from different countries; each case study covers specific aspects of Technology Assessment. Part III, **Opportunities and Challenges for Collaboration**, presents a needs-based technology assessment tool kit (presentation of the concept and key ideas emerging from group discussions), issues related to working in different policy environments, and the synthesis and recommendations for actions.

Much as the concept of "essential drugs" has proven very useful, the concept of "essential methods" for community-based health development would promote orderly, globally consistent and standardized approaches to sound policy decision-making. These essential methods could be regrouped in a "tool kit," a user-friendly, portable, interactive, flexible, electronic "tool box" containing a selection of "best-practices" and tested tools to assist health policymakers and providers in the planning and provision of health care to communities, districts and countries. These essential methods should include: 1) Assessment of "Burden of Disease" and "Needs"; 2) Priority setting for services, education and research (burden of illness, both current situation and future trends; community concern, political circumstances, the social environment and the economic context; health development strategies; cost-effectiveness of interventions); 3) Measuring Cost-Effectiveness; 4) Tools for "Equity" and "Distribution"; 5) Management Tools; 6) Policy Formulation Tools and; 7) Practice Guidelines Incorporating "Evidence-Based Technology Assessment." Furthermore, participants envisaged a network where users could seek advice and expert opinion by activating various nodes on the network.

Conference participants recognized the invaluable contribution of the World Development Report 1993 "Investing in Health" particularly in its approach to the assessment of "burden of disease" through the use of disability adjusted life years (DALYs). Caution was expressed, however, in employing these methods indiscriminantly in the context of developing countries. These methods are relatively cumbersome. They require quantitative information and usually focus on "disease entities" rather than on "health determinants." The absence of good data, or the biases in existing data (e.g., referral bias from health facility-based providers) for important conditions such as violence against women, trauma from road accidents or physical violence); and the near impossibility to quantify the effects of health determinants such as education, sanitation and water, housing, nutrition, status of women and fertility could potentially lead to important miscalculations of the "ranking" of burden of disease or contributing factors. Furthermore, it was noted that the focus on disease entities could lead to a skewing of policy towards health service interventions where alternative health development strategies might have been more cost-effective. Tools addressing alternative "health development" strategies

could be far more cost-effective and should be placed into the kit in a balanced and complimentary fashion.

Such an approach is likely to lead to more cost-effective health development addressing priority community needs and employing the most appropriate technologies.

OPENING REMARKS

Dr Keith Bezanson
President of IDRC

On behalf of IDRC, I would like to extend a warm welcome to all the conference participants.

We, in IDRC, are very pleased to be associated with this conference; it is both important and timely. The World Development Report (World Bank. *World Development Report 1993 — Investing in Health*. Oxford, 1993) made very clear, perhaps more clear than at any other time in recent years, that the link between the burden and the cost of disease on the one side and the availability of investment and action on the other, is extremely imbalanced: the burden of disease lies in countries largely in the South and the investment in technologies and the investment in health systems is largely in the North. One of the unequivocal challenges set out in the World Development Report is to deal with this situation in a constructive, systematic, balanced and responsible way.

We were delighted to be part of the sponsorship of the first reflection following the publication of the World Development Report, the Conference on the Future Partnership for the Acceleration of Health Development, which took place here in Ottawa on 18–20 October, only 1 month ago.

This Conference, Needs-Based Technology Assessment: Exploring Global Interfaces, is another very important follow-up to the World Development Report.

I wish you fruitful deliberations, which I am sure will contribute to our understanding of the role of technology in responding to priority health needs, both in the South and in the North.

OPENING REMARKS

The Honourable Flora MacDonald
Chairperson of the International Development Research Centre

It is my pleasure on behalf of the Board of Governors of IDRC to welcome you to what I know will be a very unique and very important event. A few weeks ago, IDRC had the privilege of hosting the Conference which brought together key international donors to debate the recommendations of the World Development Report on health (World Bank. *World Development Report 1993. Investing in Health*. Oxford, 1993) and I understand that some of the highlights of that Report will be presented later during these Conference sessions.

The World Development Report pointed out that the successes in terms of the improved health status have come about in part because of growing incomes and better education around the globe, and in part because of efforts by Government to expand health services enriched by technological progress. However, what is clear, very clear, is that we need to examine some of these health technologies that have supported this progress in terms of their cost to the system, the availability of and access to less costly alternatives, their relative effectiveness and their appropriateness to the health needs of particular populations.

Considering alternatives may mean that we rethink approaches to prevention, thus diminishing the demand for certain health technologies, or that we try to understand better the full impact of development, evaluation and diffusion of technology. The role that research can play in such considerations, in particular that which is responsive to the health needs of populations or as the Conference pamphlet says, a needs-based approach, should have increasing priority. This Conference will provide the environment to share the lessons about some of these issues not only within the health sector but among sectors which deal with technology and sustainable development. As some of you already know, the UN Commission on Sustainable Development (The World Commission on Environment and Development. *Our Common Future*. Oxford, 1987) has identified the necessity of examining technologies in the context of human health. So, obviously the time is right to share. I am pleased do see such a good representation here among you from some of the IDRC supported projects. I know that their contribution will be very worthwhile.

Given the agenda that has been developed for this Conference, I am sure that your discussions will be both lively and fruitful and that this will be a benefit to all of us. So, I wish you well. Thank you.

INTRODUCTORY REMARKS

Dr Devidas Menon
Canadian Coordinating Office for Health Technology Assessment

The need for health technology assessment has been talked about in Canada for many years now. It has become more pressing in recent years. The creation of the Canadian Coordinating Office for Health Technology Assessment (CCOHTA) was a response to this need. The situation in Canada which necessitated the establishment of CCOHTA was characterized by a set of factors.

- First, recognition for the vital importance of health technology and the major role it plays in the evaluation of our health care system and its cost.
- Second, fast-paced developments in medical research resulting in a constantly increasing quantity of innovations which, in turn, cause heavy pressures on available resources.
- Third, the lack of rationality in the way in which health technology is introduced, disseminated and utilized in Canada and the fundamental problems posed by the existing uncertainty as to its benefits, risks and costs as well as its economical, ethical and social impacts.
- Fourth, technology assessment is a key element in health policy formulation. In Canada, the provision of health services, and therefore technology management, is primarily a provincial responsibility. It can be linked with a complementary intervention by the Federal Government.
- And, finally, the necessity to experiment with new mechanisms to improve the functioning of our health care system and to improve the utility of intergovernmental cooperation.

As a result, in December of 1989, the 13 governments in Canada agreed to jointly establish and fund CCOHTA. CCOHTA became operational in August of 1990. Our principle purpose is to facilitate information exchange, resulting in pooling and coordination of the assessment of technologies.

Health technology assessment clearly is a global activity. Many jurisdictions face similar technology issues and it is imperative that we create networks and linkages. CCOHTA itself has a mandated international role, specifically to establish links with agencies involved in technology research, development and assessment. Our participation in the international arena has slowly but surely increased over the three years that we have been in existence. We continue to be approached regularly by groups and individuals for various countries, to name a few, Israel, Hungary, Cuba, South Africa, and Mexico, seeking advice on and support for developing technology assessment programs. It appears the Canadian model we have developed is an attractive one to many countries.

Two months ago, a new network which is now come to be called the International Network of Agencies for Health Technology Assessment was created by a group of twelve organizations in nine countries. I am proud to say that CCOHTA was selected unanimously to be the organization to serve as the International Network Secretariat. Clearly, our international role will increase. So, it is no surprise that we have an interest in a Conference such as this on exploring global interfaces in Needs-Based Technology Assessment.

I would be particularly interested in hearing during the course of this meeting what participants here perceive Needs-Based Technology Assessment to mean. To people like me who are responsible for running a technology assessment organization, there must not be any technology assessment

undertaken unless the need for it has been identified. The need is always for information but of specific types. The information is needed for decision-making or policy-making. It could be to decide on an acquisition of a new technology by a hospital, to decide on a national screening program, to decide on the appropriate medical intervention in a given situation, to develop a clinical practice guideline, to decide whether a particular treatment should be paid for by an insurance plan, and the list goes on. These are some examples, but they point out that questions on health technologies are asked by people in every sector of health care, including consumers. The assessments that are done therefore depend upon the perspective of who it is that is doing the assessment. The need in other words is perspective-dependent which brings me back to Needs-Based Technology Assessment. My request to you, as participants in this Conference, is to give some thought to what exactly you mean by this and in this, to recognize that there are many diverse groups that require technology assessment information and that need may differ. It would be very useful to have at the end of the 2 days, an explicit statement about this that recognizes the different kinds of needs that exist.

PART I

—

OVERVIEW

OF

NEEDS-BASED TECHNOLOGY ASSESSMENT

KEYNOTE ADDRESS

HEALTH TRANSITION AND NEEDS-BASED TECHNOLOGY ASSESSMENT

Chitr Sitthi-Amorn[1]

Although health has long been considered a nonproductive sector of the society and many think health will improve if the economy improves, there are **additional benefits** that health can add to development independent of economic improvement. Unfortunately, in most instances, health is a market failure, i.e., one cannot privatize health and expect the market to provide good, fair, and equitable services.

Why does health matter? It matters because people care about their health and spend money on it. In addition, good health improves economic performance and productivity. Healthy children do better in education, which is linked with productivity and economy. Finally, if people are healthy, less will be spent on health.

Elements of Health Situations and Their Solutions

Components of health development consist of

i) Analysis of the changing contexts of health needs;
ii) The response to the needs via policy, program planning, improved performance of health services, capacity strengthening, and information and research for decision;
iii) The promotion of appropriate consumer's demand and responsibility through monitoring variation of use, demand, and practice with implication for equity to access and coverage; and
iv) The assessment of outcomes.

Policy makers and providers of health services must be accountable to the public. The people have their right to be healthy but they must also be responsible for their behaviour. Therefore, all stakeholders in health must be involved in need- and knowledge-based health systems, providing and generating information for decisions and actions. This is the case both for developed and developing countries.

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[1] Chitr Sitthi-Amorn, MD, MSc, PhD, is a Professor of Clinical Epidemiology at the Faculty of Medicine at Chulalongkorn University, Bangkok, Thailand, and Dean of the College of Public Health. He is a member of the International Clinical Epidemiology Network (INCLEN) and a current Council member of the International Epidemiological Association. Among his numerous international activities, and of particular interest to this conference, Dr Sitthi-Amorn has contributed to the Commission on Health Research for Development which published *Health Research: Essential Link to Equity in Development*. He is also a member of the Planning and Advisory Committee, University Partnership Project in Essential Health Research. Recent publications include "Setting Research Priorities at the Country Level" (*Bridge*, 12, 1–2, 1993) and "Biases in Medical Research" (*The Lancet*, in press).

Health Needs

Indicators of Health Needs

Mortality has long been used as the main indicator of health. Mortality is expressed in many forms such as life expectancy, infant mortality, and mortality from specific diseases or in specific subgroups of the population. The potential years of life lost (PYLL) method has been used as a common indicator of mortality for comparison across diseases and population subgroups (NEB 1987; Anon. 1989).

Due to a reduction in mortality and increase in morbidity, mortality-related indicators are not sensitive enough reflect the true burden of illness. This led to the development of many indicators representing both mortality and morbidity, such as the healthy days of life lost (HDLL) (HAPT 1981), the quality adjusted life years gained (QALYs) (Torrance 1986), and the disability adjusted life years (DALYs) (World Bank 1993). DALYs is the most recent indicator used in the 1993 World Development Report. These indicators were based on certain assumptions. While they are useful for international comparison, the assumptions might not work consistently from culture to culture, particularly those dealing with giving values to life and discounting.

Insufficient effort has been geared towards inclusion of people's perception in the measurement of needs.

Lack of data for use to estimate health needs is a deficiency particularly in developing countries. Many times, utilization data were used as estimates of need. This is not a good estimate because people who use the services may not need them and vice-versa (Wadswarth et al. 1971; Sitti-Amorn et al. 1989). Supply-induced demand for services is a common occurrence. Utilization does not tell us what volume of service is optimal, particularly if non-cost effective services are given. It is important to know what volume of health services should be consumed, to what extent the volume actually consumed reflected what should be consumed and to what extent the service actually consumed do not coincide with what should be consumed. Without appropriate data, decision makers might focus on provisions without meeting needs. A need-based system is difficult but it is essential to establish one so that people will be more responsible for what they do.

Better health is not only freedom from illness (D'Souza 1978; Cambell et al. 1979). It requires health promotion and disease prevention which involve intersectoral issues with implications for physical, mental, social, and spiritual well-being. How to incorporate mental, social, and spiritual elements into the measurement of health is a challenge.

The Current Health Situation

A High Avoidable Burden of Illness

Currently, too many deaths and much suffering result from the avoidable burden of illnesses. In 1990, there was a loss of 1.36 billion DALYs worldwide. Of this loss, two-thirds (893 million DALYs) were from premature death and one-third (468 million DALYs) were from disability. Communicable diseases accounted for 46% (624 million DALYs), noncommunicable diseases for 42% (575 million DALYs), while injuries for 12% (162 million DALYs) (World Bank 1993).

Inequity

Health Status Inequity: There has been a clear inequity with respect to health status. Avoidable deaths and sufferings affect the world population differently. The DALYs from communicable disease accounted for less than 10% among the industrialized countries and more than 71% in sub-Saharan Africa.

Variations were also observed between the rich and the poor. In Thailand in 1987, the infant mortality differed two-fold between regions. In the Northeast, a great deal of infant mortality is not reported. The difference might be greater than what is shown in the public data (IPSR 1988; HSD 1988; Hsiao 1993; Pavabuta 1993).

Inequity of Finance: Even though there are six major health insurance schemes, Thailand has not insured 49% of its people. There is no organized financing for half of the people. In addition, the spending by the scheme is uneven. For the civil service, a person got 916 baht in 1992, compared to only 65 baht for the Health Card Program. The benefit coverage varies greatly. Therefore, the poor or the near poor do not have any organized financing arrangements. Even for those who have coverage, it is often inadequate (Hsiao 1993; Mills 1991; Mongkolsmai et al. 1993; Mongkolsmai 1993; Kranandana 1993; Nittayaramphong et al. 1993; Pannarunothai and Tangcharoensathien 1993; Rojvanit 1993; Tangcharoensathien et al. 1993; Wilbulpolprasert 1991).

Inequity of Service Delivery: Despite the poor health status of the underprivileged, there has been an uneven distribution of resources. In Bangkok, there is one physician for 958 people. There is a 10-fold difference in the Northeast, where there is one physician per 10,900 people. Similar situations exist for hospital beds. There is a three-fold difference is hospital beds/person in Bangkok compared to the Northeast (RHD 1991; Hsiao 1993).

We need to use the variations of health needs as a basis to reduce inequity through decisions on regulation, efficient finance, and service delivery.

Trends and Transitions

The current health needs is useful for dealing with problems of the present and the past. We need information on trends of health and diseases to design actions to cope with problems of the present and future.

Demographic Trends

The pattern of population structures has changed worldwide. The population pyramid has a narrower base. The elderly are becoming more significant. Fertility and mortality declines go hand in hand (Prachuabmoh Ruffolo 1993).

Epidemiologic Trends

Epidemiological changes are fundamental to health reform. The trend includes a substantial increase in life expectancy worldwide, and a more rapid decline in mortality from communicable diseases compared to the noncommunicable diseases. Mortality among the young has fallen much faster than

among the old. In the last 40 years, mortality has fallen more than in all of human history. From 1950–1990, in less developed countries, the life expectancy has increased from 40 to 63 years. The risk of dying by age 5 has fallen from 29% to 11%. The greatest effect has been in communicable diseases and in the diseases of the very young. We eradicated smallpox, eliminated polio in the Americas, and we are working to eliminate polio in Asia. We also made progress in the health of adults.

The rate of change differed in different regions. Mortality before the age of 5 is still a problem in sub-Saharan Africa and the Middle East Crescent. In South-East Asia, the probability of dying by age 5 reduced by 50%. The median age of death also shows a comparable trend.

The epidemiological transition is complex:
i) overlap between pre- and post-transition situations;
ii) resurgence of diseases that have already been controlled;
iii) a resistance to control such as with malaria; and
iv) the increasing disparity between population subgroups: rural (communicable disease and malnutrition) versus urban (noncommunicable disease and injury).

Morbidity has contributed a greater share to the burden of illness: problems of infancy and childhood involve the diarrhoea-pneumonia-malnutrition triad, the so-called diseases of poverty. There is a need for diligent control.

- First, there is a need for the promotion of sanitation and hygiene. We still have a major problem with intestinal parasites that can produce diarrhoea and malnutrition. Ascaris and hookworm infestations are still important for Thailand and other developing countries.
- Second, food and nutrition programs are needed in rural areas and for the poor in Bangkok.
- Third, there are still occurrences of many vaccine-preventable diseases such as measles and hepatitis; the prevention of these conditions require a relatively high investment.
- Finally, vector-control programs need diligent attention. Malaria, dengue haemorrhagic fever, and Japanese encephalitis are still prevalent. Vaccines are being developed for these vector-borne diseases but, until we have good vaccines, control of vectors should be our prime focus. The outcomes of all of these diseases lead to long-term disabilities for our children. If the children survive these, they will be stunted, or become disabled throughout their lives (Pavabuta 1993; World Bank 1993).

The health problems of adults can be described as being in two main groups: diseases of affluence and social pathology. Diseases of affluence include: obesity, diabetes, and hypertension; cardiovascular and cerebrovascular diseases; cancer; and reproduction-related diseases (NCI [1981]; DHS [1988]; Department of Labour [1989]; NEB 1990a; Pavabuta 1993). Diseases related to social pathology are: injuries, violence, and crime; drug and alcohol abuse; occupational health problems; environmental pollution; and sexually-transmitted diseases including AIDS (Anon. 1993). Tuberculosis will continue to be a major problem. The rise of AIDS and drug resistance is bound to magnify the problem of tuberculosis. Malaria is one of the diseases that does not recognize national boundaries and, in some areas, is associated with migration and occupation (e.g., gem mining) (Division of Epidemiology [1991]). Drug-resistant malaria strains are prevalent along the border of Myanmar, Cambodia, Laos, Vietnam, and South China. The number of people in the infection zone is estimated at 300 millions with one-fifth being infected.

The campaign against smoking has not been satisfactorily addressed, except for some effort in Singapore, Thailand, and Papua New Guinea. There is a rising trend of cigarette smoking is Asia compared to a lowering trend in the US, Canada, and Australia. In China alone, the consumption of cigarettes rose from 500 billion in 1978 to 1700 billion in 1992. If the trend persists, 2 million tobacco related deaths per year are projected for China (World Bank 1993). There is a long delay of lung cancer in US males with the increase in smoking in 1945. The main control strategies are not those of health care services but those of education, information, health promotion, and taxation. Smoking-related deaths in developing countries will rise from 1.7 million in 1990 to 4.5 million annually by 2015.

Health problems of old age are posing a greater burden to society. Aging will quadruple by 2030 with all its attendant ill health. The aged proceed along a continuum from healthy to unhealthy life. The objectives should be to prolong the healthy part of their lives and to enable them to cope with the increasingly unhealthy part of their lives (degenerative diseases, loss of mobility and perceptual acuity, mental problems, etc.). In addition, their care will require investments in housing and recreation. Medical approaches involve prevention, care, and cost control. With an increasingly higher proportion of elderly, health care costs will rise dramatically (Prachuabmoh Ruffolo 1993).

The newly industrialized countries (NICs) are seeing a rapid increase in occupational injuries and diseases. The growing urbanization and the environmental threat will present major health challenges (HAPT 1981; Chunharas et al. 1990; Ngarmwuthiporn 1992).

The epidemiological transition is also associated with a change in the social meaning of diseases: illness episodes are not only acute events but can be chronic and thus more likely to create stigmatization. The burden of illnesses includes not only prevalence and incidence, but also perception of people about their needs.

Trends in the Social Demand for the Right to Health

With education and unprecedented effectiveness of media, the people or consumers of health care will have more knowledge about their right to health care and can exert certain claims (Porapakkham 1987). How can we promote positive changes based upon need and cost-effective interventions reflecting the collective will of the society? This will be a challenge.

Technology Trends

The social demand for the right and the development of more sophisticated and more expensive technology can increase health care costs drastically particularly if there is no consciousness of cost-effectiveness. Efforts must also be made to raise the responsibilities of the people which should come with their rights to reduce inequity and decrease polarization between subgroups. The disadvantaged would otherwise lose in the competition for resources (NEB 1990b; Chaudhury Roy 1993).

The Responses to the Needs

With the changes in health problems, there must be a corresponding change in health system response to reduce the gap between what is attainable and what is being attained. The policy, programs, and organization arrangements for and financing of health care delivery must respond to need and achieve

equity, efficiency, and quality of care. Health transition is a continuous process. The response must be dynamic and specific to the transition situation.

The Reasons and Objective of Responses

There are many reasons behind the government response to health needs:

First, the health market is a failure. If the market works perfectly, there is no need for government intervention. The market fails in health because the patients are ignorant and desperate and doctors not only sell services but also generate the demand for them. The health insurance market fails from moral hazard and adverse selection. The health care market fails as health is a public good. There is a high cost associated with giving relevant information to consumers as well as making the wrong choices. This suggests that the demand for health services is unlike the demand for other goods because society value people's health independently from what they are willing to pay for it. Hence, looking at health like any other commodity or using rules for public finance theory to subsidize it optimally is inappropriate.

Second is the need to improve equity while reducing cost. Cost containment is working to some extent in Canada and Western Europe. The economic crisis led to reform in Latin America. Scarcity of resources has challenged Asian and African countries.

The **third** reason is the right of the individual as a citizen of a society to have access to certain basic essential health services. The disabled and the disadvantaged should have equal opportunity to participate in the society; a functioning civil society requires participation by everyone. The government acts to ensure equity, efficiency, and quality of services. Individual preferences must be overridden by the government, e.g., drug abuse, the compulsory wearing of seatbelts and compulsory pension scheme.

Fourth, governments intervene because of concern for future generations, e.g., preventing global warming, conserving rain forests, etc.

Finally, political views and social values led to changes in the former Soviet Union and Eastern Europe while belief in the market mechanism over state intervention has dictated the American system.

Health development consists of defining the targets and the means to reach them. Primary Health Care, Health For All, and Child Survival, health care financing, decentralization, and privatization are means to achieve targets. The most recent World Bank Development Report represents a major effort to quantify the global burden of illnesses and the cost-effectiveness of health interventions. These are also means to reach the targets.

The target of health care responses include:
- Improving aggregate health status;
- Improving equity and reducing poverty; and
- Improving individual quality of life.

These are the three poles. Most health care aims to include some of the three objectives. Each goal may have some elements which contradict with other goals in terms of the actions required.

For **improvement of health status,** the Ministry has to adopt technology and programs which yield the greatest impact in health status. The government can use the analysis of burden of disease and cost-effectiveness to set priorities and choose interventions that will yield the most good to the public, i.e., maximize cost-effectiveness interventions to improve health status. An example of pure public goods is aerial spraying for mosquitoes. If the private sector can provide the service, the government should let them do so. For services which the private sector can give, the government has to estimate the capacity of the private sector and provide service only to areas where the private providers cannot deliver it. This requires data on demand for public and private services as well as the efficacy of government and nongovernment services.

For **improvement of equity and reducing poverty**, the most effective way is to target essential health services to the poor alone. The poor carry a higher burden of illness and they have the least capacity to purchase health services. Spending on general health for all usually does not work because of the leaking of benefits to the non-poor. Only cost-effective services should be given.

For **improvement of individual quality of life**, the Ministry of Health invests in things that do not improve health per se but that will improve other things such as productivity and self sufficiency. For example, the ability to provide service with shorter time or in the evening will allow people to come for government service and free their time to work and earn their living, i.e., the government gives services which cannot be provided in the market, are cost effective, and improve the quality of life and not just health.

Nature of Response

Policy Response

A Total System Response: Response should be made from the viewpoint of a total system and not only some of its components. For example, Primary Health Care is a movement leading to a consensus about financing and delivering of health care. But Primary Health Care is only a component of response system. The health system includes

- The units providing health services at various levels;
- The consumers of health service; and
- The interrelation between the providers and the consumers.

The whole health system is different from the sum of its parts because of the tensions between interest groups within the system and its relations with its external environment. Therefore, the health system is complex.

The Components of Policy Response: The policy of the government should address at least four issues: i.e., the target groups, the regulations and their enforcement, financing, and the delivery of services.

Target Groups: If equity is what the government wants, then the policy must define disadvantaged groups most in need of health care who do not have the ability nor the incentives to

pay for it. The basic care must be of high quality and cost-effective. The package must include interventions, both preventive and promotive, that can cope with the major disease burden. As citizens of the country, the disadvantaged groups are entitled to receive the services regardless of their ability and willingness to pay for the services.

Regulations: The aim of policy response is to promote a positive interaction between providers and consumers of services. Such interactions are complex because provider and consumer do not act alone but belong to their respective organizations. Moreover, their relationships are not direct but mediated by actors such as the insurance company. Regulations are needed to ensure a fair and productive interaction.

Financing: The aim of policy response is to ensure adequate financing of high quality, cost-effective, basic health services to the target groups. It involves the generation of fund, payment schemes, the population covered, benefits, and monitoring of the performance.

Delivery of Services: The aim of policy is to ensure quality of the cost-effective services provided. The quality of cost-effectiveness packages have to be addressed not only in the professional sector (public and private), but also in the folk sector and the popular sector.

Policy Implementation and Evaluation: This include the development of strategic program and operational plans according to the above policies. Designs of essential information of resources for implementation of cost-effective packages, information on quality of health-system performance, utilization, and change in health outcome will be needed.

Strategic Program Planning

The aim of strategic program planning is to maximize allocative efficiency of resources, such as the use of the national health expenditure account to help diagnose allocative inefficiency.

Defining Allocative Inefficiency: In Thailand, the National Health Expenditure Account adjusted for 1992 prices showed that the health expenditure was 4.5% GDP in 1982 compared to 5.9% in 1992 (Hsiao 1993). Despite a very rapid economic development, the health sector has grown faster than the economic sector. The health expenditures almost tripled during the period (46,490 baht versus 148,455 baht). However, the government expenditure has remained fairly constant or increased slightly. Most of the money spent comes from the private household expenditures. Therefore, Thailand is spending more on health; the spending largely came from the individuals; and the rate of increase is faster than the 6% enviable increase in income. Despite the highest spending of Thailand's GDP on health care, the country does have relatively poorer life expectancy and infant mortality compared to Malaysia which spent less of its GDP on health (3.5% of GDP). Therefore, the money may not be spent efficiently under the present structure of health care in Thailand. Part of the inefficiency may be due to the organizational inefficiency. This partly depends on the integration of private and public sectors. The private sector is growing very rapidly and is drawing away health personnel from the public sector because of a much higher compensation. The private sector is duplicating new and expensive technologies. So, there are duplications and competition between public and private sector because of the different compensation system. To what extent this results in greater or less efficiency in the delivery of health services remains to be determined.

The allocative efficiency may be estimated by calculating the production function (health output versus expenditure). The databases required are

- Regional burden of illnesses such as DALYs;
- Cost-effectiveness estimate (marginal cost versus increase output); and
- Health resources in terms of the available human and physical infrastructure.

The production function is used to optimize health gain at any budget level (allocative efficiency). From the optimal health gain, we can find the gap between reality and what should be optimal. The primary sources of the gap is the lack of adequate information on whether the resources are targeted towards delivery of the most cost-effective intervention to the priority burden of illnesses and inappropriate institutional management or strategy.

Cost-Effectiveness Interventions for Significant Health Problems (Evans 1994; Jamison 1994): The Oregon Health Service Commission and the World Bank report introduced an approach to health development based on cost-effectiveness and allocative efficiency (HSC 1991; World Bank 1993). Although most cost-effective interventions are preventive and promotive, the analysis showed that some of the most cost-effective interventions can be curative while some cost-ineffective interventions are preventive or public health programs. Cost-effective interventions must be packaged because the effectiveness of some intervention may depend on the availability of other interventions. Examples of a public health package include EPI, expanded EPI, micro-nutrients, school health, family planning, nutrition, education, and AIDS prevention program. Clinical packages include short course chemotherapy for tuberculosis, management of a sick child, prenatal and delivery care, treatment of STDs, and limited care for emergency operations, e.g., appendectomy, minor trauma, and broken bones. The necessary basic service such as sanitation and water supply are also crucial. Essential health intervention packages include an appropriate balance between preventive and promotive strategies versus treatment and rehabilitation. Other development measures in fulfilment of nonhealth needs can also lead to health improvement. For example, the role of women on health and life prospects of their children is crucial. We then should find ways for them to be healthy: nutrition, education, understanding gender role, and practices. How would social and other nonhealth interventions affect the vicious cycle of poverty, ill-health, and the lack of social development? This general area will remain active for research in years to come.

The use of the cost-effectiveness model together with the global burden of illness estimates is useful but has to be done with care since the model assumes that the individuals have an additive, discounted, multi-period utility function for purposes of generating health care demand and that the utility of extra life is equal to the utility of consumption within that period of time. The utility of function is then weighted by the quality of life or disability weight. Actually, there may be other reasons for extending lifespan than the opportunity it gives to consume more. People may want to extend their life for many reasons, e.g., seeing their grandchildren grow up or finish education. These judgements are not based on valuing additional years of health for life in terms of extra consumption but rather what they enable a person to do or be. The second implication of the cost-effectiveness model is that it implies a lower valuation of extra years lived by those with disabilities or people in the higher age groups. Extending the life of a disadvantaged person who is wheelchair bound counts for less than extending the life of enabled body person. This lower valuation may be contradictory to justice that priority should be given to the disadvantage or least well off.

Organization Aspects of Health System: Maximization of allocative efficiency involves the whole health system: i.e., the public health facilities, the private sectors, folk sectors, the popular sector, the

communities, workplace, families, and individuals. At the moment, a major part of allocative inefficiency depends on the integration of private and public sectors (Hsiao 1993). The private sector is growing very rapidly and is drawing away health personnel from the public sector because of a much higher compensation. The private sector is duplicating new and expensive technologies. So, there is duplication and competition between public and private sector because of the different compensation system. To what extent does this result in greater or less efficiency in the delivery of health services? Privatization will not facilitate universal access to health care. It must be brought in to free up resources for those who can pay for the services and freeing resources for the basic cost-effective quality services for those who could not pay. More active work and more cross-cultural comparisons are needed in this respect, particularly where more privatization is coming up in many countries, including Eastern Europe. How far these trends will alter the basic relationship between patients and health care professionals resulting in an impact on health and the quality of service is at issue.

Since the major activities are still in the public sector, particularly in the Ministry of Public Health, the role of the Ministry must be redefined in the light of this new trust for essential cost-effective packages and the organization structure modified accordingly.

Financing Aspect of Health System: In the World Development Report 1993 (WDR), the data showed that the health system is financed by public and private input and as income rises spending on health does increase. The world spends $1.7 trillion annually on health, less than 10% is spent in less developing countries (World Bank 1993). About half is spent by government and half by private. At the moment, the spending may not be efficient. Poor spending, internal inefficiency (e.g., spending money on salary in health station with no drugs), inequity, and cost escalation cause allocative inefficiencies. When the GDP increases, the amount spent on health also increases, both in the public and household sector.

Since the private market will not provide public goods and goods with substantial positive externalities, the government should provide the minimum basic essential cost-effective package or at least pay for the package. However, a public good should be financed because it is cost-effective and not simply because it is public. Choosing to finance packages in decreasing order of cost-effectiveness is the way to maximize the health gain. However, the interventions must be "packaged" to exploit joint costs and synergies, particularly if a small number of interventions can deal with a large share of the disease burden. In low income countries, the current annual spending is US $14 per capita of which US $6 is public. In middle-income countries, the current spending is US $113 per capita of which US $60 is from public. The minimum package defined in the WDR cost US $12 per capita in low income countries, and US $22 per capita in middle-income countries (the differences in due to the different wages in the two systems). Therefore, most countries are capable of caring for the minimum essential package.

There is little justification for public financing outside the package. We need to expand the insurance scheme for the purpose. Insurance coverage is crucial for more expensive interventions because people can pay out-of-pocket for cheaper services. The government need to intervene to ensure that freedom of choice in any insurance scheme does not contradict with cost-effectiveness principle within a given coverage.

Also, the coverage is not inferior to an uninsured person paying out-of-pocket. Third-party insurance may not be cost-effective if

- Coverage does not include conditions with cost-effective interventions;
- There is moral hazard and adverse selection;
- There is an urge for maximization of health gain at the expense of third-party payment;
- The patients are ignorant and desperate; and
- A demand is created for services that are not cost-effective.

By getting people's agreement to coverage for a set of interventions, insurance can be useful. Second party insurance particularly by the physician such as in Health Maintenance Organisations (HMOs) showed that it could control cost better without sacrificing health gains (Anon. n.d.). Government insurance can make a difference if it provides interventions which are cost-effective, cover the right target, waste no resources on delivery, and provide quality service so that people do not spend money elsewhere. Ideally greater public control of expenditure promotes value for money if they have good criteria for what to finance, who to finance. Cost-effectiveness should be one criteria. Governments should intervene when private markets fail.

Individual and collective behaviour in seeking and paying for health care must be consistent with cost-effectiveness. Unfortunately, most individuals are not well informed about the probabilities of health outcomes given a set of interventions. Uncertainty about the outcome make it difficult to behave cost-effectively. There is no evidence that charging "user fees" will "rationalize" demand. The RAND experiments found that higher prices reduce demand but do not make the interventions more cost-effective.

Monitoring of practice variation and use variations can be used to detect supply-induced demand as well as inappropriate utilization. Practice and use variations depend on which scheme health care providers are paid. In the USA, the rate of Caesarian section has been much higher than in England with no significant differences in infant and maternal outcomes. Therefore, it is not always true that more services lead to more coverage of those who are in need. On the other hand, the hospital might not give standard cost-effective services if they are costly if the capitation scheme is in place. The people who are under coverage of health care financing schemes might over- or under- utilize services depending on their perception of the right to get the services and the quality of the coverage under the scheme.

We have to associate population denominators with the numerators, particularly where the people in a catchment area can use many service facilities for the same health condition. In this general area, the topics of national salience are those of access, equity, and coverage. Access, equity, and coverage must be examined across several groups distributed by geography, income, age, sex, and occupation among others.

The steps for maximization of allocative efficiency include: defining the important burden of illness, searching for cost-effectiveness interventions (or intervention packages), looking at resources (structure/manpower), calculating the optimal production function and subsequent allocative inefficiency, determining the causes of such inefficiency, and finally designing new alternatives to reduce inefficiency.

Each of the various alternative models have their strengths and weaknesses. Each of them might be the most appropriate for meeting the needs of health service, depending on the situation. However, there are some common targets of all models of financing. These are equity, efficiency, stability, sustainability, administrative feasibility, and health impact as well as impacts on socioeconomic and

political system of a society. With the possible variations of the organization of resources with respect to the structures and financing of services, alternative models have to be developed, tested, and compared.

Organizational Performance

Organizational performance includes technical efficiency and quality. Both result from critical appraisal and optimal application of existing knowledge and from institutional management (incentives, reimbursement mechanisms, regulation, etc).

With respect to technical efficiency, the cost for in-patient admissions vary between 1,000 and 1,500 baht per admission to more than 3,000 baht per admission, i.e., there is a two- to three-fold difference. If we are treating similar diseases, why should there be such cost differences (RHD 1991; Hsiao 1993).

With respect to the optimal application of existing knowledge, a reason for variation is the amount spent on drugs. Japan spent US$ 412/person/year, while Mozambique only spent 2US$. About 60% of Thailand health expenditures are on drugs (World Bank 1993). People go to pharmacists and get their drug directly or they receive drugs from physicians and from the hospital (Hsiao 1993). Is the safety, efficacy, and efficiency of drugs being assured for the people? We have to think of how to implement the concept of essential drugs and revise essential drug lists using cost-effectiveness principles.

For optimal application of knowledge and management, we need to use the concept of Total Quality Management (TQM) and setting standards (Sitthi-Amorn 1989; Berwick et al. 1990). When we spend money and organize the delivery of services, we have to ensure the best quality within the existing resources and organizational arrangement. Right now, Thailand does not have adequate monitoring of quality of services in the hospital. Thailand is growing rapidly and is a country in transition. The standard of service and the regulations are not keeping up with the economic trend. We must set up adequate standards for all types of providers (hospitals, clinics, and pharmacies).

The field of clinical epidemiology, decision analysis, and clinical economics has made a great contribution for assessing performance and increasing technical efficiency. It is not only the expensive technologies that are analyzed. The inexpensive, moderately priced, every-day practices must be evaluated, including preventive activity, immunization programs, and screening for chronic diseases for which early treatments are available.

Health providers must have skills to evaluate their own practices and be more accountable for their decisions. Research should empower these practitioners to ask questions about health care which leads not only to the heightened expectation and demand for quality, accessibility at reasonable cost, but also creates an environment in which health-care research has reason to grow. The emphasis in increasing health system performance must shift from a traditional study of inputs (e.g., personnel, facilities, procedures, appliances, and drugs) to the evaluation of health-care outputs.

In addition to clinical epidemiology, the creation of competition through privatization is a measure to deal with the management component of institutional technical inefficiency.

Capacity Strengthening (Frenk 1992; Aitken 1993; CPH 1993)

The possible personnel requirement is also an important issue. What are the appropriate proportion, types, qualifications, and distribution of personnel required to carry out cost-effective packages based on needs? An analytical framework for needs-based human resource development has been developed. Essentially, the implication of the basic essential package on human resources must be determined in terms of the role and function required, the capacity of personnel required to fulfil those roles and functions, and how to acquire those personnel. How far should the "unqualified" personnel be trained to support the system? What is the role of informal care and self care? If we can use more of the so-called "unqualified" personnel, family support, and self care to deliver similar services, it would affect the resources needed to deliver the essential packages. Ideally, plans for new capacity strengthening must be based on skills and functions which are different but complementary and add to the functions performed by the existing working personnel. Within this context, we need to identify new and complementary functions before we can develop our programs.

Since variations exist with respect to the health needs in the locality, public health personnel should be able to identify local problems distributed among various populations. They must be able to consider intervention packages which are cost-effective and can be delivered with high quality at reasonable cost.

At a higher level of training, some local policy makers, administrators, and health care providers must be able to analyze factors influencing equity, efficiency, and quality of basic essential cost-effective health care. These include the political economy, social development, and laws and law enforcement. Social development has introduced behavioral changes in many respects. Economic development affects people's ability and willingness to pay for their health care, while the people have become aware of their rights and have begun to place various claims on the health system. Thus, public administration will be an important consideration in the government sector while business administration will be in the private sector. Management, marketing, and planning must be among our considerations.

In the preparation of education for such needs, the key players are not only those in the Ministry of Public Health but also in other sectors such as the for-profit private sectors, international organizations, NGOs, and health-related businesses such as insurance companies. We may need to define educational objectives in terms of the behavioral capacities or skills which our graduates should have to work in the different organizations influencing health through needs-based cost-effective approach. Some examples of the skills include the technical skills, critical appraisal, a broad vision, leadership, planning and management, teaching, research, and the capacity to undertake continuing education. It should be noted that technical skills and skills for professional growth are different; those who can perform certain work may not necessarily be those who can also increase their professional capacities.

We must define educational objectives in terms of knowledge, attitudes, and skills. Concerning knowledge, students will need to acquire both content and abilities. Content refers to knowledge or information while ability refers to the processing needed to transform this information into decisions. Such abilities include those to acquire and evaluate information critically from both primary and secondary sources. Skills refer not only to those for information processing and decision making, but also those for acting upon decisions related to interpersonal communication, group work, community

relations, and other professional skills. Attitudes refer to the affective qualities that are required for the students' work concerning associated ethical, philosophical, and legal issues.

Knowledge and Information Generation and Application (Aitken 1993)

The key to information and research is to analyze health burden and setting priorities for health actions. Research is needed on appropriate information systems, surveillance, rapid assessment procedures, health financing, health manpower, facilities and health-service utilization, drug use, and health-care cost within the cultural context of the society. Most developing countries do not have information and research data. The data available usually come from those who have access to health care. The underprivileged do not get represented. This will need some kind of "rapid assessment" technique.

For diseases where cost-effective services are available, the challenge is to make the services acceptable, accessible, and affordable. Multidisciplinary research into how health systems in these countries can work effectively should be established. An important strategy is community participation. For diseases where cost-effective interventions are not yet available, more strategic research will have to be done, such as in areas of global microbiological threat.

Strengthening of Appropriate Demand for Services

The people can choose from the various sources of care: the professional, popular, or folk sector. In many instances, there are questions whether professional care offer better benefits. For example, it is questionable whether diazepam given by professionals to relieve sorrow of the hill tribes is better when compared with worshipping trees. Fortune tellers have been an important component of psychotherapy in many Asian societies (CPH 1993).

Strengthening of community organization is important for sustainable development. A broader perspective can be achieved by involving the community who harbour needs. Many times, emphasizing health intervention alone is inadequate, since health improves as income grows, medical technology advances and knowledge spreads among the consumers and providers. The interaction between the three is more dramatic than the effect of one factor alone.

The overall objective of strengthening the community is to make people able to participate in the identification of their own problems and help identify interventions and responsibilities of different actors in solving the problems. Several key factors were thought to be essential.

- First, the most dedicated health workers including government officials, community workers, and the people must be identified.
- Second, participation must be based on the collective identification of problems, defining alternatives, delegations of duties, responsibility to carry out the duties, evaluation, and reaping of benefit together.
- Third, a close interaction must be in place between local community with the government officials, the administrators, and the implementors in development of plans.
- Fourth, consistent education, supervision, monitoring, and feedback both for key individuals in the community (e.g., women), the community organization, and government officials particularly during the development, implementation, and evaluation of the strategic and operational plans.

- Finally, whenever possible, the academic institutions should be involved in giving technical support and have their experiences implanted in public health life.

In addition to strengthening the community, other roles of the government include finding ways to increase income for the poor, improve education for women and girls who will be important in taking care of child health, ensure a universal access to the minimum package of universal public health and clinical services, promote diversity and competition among providers, increase the efficiency of government spending on health, and regulate appropriately financing outside of government.

Assessment of Health Outcomes

Assessment of health outcomes is important to know whether the response to health needs produces any significant improvement in health status, equity, and quality of life (Evans 1994).

As for assessment of health status, while morbidity and mortality are important outcomes, they do not take into account the impact of illnesses and death on the individuals or their families, as well as the economic and social well being of the society resulting from deaths and sicknesses. The death of a child in a family can be very different from the death of the mother. In many societies, such as those in Africa, the death of a mother might lead to the death of other children and disintegration of the whole family. Death of young adults have more impact on the production of the society than death of the incapacitated elderly. In the calculation of DALYs, social preferences were incorporated into health status, emphasizing young adulthood because the family has invested a lot more in the upbringing and education of grown-up children than in very young children. A set of relative values is used for adjustment of disability and healthy life. If someone is healthy until age 80 and then dies, he will lose no DALYs. What we do not know is how well this model can be applied across cultures. This needs systematic study.

An exciting feature of health care outcome is the measure of functional health status and well being. Much time has been spent in measuring the inputs to health systems and not the outcome. More people are doing research on what it means to have a certain physical limitation. More research on quantitative measures of well being is needed. Methods must be developed to measure these not only in individuals but also in the community.

Impact of Health Improvements on the Society and the Economy: In this general area are issues about the possible effect of health actions on the political and the socio-economic conditions of the country; eg. the competitiveness of national industry in foreign markets both in quality and price as well as the social harmony both within countries and internationally.

Looking Ahead

Equity, efficiency, and quality of interventions based on alleviation of health needs should guide reform. Countries should plan on a long-term goal, an intermediate goal, and step-by-step measures. No nations can carry out their reform in 5 years. We need at least 10 years. We need technical people. We need infrastructure. We need data and relevant information.

Concerning affordability, we have three sources of funds. First, reallocation of the existing funds for more effective use is needed, e.g., allocate to a more cost-effective technology and allocate existing funds to the poor or the near poor. This is possible for most countries including Thailand with its Ministry of Health budget of 39,000 million baht. Second, additional funds can be generated either through direct or indirect taxes, such as taxing alcohol and cigarettes. Third is to improve technical efficiency through research and management such as giving the right incentives or organizing the services correctly to save money.

Finally, there are questions of feasibility. Three aspects must be considered.

First, the technical feasibility is at issue. The *1993 World Development Report* is a major thought-provoking challenge, emphasizing the need for sound research and analysis. The report illustrates the possible use of new tools, provides the possibility to apply the tools, and opens new challenges to improve the tools. The economic tools are available but we question how applicable they are to many developing country situations, not only in terms of analysis but also experiments in countries. Thus, many tools, such as the global burden of disease, cost-effectiveness analysis for priority ranking, technology assessment, analysis of finance, and provision of health care, must be applied, tested, and improved. In addition, there are inadequate linkages between the tools: i.e. linking the burden of diseases with cost-effectiveness analysis, and translating them to incentives for providers to carry on their tasks to reduce health needs. Can cost-effectiveness analysis of the burden of illnesses create a clinic that everyone would want to go to? This means that all disciplines have to broaden their perspective to allow linkages to be developed. We also need to develop communication tools which will link analysis to the people to improve the ways and incentives which people can deal with their needs and demands.

Second is the feasibility for organization changes. This includes the change in the role of different ministries; changing the roles of public and the private sectors. The World Bank report does allude to the need for political commitments and organizational changes. This is country-specific and therefore needs to be resolved locally.

Third is the management feasibility. Is it feasible for the country to manage the system? Do we have the people? Do we have the Management Information System? What information do we have to collect?

We need to work together and follow-up, enhance, sustain, and increase our focus on the WDR. Prime-movers to lead the way must be identified. Capacity strengthening is needed to use analytical thinking. Immediate and long-term strategy for this is important. With this there is a need for institution development and support, especially for institutions in developing countries. An international forum to create objective exchanges will be important so that opportunities will be created for activists, scholars, officials, and practitioners involved to exchange experiences in a horizontal way with people and which is not tied to specific donor agenda or projects. Finally, the documentation of successful results is needed: i.e., it will be important to document where health development has made a difference in the health sector.

The amount of donor aid represented 10% of health expenditures for sub-Saharan Africa and 1.4% in Southeast Asia. This is a small amount of money but crucial; and if it is well spent it can change things. The donors can promote more efficient intersectoral actions through repackaging resources, priority, and infrastructural linkages; and they can promote reorientation of the infrastructure to meet

the goals which will influence management, direction, and accountability. Some form of debate must be created within countries to study the package of services and arrive at a consensus to accept, reject, or modify the package. Even if we do not have an answer now, we should propose a process so that the desired target will be achieved.

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TECHNOLOGY ASSESSMENT AND THE WORLD DEVELOPMENT REPORT 1993

Helen Saxenian[1]

It is a great pleasure for me to be here with you this morning to discuss the 1993 *World Development Report, Investing in Health*. The Report examines one of the central issues of our times: how to design and implement public policies to improve the health of the world's five billion people, and especially the health of the more than one billion living in poverty. My presentation will not be a broad overview of the World Development Report. I encourage you to browse through the Report to get a fuller sense of the analysis and conclusions, particularly on health policy reform. This presentation will focus on the topic of technology assessment as it relates to the main findings of the *World Development Report 1993*. Within technology assessment, I will focus mainly on setting priorities by using cost-effectiveness and disease burden analysis. This is highlighted a great deal throughout the Report. The Report does not use the specific term "needs-based" technology assessment, but this concept and the concept of priority setting in the WDR are quite similar. But before turning to this specific topic, I would like to step back and sketch out very quickly why the World Bank did such a report on health, and what the main conclusions are.

Let me begin by setting forth three reasons why health matters.

- First, health is a crucial part of individual *well-being and welfare*.
- Second, health status has *economic* consequences. Good health improves economic performance. It does this in several ways. Better health leads directly to better economic performance through improved work productivity. It leads to productivity gains in *future* generations by improving educational outcomes. (More and more research is indicating the important links between health and educability and school enrolment rates.) And health investments can, in some cases, reduce net spending on health care. In some cases the savings in treatment costs alone are sufficient to justify investments to control disease as is demonstrated by calculations for smallpox eradication and AIDS control.
- Third, improving health is an effective way of *reducing poverty*. The poor carry a disproportionate share of disease burden, and have the least capacity to purchase health services. Investments in the health of the poor raise their educability and their productivity — giving them both the assets they need to lift themselves out of poverty and the immediate welfare gains from relief in suffering.

Health, then, was selected as the topic of the WDR 1993 because of its importance to welfare, economic development, and poverty reduction, and also because it is an area where the government must play a central role.

I would now like to summarize the three main messages of the *World Development Report 1993*. The Report advocates a three-pronged approach to government policies for improving health.

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- First, governments should foster an economic and social environment that enables households to improve health. This requires pursuing pro-poor economic growth policies oriented to reducing poverty, expanding basic education, especially for girls, and promoting the rights and empowerment of women, given women's key role in promoting the health of the household.

- Second, governments can improve their own spending on health, by focusing public spending on assuring a national package of highly cost-effective public health interventions and essential clinical services. For many reasons the government cannot leave these services simply to market forces, if it wants to ensure good performance. At the same time, governments should greatly reduce public spending on sophisticated tertiary facilities, equipment, and specialist training — used for interventions that provide little health gain for the money spent. Governments can also take steps to improve the management of public health systems.

- Third, and last, governments can improve efficiency and quality in the health sector by promoting diversity and competition in the provision of health inputs and services. This can be done by policies to encourage insurance with regulations or incentives for equitable access and cost containment, to encourage competition in the supply of inputs such as drugs and equipment, and to generate and disseminate information on technology assessment, provider performance, and the like to improve decision making.

Clearly technology assessment is central in the second and third key messages of the WDR. In the second message, technology assessment plays a role in the design of the national package. In the third message, technology assessment is key in improving decision-making in the health sector overall.

I will focus the remainder of my remarks on these two areas. First, I would like to explain in more detail what we mean in the second message by the "national package." The national package concept is a framework for thinking about what clinical services and public health interventions governments should attempt to ensure to their populations, and what they should finance. No country in the world can provide health services to meet all the possible needs of the population. We argue that it is advisable to establish two main criteria for which services to try to ensure to the population — the size of *disease burden* caused by a particular disease or condition, and the *cost-effectiveness* of interventions to deal with it. These criteria can be used to design a national package, tailored to local conditions and resource availability. Disease burden alone cannot help us select interventions for the package; cost effectiveness alone cannot either. It makes no sense, for example, to include a highly cost-effective intervention in the package that addresses only a very tiny share of disease burden because it is administratively difficult to do so and diverts attention from bigger problems. Likewise, an intervention that addresses a major share of disease burden should only be included if it ranks well in terms of cost-effectiveness vis-à-vis other health interventions that also address major shares of disease burden.

How Do We Measure Disease Burden?

Often the relative importance of different diseases is assessed by how many deaths they cause. But there are many diseases or conditions that are not fatal, but cause a great deal of loss of healthy life, such as chronic depression and paralysis caused by polio. The Report quantifies the burden of disease in the world in terms of loss of disability adjusted life years (DALYs for short). In a perfectly healthy world, each person would live free of disease or injury until at least age 80. But the world is not

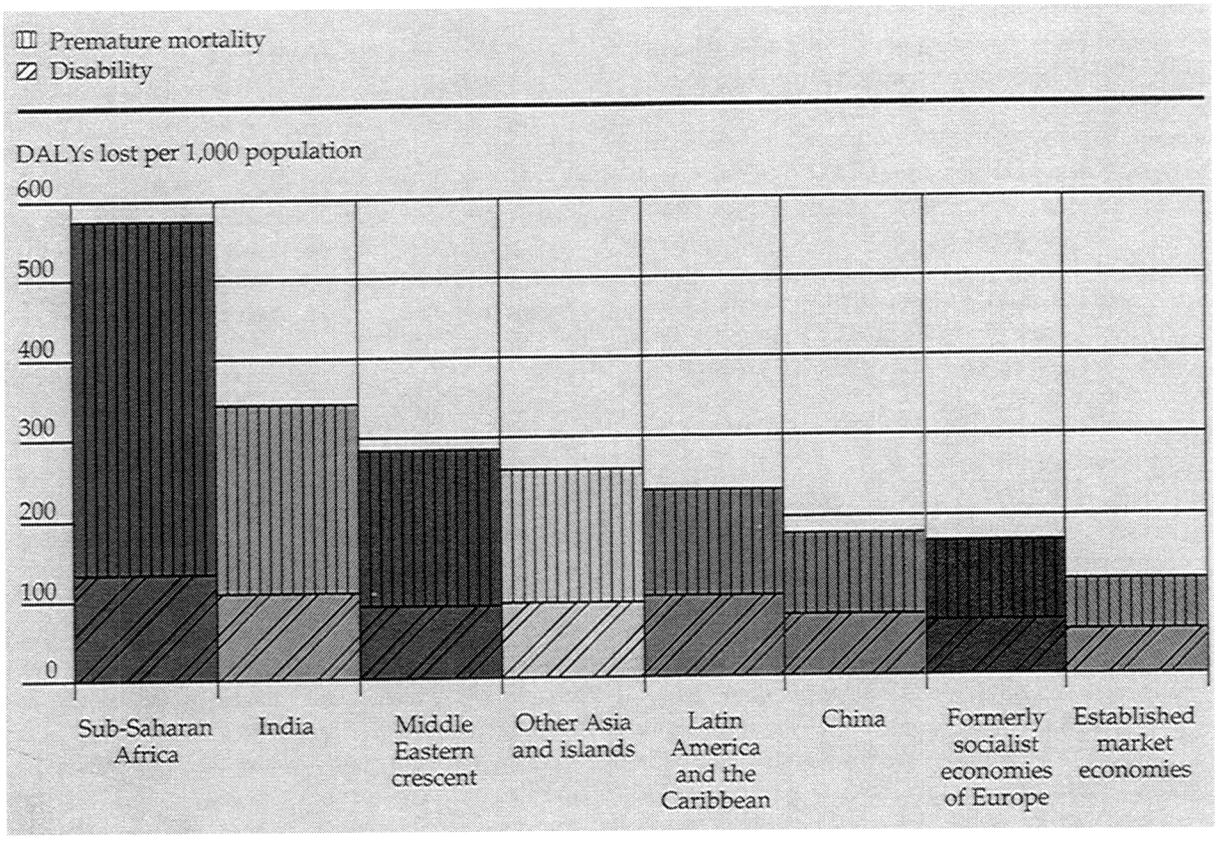


Fig. 1. Burden of disease attributable to premature mortality and disability, by demographic region, 1990. Source: World Bank (1993, p. 3).

disease free. DALYs are lost from premature death, disease, and injury. The Report quantifies diseases into 109 categories, covering all causes of death and about 95% of possible causes of disability in the disease burden exercise. Calculations of disease burden are made across eight regions in the world, and by age and sex.

This concept of DALYs as a measurement of disease burden is not new, but the Report provides the first ever estimates for the world. The analysis was carried out by our consultants at Harvard University, working closely with WHO staff and scores of experts around the world. In 1990 the world lost 1.36 billion years of healthy life. Spread evenly over each person, that is equivalent to roughly 3 months per person just in 1990. This is an average. The loss is six times as high in Sub-Saharan Africa as it is in the Established Market Economies (Fig. 1).

Roughly two-thirds of the global burden of disease, measured by DALYs, is due to premature death, and one-third is due to disability. Globally, about 46% is from communicable diseases, 42% from noncommunicable diseases, and 12% from injuries. The largest contributors to disease burden are respiratory infections, diarrhoea, perinatal causes, neuropsychiatric problems, cancer, heart diseases and stroke, and vaccine-preventable diseases of childhood (Fig. 2). The detailed disease burden estimates, by region, are presented in Appendix B to the Report. This information is also available on diskette. Four working papers on the global burden of disease will be available by the end of

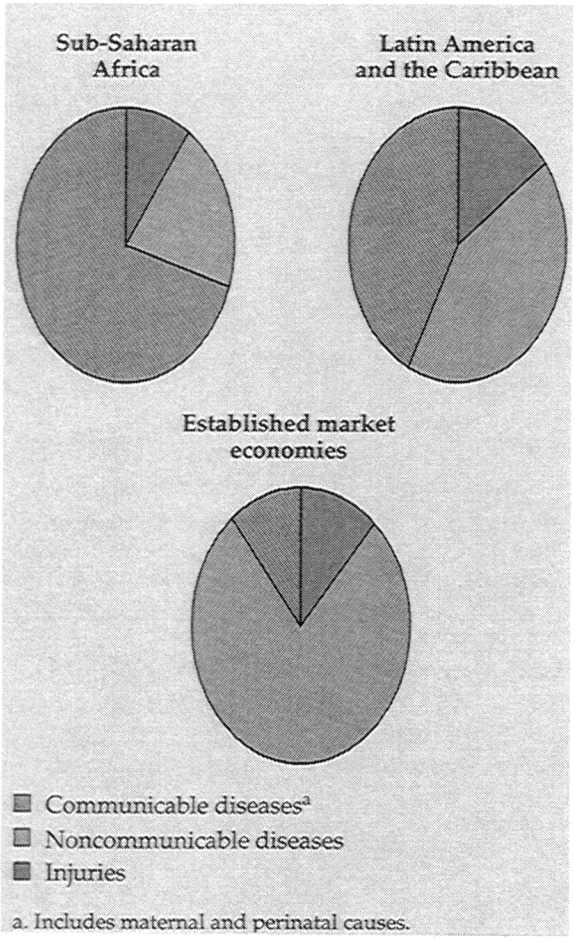


Fig.2. Distribution of disability-adjusted life years (DALYs) lost, by, cause, for selected demographic regions, 1990 (percentage of total DALYs lost). Source: World Bank (1993, p. 29).

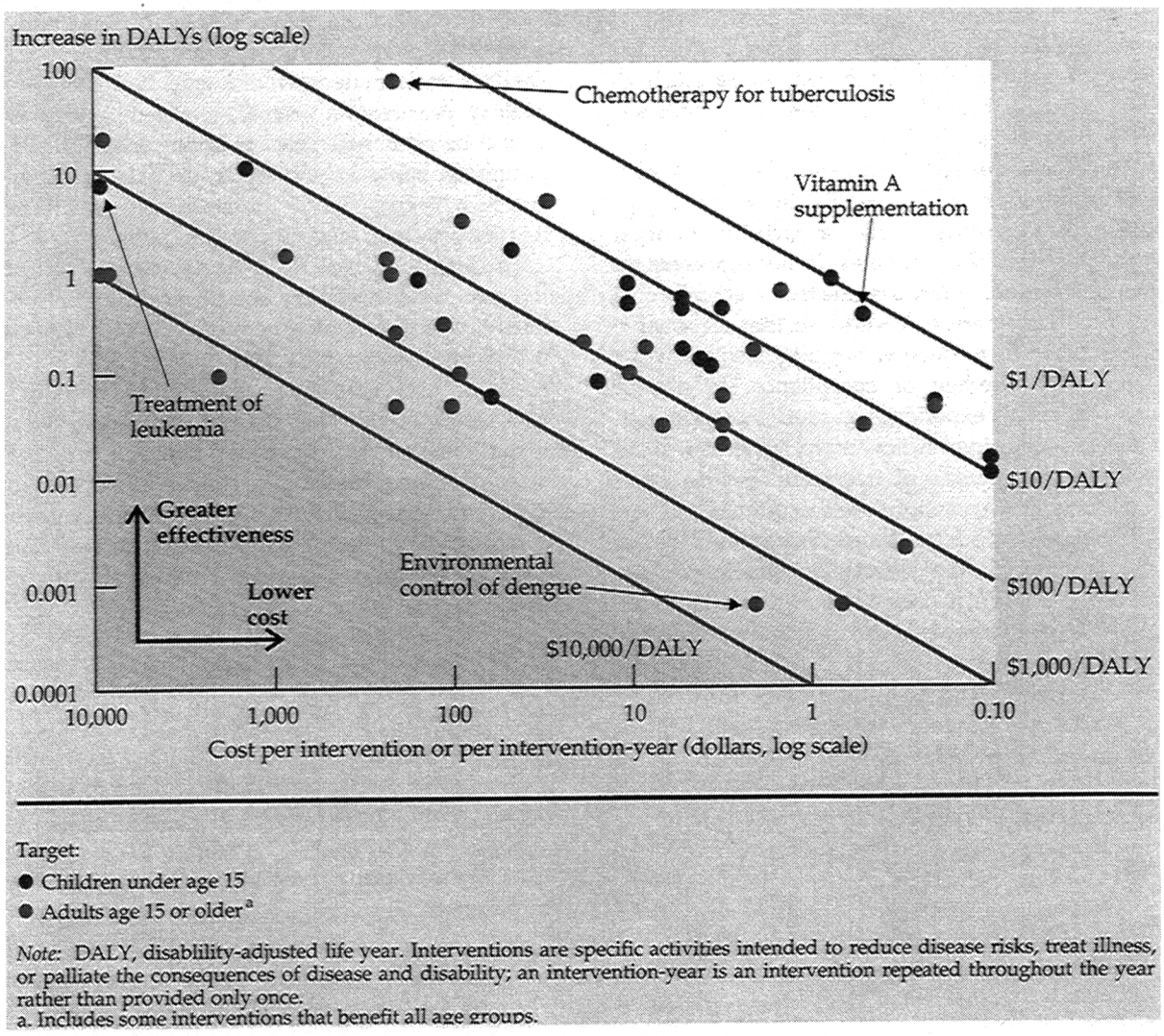
December. Note that the disease burden methodology is not tied to specific assumptions for discounting, age weighting, and disability weights. These assumptions can be changed.

Clearly, the numbers indicate that the burden of disease is large. Looking at it by condition, we know that a substantial part of it can be addressed through health interventions of relatively modest cost. How should governments prioritize their efforts to reduce disease burden?

Disease burden information is one of the two elements important for designing the national package. The other element is cost-effectiveness.

We know that health systems are plagued by poor allocation of spending. Too much is spent on interventions of low cost-effectiveness and too little is spent on highly cost-effective services. Knowing the cost-effectiveness of a health intervention and the disease burden the intervention could address can help governments design policies, particularly *incentives*, to better allocate resources across interventions. This information can also help private providers, consumers, and insurers make decisions.

To measure cost-effectiveness, we can use the DALY measure I mentioned earlier — the disability-adjusted life year — as a measure of health gain from interventions. The ratio of cost and effect, or the unit cost of a DALY, is the cost-effectiveness of an intervention — what it costs to achieve one additional year of healthy life. The lower that number, the greater the value for money offered by the intervention. The WDR found huge variations in both cost and effectiveness of 47 common health interventions (Fig. 3). Because cost-effectiveness differs so much across interventions, from less than $25 per year of healthy life for interventions such as childhood immunization and vitamin A supplementation, to over $10,000/DALY for some treatments of heart disease, making resource allocation decisions badly costs lives. Here is an example: $100,000 spent on chemotherapy for tuberculosis would directly save 500 patients. It would also prevent many others from becoming infected. Because of this, we calculate the health gain from $100,000 on tuberculosis treatment at 35,000 DALYs — thus, one DALY costs only $3.5 — An extraordinarily good buy. That same $100,000, spent on the management of diabetes, would save only 400 DALYs, at a unit cost of $250 per DALY.



Note: DALY, disablility-adjusted life year. Interventions are specific activities intended to reduce disease risks, treat illness, or palliate the consequences of disease and disability; an intervention-year is an intervention repeated throughout the year rather than provided only once.
a. Includes some interventions that benefit all age groups.

Fig. 3. Benefits and costs of 47 health interventions. Source: World Bank (1993, p. 62).

Figure 3 represents costs on the horizontal axis and gains in DALYs on the vertical axis. The diagonal lines show equivalent cost effectiveness ratios per DALY. As we move out the diagram, interventions become more cost effective. You can see the wide variation in cost-effectiveness in these 47 common health interventions.

The Report argues that governments can improve their spending by defining a national package of highly cost-effective public health interventions and essential clinical care, and using that package to guide resource allocation. We developed for the Report a "minimum package" that we recommend all countries consider for inclusion in their national package. In low-income countries, this minimum package costs about $12 per capita, and buys DALYs at about $50 each. In middle income countries, because of different labour costs and disease patterns, this same package costs an estimated $22 per capita.

If governments assured almost universal coverage with this minimum package — through its own financing policies and through insurance regulatory policies then we estimate that the disease burden

Table 1. Costs and health benefits of public health packages in low- and middle-income countries, 1990

Country group and component of package	Annual cost ($)			Disease burden averted (%)[a]
	Per participant	Per capita	Per DALY	
Low-income (income per capita = $350)				
EPI Plus	14.6	0.5	12–17	6.0
School health program	3.6	0.3	20–25	0.1
Other public health programs (including family planning, health, and nutrition information)[b]	2.4	1.4	–[c]	–[c]
Tobacco and alcohol control program	0.3	0.3	35–50	0.1[d]
AIDS prevention program[e]	112.2	1.7	3–5	2.0
Total	–	4.2 (1.2)	–	8.2
Middle-income (income per capita = $2,500)				
EPI Plus	28.6	0.8	25–30	1.0
School health program	6.5	0.6	38–43	0.4
Other public health programs (including family planning, health, and nutrition information)[b]	5.2	3.1	–[c]	–[c]
Tobacco and alcohol control program	0.3	0.3	45–55	0.3[d]
AIDS prevention program[e]	132.3	2.0	13-18	2.3
Total	–	6.8 (0.3)	–	4.0

Source: World Bank (1993, table 4.7).

Note: Numbers in parentheses refer to per capita cost as a percentage of income per capita.

a. Although costs are estimated for 100% coverage, the health benefits are based on 95% coverage for EPI Plus and 80% coverage for the school health, AIDS prevention, and tobacco and alcohol programs.

b. Includes information, communication, and education on selected risk factors and health behaviours, plus vector control and disease surveillance and monitoring.

c. The health benefits from information and communication, and from disease surveillance are counted in the other public and clinical services in the health package. The health benefits from vector control are unknown.

d. Calculation of the potential disease burden averted through this program assumes no change in the prevalence of smoking and alcohol consumption; if such prevalence were to rise, the potential benefits would be larger.

e. Excludes treatment of STDs, which are in the clinical services package.

could be reduced by about 30% in low-income countries, and by about 15% in middle-income countries.

Let us look at the content of this minimum package (Tables 1 and 2). The minimum package reinforces the importance of many primary health care activities such as immunizations. But it also highlights some that have been relatively neglected, such as tuberculosis diagnosis and treatment and sexually-transmitted disease diagnosis and treatment.

The minimum package includes several public health interventions — immunizations, school health programs, information programs, tobacco- and alcohol-control efforts, epidemiological monitoring and surveillance, vector control, and AIDS prevention — that make up about one-third of the cost of the package. It also includes essential clinical services in six key areas — TB treatment, a cluster of

Table 2. Estimated costs and health benefits of selected public health and clinical services in low- and middle-income countries, 1990.

Country group and package	Annual cost ($)[a]			Per capita cost as share of income per capita (%)	Disease burden averted (%)[b]
	Per case or per participant	Per capita	Per DALY		
Low-income (per capita income = $350)					
Public health package[c]	–	4.2	–	1.2	8
Minimum essential package of clinical services	–	7.8	–	2.2	24
Short-course chemotherapy for tuberculosis	500	0.6	3–5		1
Management of the sick child	9	1.6	30–50		14
Prenatal and delivery care	90	3.8	30–50		4
Family planning	12	0.9	20–30		3
Treatment of STDs[d]	11	0.2	1–3		1
Limited care[e]	6	0.7	200–350		1
Total, public health and clinical services	–	12.0	–	3.4	32
Middle-income (per capita income = $2,500)					
Public health package[c]	–	6.8	–	0.3	4
Minimum essential package of clinical services	–	14.7	–	0.6	11
Short-course chemotherapy for tuberculosis	275	0.2	5–7		1
Management of the sick child	8	1.1	50–100		4
Prenatal and delivery care	255	8.8	60–110		3
Family planning	20	2.2	100–150		1
Treatment of STDs[d]	18	0.3	10–15		1
Limited care[e]	13	2.1	400–600		1
Total, public health and clinical services	–	21.5	–	0.9	15

Source: World Bank (1993, table 5.3.)

Note: Figures assume coverage of 80% of the population.

a. Average costs.

b. Marginal benefits.

c. Includes EPI Plus; school health including deworming, micronutrient supplementation, and health education; information on health, nutrition, and family planning; tobacco and alcohol control programs; monitoring and surveillance; vector control; and programs for prevention of AIDS.

d. Benefits were calculated assuming an AIDS epidemic comparable to that in sub-Saharan Africa today.

e. Limited care includes assessment, advice, alleviation of pain, treatment of infection and minor trauma, and treatment of more complicated conditions as resources permit.

services which we call "management of the sick child," the cluster of services for pregnancy-related care, family planning, treatment of sexually-transmitted diseases, and something we call "limited care." Limited care is intended to give some response — often quite limited — for other health problems. This will sometimes be simply palliative, such as pain relief for highly fatal cancers. The cost-effectiveness of these interventions is very high. And these interventions would, as mentioned earlier, avert about 30% of disease burden if almost universal coverage could be achieved (Fig. 4).

After defining the national package, we turn to the question: who should pay for the package? Governments must have a heavy role in financing the package. How much it finances and how generous the national package can become depends very much on resource availability and the degree to which societies will want to make their package more comprehensive and targeted to the poor

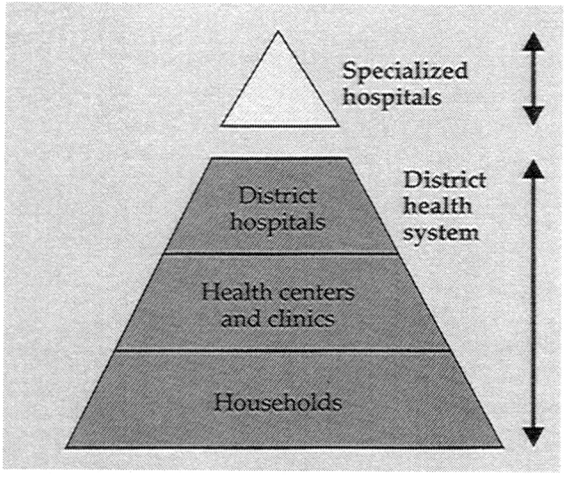


Fig. 4. The health system pyramid: where care is provided. Source: World Bank (1993, p. 135).

versus more reduced but available to everyone.

We know that most public health interventions — because of their public goods quality — should be heavily — if not entirely — publicly financed. This is because the private sector cannot or will not supply most public health interventions. The clinical services in the national package will also have to be government financed, at least for the poor, to ensure wide access.

Governments can achieve this by redirecting their current spending towards the national package. In some cases, they will need to increase spending as well, and use targeting mechanisms and selective cost recovery so that government finance — free services — are directed to the poor. If resources permit and as national income grows, the national package can be made more comprehensive. The Report argues that the package should be extended according to the same criteria — selecting interventions according to value for money — or cost-effectiveness — and disease burden — in other words, if resources permit, add the next most cost-effective intervention that addresses significant disease burden.

If governments are to redirect spending to support their national package, they must redirect spending toward the infrastructure, personnel, drugs, and equipment required by the package. This means supporting community outreach activities, health centers, and district hospitals, and improving the quality of care and management in those facilities in order to deliver the national package efficiently. And it means not publicly financing drugs, equipment, personnel, and facilities used to deliver services outside the package. Private finance can be used to purchase services outside the package.

In summary, we believe that if governments defined and focused their efforts on financing the national package, for at least the poor, it would greatly improve the impact of public spending on health. It would improve equity and efficient resource allocation. There is little justification for public financing of the less-cost effective services outside the national package. When governments try to provide everything to everyone, there are inefficient and inequitable outcomes. Highly cost-effective programs are inevitably neglected; and the less cost-effective services that are financed tend to be captured by the urban wealthy.

The third main message of the *World Development Report* is that governments can improve the efficiency and quality of health services by promoting diversity and competition in the supply of health inputs and services — under an appropriate regulatory framework. I will not go into all the recommendations here except the one pertaining to technology assessment. Governments should facilitate competition and sound decision-making in the health sector by generating and disseminating information on prices and provider performance, and on the cost-effectiveness and safety of drugs, equipment, and health interventions.

Let's focus for a few minutes on the government's possible role in disseminating health technology assessment information and how to prioritize where it should direct its efforts. I will use medical equipment as an example. This is certainly complicated by the difficulty of keeping up with the rapid pace of innovation in the field, and the limited capacity in developing countries to carry out technology assessment. In all countries the ability of the medical equipment industry to develop, produce, and promote new health care technologies has vastly exceeded the capacity of decision-makers to evaluate the clinical value of such innovations and their cost-effectiveness. And synthesizing information about available products in order to make rational selection decisions can be extremely costly for public and private health care providers.

We argue in the Report that indicative "essential equipment lists" could be developed by an international agency or nonprofit organization along the lines of essential drug lists for use by many countries. These would need to be regularly updated by expert committees who evaluate new products. These lists would need further adaptation at the country level, tailoring the list to support the country's national package. Information costs about equipment technology and about specific products could be reduced by broader dissemination of technology assessment data bases and product comparison information developed by independent laboratories. Although international data bases could be helpful for decisions about health care technology, some technology assessment is still needed at the local level to evaluate equipment in terms of appropriateness and adaptability to local conditions.

To close, I would like to return to the concept of the "national package" in the Report and report on the follow up work that has occurred in this area since the publication of the Report in July of this year. The idea of designing a national package, based on the two criteria of disease burden and cost-effectiveness, costing it, and directing public financing to that package, has generated a lot of interest from many countries. Many countries have requested assistance to develop such a package. Applications in progress vary considerably. One country has taken the minimum package presented in the Report and costed it. At the other extreme, another country is carrying out a full-blown disease burden estimation along with the calculation of intervention cost-effectiveness. It is using the results to design of a much more comprehensive national package. The notion of basic services is not new, but the systematic application of explicit criteria and the use of quantitative methods to design the package has sparked a lot of interest. One of the challenges we face is in developing and improving these methodologies and helping build the domestic capacity to carry out these analyses and link them to policy reform.

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ISSUES AND CHALLENGES FOR NEEDS-BASED TECHNOLOGY ASSESSMENT

Peter Tugwell[1]

This conference provides the opportunity to bring out some technical issues around changing the paradigm of technology assessment from one of "supply-driven" to "demand-driven" (or "needs-driven").

First, the definition of technology assessment needs to revisited to set the boundaries of the topic. The Office of Technology Assessment (1978) specified "health technology" as "drugs, devices, medical and surgical procedures, and the organisational and supportive systems within which such care is provided." The concept of embodiment (Feeny et al. [1986]) is useful in classifying technologies and understanding their range; embodiment describes the degree to which a technology is contained in a drug or device. For example, a machine such as magnetic resonance imaging (MRI) or a drug such as Erythropoietin therapy are "embodied." A technology is "disembodied" if it is an idea or procedure that is available without a machine or drug; for example, counselling to stop smoking or early ambulation after surgery are "disembodied." Fuchs and Garber (1990) have emphasized that the field has evolved from the "old technology assessment" that focused upon the safety and efficacy of an intervention, to the "new technology assessment" that includes assessment of the higher order impacts that draw on multiple data sets, multiple investigators, and diverse methodologies to yield an assessment that is based upon a range of values and interpretations of the data. This "new technology assessment" reflects the importance of assessing impacts such as health-related quality of life including social and emotional health status, consumer and patient preferences, public, patient, and professional behaviour change.

Currently for many reasons, the development, assessment, and diffusion is "supply-driven" rather than "demand- (or needs-) driven." The financial incentive drives the introduction of the majority of technologies — much of this is because of the enormous expense of the R&D of the "embodied" technologies, i.e., new drugs and devices. With profit being the primary incentive, combined with the fact that the disembodied technologies such as people skills are much more difficult to make attractive to investors of venture capital, it is perhaps not surprising that "supply" does not match "demand" or "need." Examples of this abound in the WDR 1993 Report; for example, how are developing countries to address the assessment of the 6,000 distinct types of medical devices, 750,000 brands and models, 12,000 manufacturers are on the market currently; over 50 % of these are not working. Drugs are another major problem; whilst recognising the major benefits of drugs, there are 100,000 different drugs created from 5,000 active ingredients. Although drugs and devices represent the most rapidly growing sector of health care, less than 5% of these have been evaluated for their cost-effectiveness. Hospitals in most countries represent the largest cost and contain many of the most expensive technologies both in terms of people expertise as well as the use of the most expensive drugs and devices. There is evidence from Third World countries, such as Colombia, and from the USA that

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over 50% of patients seeking care could have been given appropriate care at a lower-level facility. Likewise, the whole area of practice variation without differences in health status suggests that health needs are not driving use of technologies: the impressive videos that are being developed in the USA showing that if you show a patient who would normally be recommended for coronary artery bypass or a prostate surgery, up to 50% of those who would have gone for surgery say: "No, thank you, I'll wait."

How about the disembodied areas such as human resources? Evans (1981) identified the importance of measurement, management, and monitoring as key competencies of health care workers of the future. This has been taken further through an initiative, "Educating Future Physicians in Ontario," in Canada and is also being developed through the International Network of Community-Oriented Educational Institutions for Health; the following disembodied technologies skills and competencies have been identified that will be needed for needs-based health care: community-needs orientation, clinical and community decision-making, communicator, collaborator, consumer advocate, coordination of resources, critical appraisal skills for the consumer of technology assessment, and continuing learner. As the Commission on Health Research for Development (CHRD) noted: "there is a gross mismatch between the burden of illness, which is overwhelmingly in the Third World, and investment in health research, which is overwhelmingly focused on health problems on the health problems of the industrialized countries" (CHRD 1990). The concept of Essential National Health Research (ENHR) was developed by the Commission to redress this imbalance (Table 1). This issue is beginning to be better appreciated as industrialized nations are having to introduce cost-containment mechanisms to control the spiralling cost of health care. As Donaldson and Sox have pointed out, across-the-board efforts to control the use of procedures and other health technologies, such as through administratively imposed caps or cuts in programs may well increase the current inequities. The appropriateness research of Brooks and the variations research of Wennberg have shown that a more selective approach through discouraging use accepted as inappropriate by the clinicians themselves is feasible.

Table 1. Essential national health research (ENHR) steps.

Promotion and advocacy	Create a "demand" that is based upon health needs
Establish the ENHR mechanism	Create a partnership between the community, the health care givers, and the researchers
Priority setting	Based upon targeting research to increasing health equitably
Capacity building and strengthening	Critical mass of expertise within country to implement country-specific research
Networking	• Within country to build multidisciplinary teams with existing resources • International partnerships/twinning
Financing	• For training to build a critical mass • For projects
Evaluation	Structure, process and outcome

Table 2. Estimated costs and health benefits of selected public health and clinical services in low- and middle-income countries, 1990.

Country group and package	Annual cost ($)[a]			Per capita cost as share of income per capita (%)	Disease burden averted (%)[b]
	Per case or per participant	Per capita	Per DALY		
Low-income (per capita income = $350)					
Public health package[c]	–	4.2	–	1.2	8
Minimum essential package of clinical services	–	7.8	–	2.2	24
Short-course chemotherapy for tuberculosis	500	0.6	3–5		1
Management of the sick child	9	1.6	30–50		14
Prenatal and delivery care	90	3.8	30–50		4
Family planning	12	0.9	20–30		3
Treatment of STDs[d]	11	0.2	1–3		1
Limited care[e]	6	0.7	200–350		1
Total, public health and clinical services	–	12.0	–	3.4	32
Middle-income (per capita income = $2,500)					
Public health package[c]	–	6.8	–	0.3	4
Minimum essential package of clinical services	–	14.7	–	0.6	11
Short-course chemotherapy for tuberculosis	275	0.2	5–7		1
Management of the sick child	8	1.1	50–100		4
Prenatal and delivery care	255	8.8	60–110		3
Family planning	20	2.2	100–150		1
Treatment of STDs[d]	18	0.3	10–15		1
Limited care[e]	13	2.1	400–600		1
Total, public health and clinical services	–	21.5	–	0.9	15

Source: World Bank (1993, table 5.3.)

Note: Figures assume coverage of 80% of the population.

a. Average costs.

b. Marginal benefits.

c. Includes EPI Plus; school health including deworming, micronutrient supplementation, and health education; information on health, nutrition, and family planning; tobacco and alcohol control programs; monitoring and surveillance; vector control; and programs for prevention of AIDS.

d. Benefits were calculated assuming an AIDS epidemic comparable to that in sub-Saharan Africa today.

e. Limited care includes assessment, advice, alleviation of pain, treatment of infection and minor trauma, and treatment of more complicated conditions as resources permit.

In order to compare mortality with morbidity, the WDR authors have developed an index to combine morbidity and mortality, that they named the Disability Adjusted Life Year (DALY). Table 2 shows an example of how different conditions compare. A similar approach has been developed by Wolfson et al. at Statistics Canada to incorporate data from community surveys in order to calculate Quality Adjusted Life Years (QALY) — very similar to the DALY — and to measure the impact of interventions. Once again, each country or community needs to decide on the relative importance of quality of life versus mortality and although the numbers of patients dying and those with symptoms and disability can be measured in an acceptably standardized fashion, the relative contributions of these to an index such as a DALY or a QALY cannot be translated from one country to another automatically; it really has to be decided by the consumers, by the public, within the country

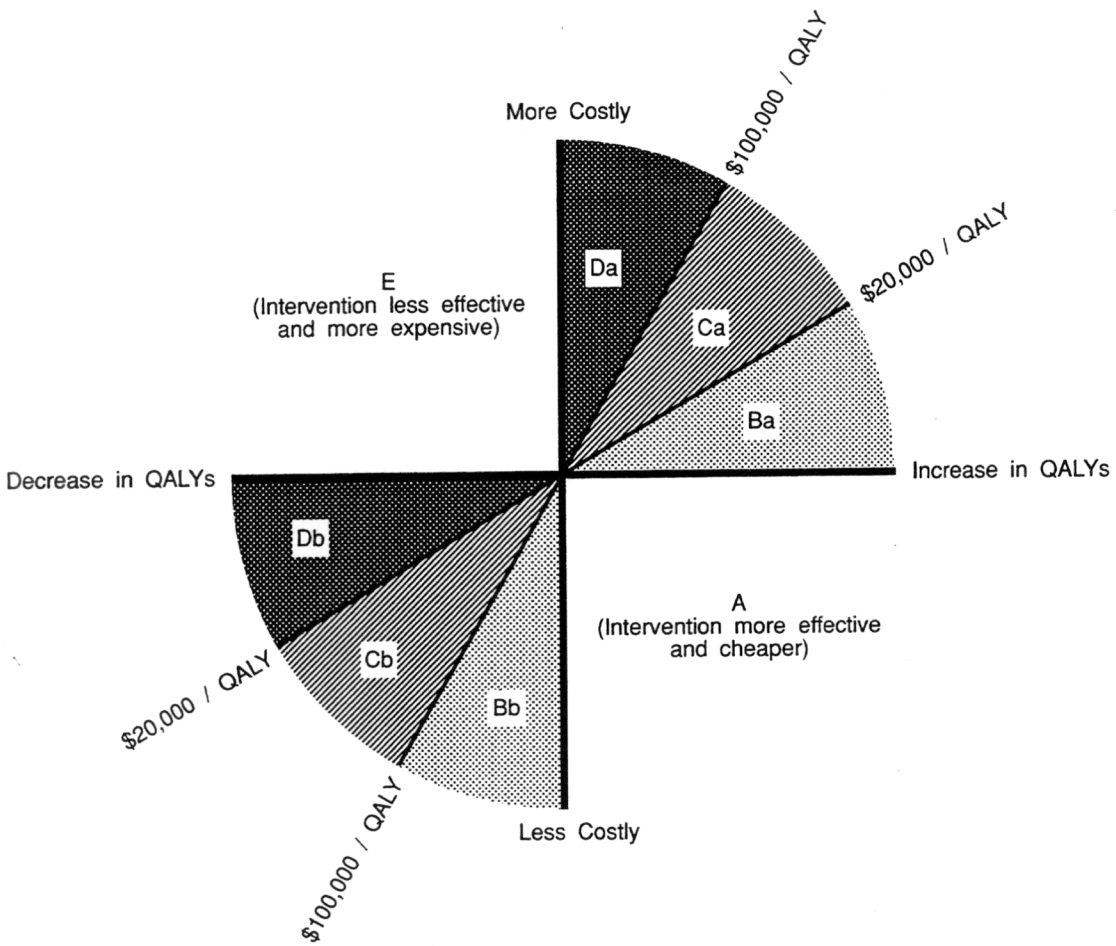

Fig. 1. Grades of recommendation. Note: Grade A technologies should clearly be introduced or continued, and Grade E technologies should not be introduced or should be abandoned. Technologies in the upper right hand quadrant are more effective and more costly than their alternatives, whereas those in the lower left quadrant are less effective and less costly. Introduction of technologies in the upper right quadrant and abandonment of the technologies with the same shading in the lower left quadrant lead to similar degrees of cost-effectiveness.

concerned. A group in Ottawa led by Judith Maxwell and Douglas Angus are involved in such an exercise currently are adapting the QALYs that were developed in the Oregon project to Canada in order to rank order all health care interventions — Canadian values are different from those in Oregon and Canadian data is available using the Torrance Health Utilities Index.

Economic Efficiency

This is a major area of interest that moulded the recommendations of the World Bank Report for the selection of a minimal package of interventions. Figure 1 shows how technologies can be usefully categorized into four types, those that are more effective and less costly (immunization, rhesus screening), those that produce benefit but at increased cost (the WDR Package for Low Income countries [Table 2] and the "League table" from industrialized countries [Table 3]), those that cost less than current interventions but are not as effective (e.g., magnesium sulphate for heart attacks instead of streptokinase or tissue plasminogen activator, ionic contrast radiographic dye instead of nonionic

Table 3. Comparative cost-utility results for selected programs.

Programs	Adjusted cost/QALY gained (US $ 1983)
PKU screening	< 0
Postpartum anti-D	< 0
Antepartum anti-D	1,200
Coronary artery bypass surgery for left main coronary artery disease	4,200
Neonatal intensive care, 1,000–1,499 g	4,500
T4 (thyroid) screening	6,300
Treatment of severe hypertension (diastolic ≥ 105 mm Hg) in males aged 40	9,400
Treatment of mild hypertension (diastolic 95–104 mm Hg) in males aged 40	19,100
Estrogen therapy for postmenopausal symptoms in women without a prior hysterectomy	27,000
Neonatal intensive care, 500–999 g	31,800
Coronary bypass for single vessel disease with moderately severe angina	36,300
School tuberculin testing program	43,700
Continuous ambulatory peritoneal dialysis	47,100
Hospital hemodialysis	54,000

Source: Torrance 1988.

contrast), and lastly those that cost more and result in no benefit (e.g., MRI or CAT scan for headache without any clinical neurological signs, laboratory screening for abnormal liver, renal, and cardiac function as part of the periodic health exam in individuals not at increased risk leads to labelling, anxiety, and increased costs of unnecessary further investigations, immunisation with a failed cold-chain, transfusion with HIV-infected blood).

It is important to look at cost-*effectiveness* (i.e., does it work in practice) and not cost-*efficacy* (can it work in an artificial study context), if the result is to be relevant to policy decisions in that we come up with are going to have credibility. Table 1 shows examples of important country-specific research identified by the ENHR Task Force that focus on solving the pragmatic problems to ensure the success of interventions that have been shown to work in ideal circumstances.

Consensus on the benefit to be expected from interventions based upon the best evidence available is needed. Poorly designed studies often result in overestimates. There is an important international initiative to address this and to produce quality estimates for health care decision-makers across the world — the Cochrane Collaboration (Sackett 1992). Iain Chalmers has put together a group in

Oxford, UK, which has developed into an international network with Centres elsewhere in Europe, North America, and Australia. Kathy Bennett from McMaster is coordinating this for developing country initiatives and there will be a major discussion of this at the INCLEN meeting this coming January [1994] in Thailand. Teams or reviewers are established for each disease area with an editorial team who use agreed-upon criteria to develop a database of systematic reviews. The approach that has been used in many situations where the data is appropriate, is meta-analysis. This is a valid technique for combining the results for homogeneous small trials that are not statistically significant to coming out with an overall result as well as for trials showing different degrees of benefit to produce the best estimate and to reduce the confidence limits. These overviews will be published in international journals as well as being made available in the Journal of Online Medicine which is available worldwide to anyone who can dial into electronic mail; it will also be available on CD ROM.

There are a number of important differences in economic evaluation when implementing cost-effectiveness studies internationally — some of these clearly relate to the available dollars for health care — the cutoff of Canadian $20,000 per QALY (US $15,000) recommended by Laupacis et al. (1992) for Canada are clearly going to be very different (even adjusted to make DALYs equivalent to QALYs) from the $350 per DALY maximum in low-income countries for the Third World WDR technologies, listed in Table 2. Other differences include difference in effectiveness modifiers (access, diagnosis, and provider and patient compliance as discussed above), indicators, differences in the way patients are managed (called "ingredients" by Laupacis et al.), the costs of each ingredient themselves, the relation between costs and the economy of the country (Drummond et al. 1993). Guidelines for economic evaluation are being developed in various countries — evidence of the increasing expertise in this area and the potential for those working in technology assessment to contribute across the world.

Other Relevant Initiatives

There are various other relevant ongoing initiatives that the Technology Assessment Community should collaborate with in tackling these challenges:

- The Puebla Group Initiative: A group of networks agreed to discuss ways of coordinating input into ENHR. Members are the International Health and Public Policy Program, the International Clinical Epidemiology Network, National Epidemiology Boards, Network of Community Oriented Educational Institutions for Health Sciences, Epidemiology and Health Management Network, WHO Program on Health Systems for Research, Field Epidemiology Training Network.
- The Primary Health Care Management Program of the Aga Khan Foundation.
- The needs-based funding experience such as that recently implemented in the Canadian province of Saskatchewan.
- The setting research priorities for evaluation of improved health care such as that by Donaldson and Sox in industrialized nations (Table 3).
- The assessment of the potential cost-effectiveness and impact upon health when funding research projects.

Conclusion

This paper has reviewed a number of issues relevant to making needs-driven technology assessment a realistic strategy that can be adapted by those in different settings. There are more similarities than differences in these discussion among leaders working in this field in countries at all stages of

development; these could be usefully integrated with the methods being developed in the ENHR strategy to form a "Tool Kit" for technology assessment that consists of written and computerized material on (i) needs assessment; (ii) efficacy, community effectiveness, and economic evaluation; and (iii) consensus-building methods. This would also provide a focus for encouraging individuals around the world in the technology assessment community to join this global challenge of "good health at low cost."

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PART II

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THE CASE STUDIES

CASE STUDY 1.
AN EXAMPLE OF TECHNOLOGY TRANSFER
—
THE CAMEROON EXPERIENCE

S. Yunkap Kwankam[1]

Developing countries have come to accept that science and technology are important to national development. But, more often than not, the pivotal role that technology plays in development is not fully understood. Hence, the minuscule amounts spent on science and technology in national budgets. Technology, the key to industrial and economic growth, is either endogenous or is acquired. Technology acquisition is a very complex subject. Some people go as far as contending that despite the attention it receives, technology transfer is not to be counted upon; the owner of the technology has too much vested in his relative advantage to wish to hand this over without extracting substantial benefits from the recipient.

Technology transfer, however, does exist in some sectors. Aid projects in the fields of health, human resources development, and agriculture usually are the most likely to result in the transfer of technology. One can argue that if a technology is acquired and adapted to suit local conditions and institutionalized to ensure its sustainability, it can be considered an endogenous technology. Endogenous technology, either locally developed or acquired and adapted is more likely to be cost effective and more likely to lead to development.

Visionary Individual Effort — An Alternative to Consensus Development

Consensus development is recognized as a precondition for the transfer of technology in several countries (Coe and Banta 1992; Foltz 1993; Vian et al. 1993). Whether in its traditional form as developed by the Office for Technology Assessment (OTA) or in the form of a forum (Perry and Wilkinson 1992), it involves general agreement among major players or stakeholders. Although this has been used in Cameroon in national programs based on imported technology (Oral Rehydration Therapy — ORT, Expanded Program on Immunization — EPI, etc.), Cameroon appears to have come up with an alternative to consensus development — a technique which we term "visionary individual effort or VIE." It is appropriate in circumstances where the number of persons with sufficient knowledge about the technology is too limited to give the term consensus meaning. A one- or two-

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person consensus would otherwise not be uncommon for transfer of state-of-the-art or emerging technologies to developing countries. The VIE method is responsible for two instances of health technology transfer in Cameroon. These are

- Development of local capacity in biotechnology at the Immunology–Biotechnology Laboratories (IBL), Faculty of Medicine and Biological Sciences of the University of Yaounde I;
- Local production of an HIV dipstick at the Institute of Medical Research and the Study of Medicinal Plants (IMPM).

It is unlikely that either the technology developed at IBL and described below, or the HIV dipstick project would exist, or survive, without its principal investigator. These researchers are "prime movers," indispensable to promotion and advocacy, the first element of Essential National Health Research (ENHR) (Task Force on Health Research for Development 1991).

Development of Biotechnology at IBL

The Need For Diagnostic Tools

The World Bank suggests that a priority area for research and development (R&D) work is low-cost and efficient diagnostic technologies for use in health centres in developing countries (World Bank 1993). Walsh (1988) proposes the following desirable features for such diagnostic tools:

- Simplicity of use;
- Adaptability to local conditions;
- Stability;
- Minimal need for instrumentation, can be performed even in home of community health worker;
- Lowest possible cost;
- Speed (for patient care less than one hour, longer time acceptable for epidemiologic surveys); and
- Accuracy.

IBL's interest is in the area of diagnostic tools for parasitic diseases.

State-of-the-Art Competence

The laboratory has developed local competence in state-of-the-art biotechnology techniques. They are able to

- Screen genomic and cDNA libraries;
- Express genes in procaryotes (e-coli) and in eucaryotes (yeast) systems;
- Develop DNA probes; and
- Use other molecular biology tools for more basic research (gene regulation, etc.).

In the area of onchocerciasis, their main focus, the laboratory work compares favourably with that of leading laboratories in Europe and North America. However, due to the competitive nature of the work, IBL has not been keen on giving details. It is our understanding that several publications in the pipeline will provide significant scientific and technical details of this work. These include, *Cloning and High Level Expression in Yeast of Onchocercal Specific Antigens*, *Use of C27 and C71 Recombinant Proteins in ELISA-based Detection of Onchocercal Antibodies*, and *A Dipstick Immunobinding Assay for Detecting Those at Risk of Blindness from Ophthalmic Microfilariae*.

IBL Development Strategy

From beginnings in clinical research the laboratory, which is now IBL, has changed focus as technology has evolved. Emphasis in epidemiologic research followed the clinical research phase. The focus later shifted to immunology, and in 1985 the laboratory was designated a WHO Collaborating Centre for Immunology. Its development program is based on the experience of the laboratory director in developing human resources using the concept of institution strengthening. As Vice Chancellor of the University of Yaounde, he instituted a number of programs and measures. A new operational structure which took into account the essential and diverse components of a teaching/learning system as shown by Ngu and Kwankam (1992) was put in place. These measures resulted in the emergence of a number of competent research groups and laboratories. These same measures, which recognize the interaction of forces in the life of a teaching/research organization (Ngu and Kwankam 1992), were applied to IBL.

As to the choice of which technology to transfer or develop, biotechnology was a logical progression from IBL's background in immunology. However training was needed to learn this new technology.

Training at IBL

The major instrument employed in the development of this know-how has been innovative institutional linkages, involving commercial companies as well as the traditional university and research organizations. These ties were facilitated by the laboratory director's international contacts. Opportunities offered by participation in such groups as the Scientific and Technical Advisory Group (STAG) for the WHO program on Human Reproduction (HRP), the Board of Directors of the International Centre for Insect Physiology and Ecology (ICIPE) in Nairobi, Kenya, and the Governing Council of United Nations University with headquarters in Tokyo, were exploited to promote collaboration between IBL and research organizations in industrialized countries. Links were thus developed with the following leading institutions in the field

- Chiron Corporation, Emeryville, CA, US. (which now includes Cetus Corporation, famous for the discovery of the polymerase chain reaction [PCR] for amplification of DNA sequences, and which won a Nobel prize);
- New England Biolabs, Boston, MA, USA;
- Elixir Biotechnology (LXR), San Francisco, CA, USA;
- The University of California, San Francisco, CA, USA;
- The Biotechnology Centre, Uppsala, Sweden;
- London Hospital Medical School, London, UK;
- Institute of Child Health, London, UK; and
- Haddassah Medical Center, Jerusalem, Israel.

Eight years ago, IBL instituted a program for rapid training of molecular biologists, locally and with its collaborating institutions abroad, to provide a pool of competent scientists. Detailed number of person-months of training at various facilities since then are shown in Table 1.

At the local level, IBL has favoured a multidisciplinary approach through collaboration with local laboratories such as the Automation and Control Laboratory of the School of Engineering and the Organic Chemistry Laboratory of the Faculty of Science. The latter, which has distinguished itself in

Table 1. Number of person-months of training for IBL staff (1986–1993)

Location	Training (person-months)
Yaounde	222
SF	18
New England Biolabs	15
Jerusalem	12
IRAD Kenya	9
London	6
Uppsala	6
Total	288

the area of medicinal plants provided plant extracts, while the engineering laboratory has been invaluable in the areas of equipment selection and maintenance, communications, and computer modeling and simulation.

Financing

The bulk of the Laboratory's funding has come through competitive research grant schemes sponsored by three organizations: WHO (TDR), the EEC (Science and Technology for Development), and USAID (Program in Science and Technology Cooperation). Other support has come from sources such as the Edna McConnel Clark Foundation and the Hoffmann–LaRoche Foundation. Government of Cameroon support has also been obtained through funding from the University's budget and bilateral cooperation.

Table 2 shows levels of funding for IBL and the biotechnology centre, a sister group also founded by the director of IBL.

Table 2. Grants to biotechnology obtained from various sources.

Source	Amount (US$)
WHO	1,000,000
EEC	120,000
USAID (PSTC)	250,000
Edna McConnel Clark Foundation	50,000
New England Biolabs	14,000
Government of Cameroon[a]	2,000,000
Bilateral Cooperation[a]	350,000
Hoffman LaRoche	100,000

a. Grants made to the biotechnology centre.

Transfer of HIV-1/HIV-2 Dipstick Technology

HIV Dipstick Technology

In response to the need for a diagnostic tool for the detection of HIV-1 and HIV-2 antibodies, which meets the developing country requirements cited above, the Program for Appropriate Technology in Health (PATH) has developed a low cost high sensitivity and specificity dipstick. The test, which has a sensitivity of 99.5% or greater and a specificity of 98.2% or more, uses "HIV peptides attached to a comb-shaped piece of plastic to capture specific HIV antibody in serum, plasma or whole blood" (PATH Canada 1993). A red spot on the plastic dipstick indicates the specimen is positive.

The technology is particularly attractive do developing countries as the targeted manufacturing cost is about $0.50 per test or less, compared to $2.00 or more for commercially available tests. The test takes approximately 20 minutes, about one-sixth the time required for ELIZA methods. A corporate decision at PATH was made not to manufacture the test but to transfer the technology to developing countries for local production.

Chronology of Events

In late 1990 the prime mover suggested that the AIDS program at the Centre de Coopération Internationale en Santé et Développement (CCISD) at Laval University, Quebec, Canada support the transfer of dipstick technology to Cameroon. In November 1990, CCISD opened discussion with PATH, and an initial visit by a team from PATH and CCISD was made to Cameroon in March 1991 to ascertain local interest and possible collaborators. This led to a needs/feasibility assessment mission in August 1991. The mission did an analysis of the health context, financial and market issues, technical requirements (staff, equipment, supplies, facilities, reporting, and regulatory), and administration and management structures. Three alternative hosts for the new technology were considered. The private sector in Cameroon has better management skills than the public sector but, as of now, does not have the technical know to support such a technology. The Ministry of Health has some know-how but an HIV dipstick project based there would be fraught with management problems. A good compromise was found to be a university or research organization. IMPM has both technical know-how and some management expertise. The one drawback, however, is that like the ministry university/research organization it suffers from problems with marketing and sales.

In February 1992, a proposal was made to CCISD. This received initial approval in April 1992 and in September 1992 the project work plan was approved and funds released. The work plan was revised and the budget reduced in May 1993, due to cutbacks at the Canadian International Development Agency (CIDA) which is funding the project.

Local Production

Although most of the materials are produced in Cameroon, some components are bought from abroad because they are less expensive and of better quality than if they were made locally. One such item is packaging, due to the poor quality of locally available paper.

Financing

The project is wholly funded by CIDA with a total budget for the project of CA $1 million divided equally among three headings:
- Facilities and local use;
- Equipment; and
- Purchase of components.

OUTCOMES

A High-Tech Tool Appropriate For The Developing World

When IBL set out to develop a diagnostic tool for the detection of onchocerciasis, it fixed on certain characteristics. They are similar to those described above by Walsh. IBL's criteria for a diagnostic technology appropriate to developing country environments are that it should
- Provide rapid and accurate diagnosis on a large scale so that the best therapeutic or rehabilitative measures can be put into place to avoid unnecessary deaths and alleviate suffering;
- Be inexpensive, so as to be affordable by most (if not all); and
- Permit forecasting (prediction) so as to enable planning of preventive measures.

For infectious diseases a cost effective approach is prevention. Hence the need for tools for predicting outbreaks. Samples collected from large numbers of people, need rapid, accurate, user friendly diagnostic tools, which can be employed under primitive conditions. IBL believes that its work has produced laboratory prototype diagnostic tools with these characteristics.

Coincidentally, what sparked initial interest in the HIV dipstick project in Cameroon were considerations similar to these. It is a diagnostic test designed to meet specifications for developing countries:
- Stability at room temperature (no refrigeration required);
- Ease of use;
- High insensitivity to humidity;
- Long storage periods — up to 6 months; and
- Small sized packages, not large bulky ones.

The test kit includes 10 items, from peptide antigen combs, through various control sera to reagents and wash tray. Use of the kit requires additional items such as timer, disposable latex gloves, and pen and pencil. There is also nine-step test procedure for administering the test and a decision tree for interpretation of results.

Potential Health, Social, and Economic Benefits

The technology developed by IBL provides rapid, early, specific, and sensitive diagnosis for onchocerciasis. Conservative figures put prevalence of the disease in endemic areas at around 92%, with over 18 million persons infected worldwide, and over 90 million at risk, worldwide. There are over 40,000 new cases of eye lesions each year (see WHO–Tropical Diseases Research, 11th Programme Report 1993). Although we do not have figures for the reduction in the quality of life due

to blindness, it is clear that there are considerable Quality Adjusted Life Year (QALY) benefits to be gained from preventing blindness.

Cases of immune-complex nephritis which may lead to chronic kidney failure (Ngu and Soothill 1982), which can result from onchocerciasis, require hemodialysis which, in Cameroon, costs about US $35,000/patient per year, or continuous ambulatory peritoneal dialysis (CAPD) where costs are about US $18,000/patient per year.

Sustainability

Threat Of Early Abandonment

The life cycle of a technology, as adapted from Banta et al. (1981) by Panerai and Pena Mohr (1989), shows five phases:

- Innovation;
- Early diffusion;
- Incorporation;
- Wide utilization; and
- Abandonment.

In the case of technology transfer, the term "introduction" is more appropriate than "innovation" as a descriptor for the initial phase. When transfer is to a developing country, abandonment is likely to correspond to the end of donor support. In such cases, the rate of abandonment would be much steeper if the QALY concept is applied to the technology's decline. Some technologies continue to survive, after withdrawal of external funding, but at significantly reduced intensities of use. Problems with human resources as evidenced by the transfer of Health Management Information System (HMIS) technology to Niger (where of the six persons trained to master's or doctoral level, only two remain with the project [Mock et al. 1993]) and the need for recurrent costs to be borne by donors even after the technology has reached its wide utilization phase as in Chad (Foltz 1993), tell only part of the story. Foltz (1993) refers to larger issues in the administrative environments of African countries which impinge on the sustainability of a the transferred HMIS technology in Chad. In the same vein, problem trees developed for health in Cameroon by Brinkmann (1992) and for health care technology by Kwankam et al. (1993) show political instability, absence of clear and effective policy, and lack of information as root causes of ineffectiveness and inefficiency in the health sector. These are likely to adversely affect the sustainability of any transferred technology. The same is likely to be true of other sub-Saharan African countries.

A Model For Sustainability Of A Transferred Technology

Mock et al. (19993) see the sustainability of HMIS (automated information system as they call it) in Niger as depending on two factors:

- Financial sustainability — annual computer-related recurrent cost, including replacement of equipment is US $30,000; and
- More importantly, human resources to maintain and upgrade the system.

While financial and human resources are key determinants of sustainability in any system, the model is too general to provide direction as to how to go about ensuring this sustainability. Kwankam and Ngundam (1994) have developed a model for maintainability of equipment in what they term "suboptimal environments." The model views maintainability as belonging to a four-vector space, namely spare parts, facilities, know-how, and documentation. Whereas the final output is a quantitative measure of system maintainability, the mathematics are kept very simple, consisting mostly of addition and multiplication of binary operands.

Similar considerations suggest a model for sustainability, based on four factors:
- User know-how: training and documentation;
- Consumables: cost and supply network;
- Diffusion: market (opportunity) and affordability (cost); and
- Institutional backing.

It is clear that for a health technology which is medical device dependent, maintainability of the device is indispensable to sustainability of the technology.

Here, know how now refers to skills needed by people who operate the technology, which as in the model for maintainability, are enhanced by training and how well documented the technology is. Consumables are analogous to spare parts, and depend not only on cost but the existence of supply networks. How well diffused the technology is influences its sustainability. Wide utilization and diffusion generally mean:
- A broad market base due to successful commercialization or charitable distribution;
- Deep penetration levels geographically or, in terms of societal strata; and
- Existence of mechanisms for promoting the technology.

Once widely diffused and utilized, societal inertia becomes a force against rapid abandonment.

The key element in this model is institutional backing. Although the other three elements can collectively make up for its absence, they often owe their existence to it. In a developing country, this usually means government support. In developed countries, one form of support is reimbursement and or subsidization by government or insurers for use of the technology. Government support has a positive impact on diffusion. National programs or campaigns based on the technology are the most common ways of getting wide utilization. Government backing can strengthen training programs and provide access to information on the technology, thus promoting user know-how. Institutional support can be instrumental in acquisition strategies for consumables to reduce costs through
- Bulk purchases;
- Purchase of drugs by generic type; and
- Use of international agencies, such as IDA for pharmaceuticals.

Institutional backing in some cases is analogous to "orphan technology" status, as proposed by Wagner (1992). The two conditions for this status are
- Commercial viability criterion, technology would not be developed by private sector due to lack of commercial viability; and
- Cost-benefit criterion; benefit to be derived exceeds cost of development and production.

How Does IBL Plan To Sustain This Technology?

IBL has registered an affiliate commercial company for entrepreneurial purposes. Multicentre trials are envisaged, and it is seeking partners for joint venture further development and commercialization of its products. Free et al. (1993) advocate this as a means of ensuring successful transfer of health technologies. Meanwhile contract work provides financial supplements to grant funds. IBL is on contract to the Lindsley F. Kimball Institute, New York Blood Center, to perform cloning and high level expression of a cysteine protease inhibitor of *O. volvulus* (onchocystatin).

Long-Term Sustainability Requires Growth

IBL is also involved to a lesser extent in agricultural biotechnology, where their main interest is in two areas; micropropagation and growth factors to enhance micropropagation. They have so far identified a growth factor which is believed to be more effective than most commercially available ones. Their strategy for long-term sustainability is based on commercialization and response to market forces. This implies growth. This is true for Pakistan, where Burney (1993) claims that sustainability of vaccine production needs growth in terms of

- Diversification of the line of products (basic capacity exists); and
- Adaptation to changing health conditions; as interventions spread and programs succeed, markets for specific products decrease (need to go from 10-dose vial to single-dose vial).

Long-term sustainability of the IBL technology and the HIV dipstick will be based on commercialization and response to market forces. These are good generic products. Others of the same type will follow. The market is unlimited for the foreseeable future. IBL is, even now, interested in the dipstick method for parasitic diseases in general.

Nurturing Environment for Technology Sustainment

Cameroon has a model for institutional support to ENHR. This is the National Epidemiology Board, which is set up to act as a liaison between the Ministry of Health and the research community. It was created with the encouragement of the Rockefeller Foundation and funded almost wholly by the Foundation. The Board could provide a nurturing environment for the sustainment of technologies in Cameroon.

Conclusion

Visionary individual effort was responsible for identifying biotechnology and the HIV dipstick as the subjects of technology transfer. The outcome of this vision and ensuing development strategy are diagnostic tools adapted to developing country conditions and local biotechnology capacity for further development. These tools will permit early and rapid diagnosis of onchocerciasis and the HIV virus, thus providing health, social and economic benefits through prevention of blindness and other complications of onchocerciasis, and the prevention of the spread of AIDS. These technologies are likely to be sustainable, as all elements for their sustainability appear to be in place.

The model for sustainability of transferred technologies and the IBL and HIV dipstick experiences could be helpful to other developing countries.

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GROUP DISCUSSION OF CASE STUDY 1

This case study of technology transfer in the Cameroon relates to the transfer of diagnostic technology for two prevalent conditions: onchocerciasis and HIV. Manufacture for diagnostic tests had essentially been nonexistent in Africa up to now.

The paper presented the establishment of a biotechnology centre soon capable of developing diagnostic tests for onchocerciasis and then went on to describe the transfer of the technology required for the local manufacture and regional dissemination of an HIV dipstick, in collaboration with PATH, Canada.

Whereas there was a formal needs-assessment for the HIV dipstick technology transfer, this was not the case for the work on onchocerciasis diagnostic test development.

Whose Needs?

One of the key questions raised during the discussion of this case study was

Whose needs are being addressed?

Participants in the discussion pointed out that needs could be defined quite differently depending on the stake-holders: the community, the consumers of health services, the providers of health services, those involved in public health and policy.

Who sets the priorities? Needs-based assessment can be quite difficult because of the number of actors with conflicting priorities and competing local, indigenous, national, and global needs and priorities. The group recognised the importance of considering local priorities.

There are more than just health needs. Needs-based assessment must be considered quite broadly in terms of health, technical, economic, and other elements, using an integrated approach.

The discussion then turned to the issue of community-identified needs versus the role of a visionary individual (Visionary Individual Effort or VIE described in the paper). The group concluded that both were needed: a community-based approach appears essential but you need a champion to be an advocate and ensure the success of the endeavour.

The HIV dipstick was created in response to the need for a simple, no-instrumentation, low-cost diagnostic test of an important condition where diagnosis and screening are key to controlling the AIDS epidemic.

Even if onchocerciasis was relatively low in the ranking of conditions according to burden of disease in Africa, using the methodology presented in the 1993 World Development Report, it nevertheless is a disease that causes much suffering and that deserves international priority.

Needs Assessment Methods

Needs assessment methods should emphasize priority setting (burden of disease, cost-effectiveness of intervention, feasibility, and community concern). The issue of sustainability appears particularly important and probably has not received in the past the attention it deserves.

Even if the burden of disease may appear relatively low, such as in the case of AIDS in Cameroon at the time when the needs assessment for the HIV dipstick was carried out, we should consider long-term needs, in this case the evolution of the AIDS epidemic. In this case we should consider the potentially important prevented mortality and morbidity and the cost savings from having limited the ultimate size of the epidemic.

The weak health infrastructure in rural areas should be taken into account: this is where a simple device such as the HIV dipstick has a significant comparative advantage.

Commercialization

Recognising the importance of needs-based technology assessment, the group felt that it was important to also carry out ***demand-based*** *assessment: will there be sufficient demand locally (nationally) and internationally at a reasonable selling price based on the cost of manufacture, i.e., what will be the local and global markets for the product.*

It was pointed out that, often, for technology targeted to the specific needs of developing countries, there is insufficient financial incentive to attract private commercial firms. In these cases, parastatal agencies, less dependant on the profit requirements, or internationally subsidized initiatives, may have a particular role in developing and initially marketing such products.

What will be the commercial viability of the technology? Will the product be competitive in price and in quality with similar products produced elsewhere? An example was given of a developing country polio vaccine development project which lead to the production of an uncompetitive vaccine.

Will there be sufficient demand from individuals, NGOs, governments, or international agencies? What price subsidization will be required to make the product accessible to the poorer populations of developing countries? (Will the demand be solvent or insolvent?) Who will cover the cost of this subsidy? The example of the difficulty of developing new vaccines of particular relevance for developing countries was given.

Three solitudes were identified: research, industry, and investment, each working in isolation. To ensure success of such ventures, one must combine the three and consider international linkages, patents (to ensure sufficient return on investment), the manufacturing potential, and finally marketing and distribution).

In the case of the HIV dipstick, the domestic market in Cameroon was sufficient to make the project financially viable. The export potential, studied in collaboration with Laval University, Quebec, Canada, also appeared significant, especially within the African region.

It was pointed out that the needs-based assessment carried out for the HIV dipstick had been extremely costly. However, this needs assessment carried out early in the product development cycle was one of the key elements to the success of the project.

Did Technology Transfer Take Place?

When looking at the question as to whether technology transfer took place or not, it is clear that this has already occurred in the case of the HIV dipstick. In the case of the onchocerciasis project, the project was designed to set-up in country a biotechnology centre capable of developing simple diagnostic tests for onchocerciasis. In this case, the technology transfer occurred earlier in the product development cycle, thus requiring a longer time period to product availability. The centre is up and running and work is in progress in the development of such diagnostic tests.

What Were the Links to Policy?

The group then turned its attention to the question whether the case study was linked to policy making. In the case of the onchocerciasis project, there are not yet any links to the policy making process. However, the HIV dipstick project has clear and important links to health policy and programs as regards to access and cost of HIV diagnosis and screening.

Other Benefits

The participants then discussed the other benefits accrued from these projects. Aside from the new diagnostic technique for HIV and for the new biotechnology centre in the Cameroon, a local capacity has been built which should provide a core platform to address more indigenous needs and national priorities. Although it is difficult to quantify its value, most felt that this capacity building process was important for the country, especially when one takes the long-term view to health systems development.

Needs-based assessment is useful in setting priorities and in project planning; it makes one look ahead and determine sustainability.

A network has begun to develop in country to carry needs-based technology assessment. This should contribute to the increasing use of this methodology and in the long run to more cost-effective health services.

CASE STUDY 2.
HEALTH TECHNOLOGY ASSESSMENT IN THE CARIBBEAN
—
A NEEDS-BASED APPROACH

Ana Rita Gonzalez and Janet Hatcher Roberts[1]

In spite of real progress in health care facilities and equipment innovation in the past decades, the health systems of the countries of the English-speaking Caribbean are not optimally organized to apply the primary health care strategies endorsed by all the governments. Many of the basic health needs of the population are not met at all; others are met at high costs; still others are met with inappropriate or excessively costly treatments.

Many of the deficiencies and inefficiencies of primary health care in the region are the result of management problems, in particular the management of health technologies. In general, mechanisms and procedures to assure access to the appropriate level of health care are faulty. Specifically, the distribution of equipment within the health sector is unsystematic. The selection of medical devices both at the time of purchase and at the moment of treatment is often inappropriate. Problems of technology management are exacerbated by the rising costs and sophistication of imported medical devices.

Current financial constraints in these countries make the replacement of many medical devices impossible. The development of management systems for health technology would help support more cost-effective care particularly at the local level.

Management of health technology was defined for the purposes of this project as "appropriate selection, acquisition, positioning, maintenance and replacement of all types of health technology, including equipment instruments and specialized health personnel."

The countries involved in the research project are Dominica, Jamaica, St. Lucia, and Trinidad and Tobago. The National Institute of Higher Education, Research, Science and Technology (NIHERST) was contracted to coordinate and administer the project. IDRC and PAHO are cofunding the project. It began in 1990 and should conclude in early 1994.

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Janet Hatcher Roberts, a Registered Nurse, holds a BA in Anthropology and an MSc in Epidemiology. She has contributed to research related to health care delivery, development and evaluation of health indicators, community-based environment and health projects, and occupational health. She was an Assistant Professor, Department of Community Health and Epidemiology at Queen's University, Kingston, Ontario, worked with the Government of the Province of Ontario as Project Director of Strategic Health Planning (Health Goals for Ontario), as a policy analyst at Health and Welfare, Canada and as Deputy Director of Research for the Royal Commission on New Reproductive Technologies. She is currently Senior Program Officer, Health Sciences Division at the International Development Research Centre (IDRC).

The overall goal of this project is to develop a regulatory and a management system for health technology.

The specific objectives are

- To describe the present situation of the management of health technology for local health services of Dominica, Trinidad and Tobago, and St. Lucia;
- To analyze the use and performance of selected technologies relative to the capacity of the technologies to meet the needs of the population using a national sample of community health centres in the participating countries;
- To analyze the use, frequency of use, and performance of selected technologies at the hospital level; and
- To analyze the problems identified in technologies at the community health centre and at the hospital as they refer to *deficient* regulations and management systems.

The policy related objectives of this project are

- To design *blueprints* for national policies to improve the regulation of health technology;
- To develop and test specific management and *information systems* for planning, selecting, purchasing, using and maintaining health technologies and when appropriate, developing the necessary computer software; and
- To identify national training needs for the improved management and regulation of health technologies and design and implement programs to help fill these needs.

The discussion session involved as cochairs Dr P. Manga (University of Ottawa), Dr Pena Mohr (PAHO), Dr Michael Cooper (Health Canada) — formerly Medical Devices Division, and Ana Rita Gonzales (PAHO) by phone hook-up and myself from IDRC as the two current people responsible for the project. Drs Mohr and Cooper were the originators of this project.

GROUP DISCUSSION OF CASE STUDY 2

What are the Elements of a Needs-Based Approach?

Community-Based Surveys and Data

- *It was agreed that these should be reflective of needs at the community level.*
- *The Inter-American Development Bank has funded a project to address problems associated with the relevance of information in health data collection. Of concern here is the difficulty of determining community needs if surveys are primarily collecting data on individuals accessing the health care system (utilization-based data). Hospital-based data for instance, tends to be reflective only of those who access, thus not giving a true picture of community based health status.*
- *Patient satisfaction should be examined as part of the health service data collection.*
- *Emergency room use in small geographic areas such as islands may be quite useful in assessing local need for this service (if distances are short and direct and indirect costs very low).*
- *The health services provide disagregated data which are often difficult to relate to a given population.*
- *Present data tends to focus on what exists (e.g. age) and not what is required from a community perspective.*

Whose Needs Count?

- *Politicians, practitioners, companies, institutions, communities, patients/users, and industry? Need is usually defined by seekers of care and providers of care.*
- *Consensus definition: mortality and morbidity.*
- *Due to access problems (financial and geographic barriers to access), volume of services may not reflect community needs; these should be determined through household level surveys (concern was expressed concerning the raising of expectations in a community by conducting surveys).*
- ***Equipment:** Are people able to use the equipment? Is the human resource support sufficient to use it? Are purchases based on needs? The answers to these questions are dependant on political imperatives which may or may not reflect assessed needs.*
- *In some cases, regional needs and institutional goals differ significantly. Feedback on successes/failures would be useful.*
- *As well, it is difficult to do long-term planning in the face of political instability. The ability of organizations to set research priorities and determine existing or emerging needs may be adversely affected.*

Has This Case Study Taken a Needs-Based Approach?

- *Yes, but in a narrow sense only — the project began as an equipment/technology overview more than an assessment of technologies in relation to population or community needs. As well, our definition of needs-based technology assessment (NBTA) has shifted since 1988–89 when the project began.*
- *Interviews involved users only, did not utilize community participation approaches.*
- *Project driven by perceived needs based on mortality and morbidity and by institutional needs.*
- *Alternative sources such as health associations or NGOs could have been included in the project.*

What Were the Needs-Based Methodologies Used in This Case Study?

- *Questionnaires reflected utilization and were designed for primary health care clinics, planners at the health ministry level, and hospitals.*
- *The data analysis was primarily descriptive.*
- *The interpretation and utilisation of data was carried out through a consensus conference.*
- *Preparation of questionnaires involved participants from health administrators; ministries of health; Health Canada; and IDRC.*
- *The questionnaires were pretested with Permanent Secretaries and other senior staff and refined in two- to four-stage iterative approaches.*

What Are the Emerging Overall Methodologies or Approaches to Needs-Based Technology Assessment?

- ***Ethical Issues**: Addressing the ethical issue of providing services and technology investment which will have an impact in the population. How to make technology investment effective in the face of scarce resources?*
- ***Quantifying burden of disease**: Different issues of assessing needs based on DALYs, QALYs etc. How should a project such as this analyze data that has been collected. Is it possible to understand the relationship between certain technologies and the outcomes as measured in QALYs or DALYs etc.?*
- ***Consumer priorities**: Is it possible to incorporate consumer priorities into these analyses; i.e. what indicator of health status do they value more? Which would make more sense in terms of a needs-based analysis?*
- ***Relation to decision-making:** We are increasingly thinking about what decisions are these findings related to? We now know that there is a need to track our process.*

- ***Clinical trials**: Clinical trials associated with the interventions may be useful in this regard.*
- ***Evaluation**: An evaluation of the minimum package versus the costs of maintaining existing specialized technology would be useful.*
- *Complimentary methodologies or emerging trends identified included efficacy studies, meta-analyses, and literature reviews.*
- *These should be a reflection of community-based burden/need.*
- *Some concern was expressed regarding the possible problem of misinterpreting NBTA as an end in itself rather than applying it as an analytical means to determine community needs.*
- *The use of consensus methodology for decision making (consensus conferences, etc.).*

Given These Emerging Trends, What Would You Incorporate Now That Was Not Done in This Study?

- *Incorporate ethical issues of equitable distribution and resource allocation. It may be that such an addition can be incorporated later in the study: once the analysis happens, it can be folded into the resource allocation decisions.*
- *Consider the issue of productivity versus real use and utility (appropriate use, the issue of false productivity).*

Did the Technology Transfer Actually Take Place?

- *Yes, in the broadest sense in that the research on Health Technology Assessment (HTA) as a methodology was transferred from the North to the South.*
- ***General comments:** Knowledge/technical transfers from North to South often have a strong impact on how research agendas are determined. In order not to lose focus, increased attention should be paid to Primary Health Care sectoral needs in the South.*

Were the Case Study Results Linked to Policy Making? If So, How?

- *NBTA/policy link is crucial.*
- *From the beginning, the project involved ministry officials, hospital officials, CEOs, chief medical officer of health, permanent secretary, etc.*
- *The research project tied into other efforts such as hospital streamlining, and therefore involved administrators and CEOs.*
- *Policy makers involved are included in the consensus conference process.*

- *As well, study results will be presented to CARICOM, the regional association of Caribbean governments. This will move the issues identified in the study to the policy agenda of each member state and of the region.*

- *Public servants should be lobbied to ensure that HTAs are included in 5-year plans. As well, ministers need to know that HTAs are available for the primary health care level.*

Key Issues Identified Through This Case Study

- *There was strong involvement of the policy makers right from the beginning: an early meeting of the policy makers of the Caribbean identified important health service problems. From this, a second meeting with researchers was organised to define the research priorities and designs.*

- *The emphasis was placed on primary care: health centre and district hospital levels.*

- *The project was not really needs-based but rather based on utilisation data (**demand-based** versus **needs-based**).*

- *The project collected different types of information: demographic data for each locality covered by the health facilities; mortality & morbidity data; utilisation data; identification and study of each type of technology (from preventive to rehabilitation) that is applied and used; volume of use of these technologies; the type of devices and drugs used. This provides a very good example on how to study a "package" of technologies and services and to analyze the different "packages" that could be related in the analysis to some population information.*

- *The difficulty of building the database; it is a mixture of methods from surveys and from case studies:*
  - ***At the local level**: Information from medical histories; data from patients to get some input on patient satisfaction; interviews with doctors, nurses and other providers; and*
  - ***At the national level**: Data closely related to the issues identified by the policy makers (problems of resource allocation to see what policies were in place and what methodologies and what information were used: maintenance, regulatory and import problems, education information, staffing information, etc.).*

- *A database was designed to put this information together: this will be an important database for whomever would like to do some further analysis.*

- *Turning to the utilization of the information, one weak part is the methodology for the analysis: to date, it is mainly in the stage of descriptive type of work; it is not yet to the stage of finding relations between technology and some health indicators; researchers are welcome to study the database and to see if the information base will permit this type of analytic inferences.*

- *After the research is finished, a few different consensus conferences will be held with policy makers and researchers. The idea is to use information as a base to support decision-making in relation to the issues submitted by the policy makers to the research community.*

- *Issues which are likely to come out of this process include: the variety of technologies found at the same level of the health system; what technologies should be available at each level; what is the pattern of referral and where should a specific technology be located.*

- *All those issues will be submitted in an organised agenda for discussion and for policy making purposes. Some technical groups will follow these discussions in terms of implementing and building some systems for national and local planning.*

CASE STUDY 3.
RELATIONSHIP BETWEEN NEEDS-BASED TECHNOLOGY ASSESSMENT AND ESSENTIAL NATIONAL HEALTH RESEARCH
—
EXPERIENCE IN THE PHILIPPINES

Tessa Tan Torres[1]

The Philippine Health Situation

In 1990, the Philippine population stood at 60.7 million, increasing rapidly at a growth rate of 2.3%. Life expectancy at birth was 64.6 years. Among the top five causes of mortality (1988) were pneumonia, diseases of the heart and cardiovascular system, tuberculosis and malignancies. The distribution of causes illustrates clearly the transition phenomenon where the system has to cope with the infectious disease burden of the past simultaneously with the growing threat of non-communicable diseases inflicted by the present.

There are not enough health professionals in the Philippines. The professional: population ratios are listed as follows: one doctor for every 3,125 population, one nurse for every 2,259 population, one midwife for every 3,926 population and one dentist for every 10,799 population. Facility wise, there is one bed per 692 population. Within the country itself, there is significant variation in distribution of expertise and facilities. Access is severely compromised as reflected by the low rates of medically attended births (55%) and deaths (40.6%). The national infant mortality rate stands at 30.1/1,000 live births but in certain regions, the rates are two or three times higher.

Health expenditures constitute only 1.9% of the Gross National Product, translating to an amount of US$5 per capita. Half of this amount is from the government of which 60% goes to the hospitals. The remaining half comes from the private sector with less than 6% from insurance providers. More than 40% are out-of-pocket payments.

In summary, the Philippines has a rapidly growing population, exhibiting the transition phenomenon and with the few resources expended in health unevenly distributed within the country. Despite the recently-gained political stability, no major improvements in the field of health can be expected. An economy struggling to recover cannot as yet fuel a nationwide development leading to less poverty and better health status. Thus, direct investments in health are needed.

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[1] A member of the Clinical Epidemiology Unit, Department of Medicine, Philippine General Hospital, Dr Tan Torres' research interests include clinical economics, infectious/tropical diseases and quality management. These interests are reflected in her on-going research, which includes a grant from the Rockefeller Foundation to undertake a before and after study of the costs and outcomes due to an institution and intensive care service. She is also involved in a Philippine Institute of Development Studies project entitled *A Study of the Relative Efficiency and Effectiveness of Delivering Primary Level Care Services from the Rural Health Unit and from the Provincial Hospital.* As a Rockefeller Foundation sponsored speaker, Dr Tan Torres gave a paper at the INCLEN annual meeting in January 1993 on "Determining the Optimum Number of Views in the Radiographic Diagnosis of Sinusitis."

Essential National Health Research

The first years of the present administration ushered in two significant events. The first is the appointment as Secretary of Health of Dr Juan Flavier, a man who has extensive experience of working in the field of health and development in the rural areas. The second event is the devolution of services, including health, to the local governments. The current administration of the Department of Health (DOH) is steadily steering the department away from its role of direct provider of health services to providing technical, administrative and managerial services to the local governments toward a vision of "putting health in the hands of the people."

One of the main strategies in achieving this vision is essential national health research (ENHR). ENHR was started as the local counterpart of a global movement by the previous secretary of health, Dr A. Bengzon. A practising neurologist, he characterized health research in the country as a mass of convulsing neurons and saw ENHR as a method of coordinating research activity to provide information which would lead to better decision-making and improved health services delivery.

To do this, ENHR embarked on three major activities: defining a research agenda based on the people's health needs, ensuring that agenda-driven research be undertaken and inputting research results to the decision making process. Achieving success in these endeavours required that the people, the academe and the policy makers participated.

ENHR Philippines recently came out with its research agenda for the next 2–3 years (see Table 1). The agenda is a result of a one-and-a-half year process of direct consultation with policy makers and program managers, focus group discussions with individuals from non-governmental organizations and people's organizations and review of existing literature by the academe who subsequently defined gaps in knowledge. The ENHR is now reviewing proposals based on this agenda and sourcing the funds to carry out the research. At the same time, it is strongly engaged in advocacy to create an environment where the policy makers in the DOH will use the results of the research to be produced.

Table 1. ENHR priority short list.

1a	Study on indigenous beliefs and practices in health (culture specific) (Phase I)
1b	Relationship of cultural/religious beliefs to health messages (Phase II)
2	Studies on the effectiveness of sectoral linkages in the implementation of Department of Health (DOH) Programs utilising the primary health care approach
3	Assessment of training needs of DOH Local Health Board Members
4	Baseline studies on epidemiology of mental health problems
5	Baseline or intervention studies on Infectious Diseases of public health importance not covered by other funding agencies
6	Study on health problems of special marginalized groups (street kids, children in armed conflict, victims of violence/internal refugees, political detainees, victims of natural calamities, and disabled)
7	Studies to develop effective strategies to rationalize drug use in hospitals

Needs-Based Technology Assessment and ENHR

ENHR requires that technology assessment be needs-based. Taking the broad view of technology as a "set of techniques, drugs, equipment and procedures used by health care professionals in delivering medical care to individuals and the system within which such care is delivered," assessment of such underlies each item in the research agenda. ENHR emphasizes that the assessment should always be agenda-driven, and therefore needs-based, and that the existing expertise and resources for carrying out technology assessments be devoted primarily to the ENHR agenda.

The following are two examples of technology assessment. The first is an example of successful assessment of a disembodied technology, the World Health Organization–Acute Respiratory Infection (WHO–ARI) algorithm. The second, Urine Screening, represents a failure of policy to be guided by needs-based technology assessment.

Case A: WHO–ARI Algorithm

Acute respiratory infections (ARI) encompass pneumonias, which is one of the top causes of mortality especially among children aged 5 and below. The WHO–ARI algorithm depends on two simple signs of respiratory distress to guide management: rapid respiratory rate of >50/minute is an indication for use of antibiotics and chest indrawing for hospitalization. Its simplicity and non-dependence on instruments allow the algorithm to be implemented by health professionals other than doctors, thus improving access to services. The WHO–ARI algorithm was pilot tested for 5 years in Bohol, southern Philippines, and compared with the standard provider (in this case, a doctor) dependent approach of treating ARI. There were 10,000 children/group in eight municipalities. Results show that WHO–ARI was more cost-effective compared to the provider-dependent approach. In addition, it brought the technology into the hands of village health workers and trained mothers. The results of the project became the basis for a nationwide Control in Acute Respiratory Infections program of the DOH.

Case B: Nationwide Urinalysis Screening Program

In its enthusiasm to promote preventive services, the Department of Health launched a nationwide urine screening program. Nephrologists cite chronic glomerulonephritis as the most common cause of end stage renal disease (ESRD) in the country. Treatment, in the form of dialysis or transplant, is expensive and can be offered only to a few patients. On the assumption that screening of urine by dipstick will detect proteinuria and prevent cases from progressing to ESRD, it was proposed that all schoolchildren be screened. Although recommended by the American Academy of Pediatrics, a review of literature reveals paucity of rigorous evidence showing the efficacy of screening for proteinuria to prevent progression of renal disease to ESRD. Thus ultimately, the program, despite its good intentions, may end up consuming more resources and straining the limits of the health care system. In this particular case, close monitoring and early reassessment are needed.

Summary

These two cases illustrate the importance of needs-based technology assessment. The first case addresses a major burden of illnesses and used an algorithm validated in local and foreign studies to

be cost-effective and simple to use. The second technology has been promulgated into policy without undergoing any rigorous assessment. ENHR's role is to promote more Case A's and exercise its influence in preventing more Case B's from occurring. Through needs-based technologies assessment, both may be accomplished.

GROUP DISCUSSION OF CASE STUDY 3

How Do We Define a Needs-Based Technology Assessment Approach?

The discussion started with how to define need. Need is subjective and may differ according to whose perspective is taken: the consumer's or the provider's or both. The perceived need may depend on one's background knowledge and beliefs; these may sometimes be inadequate or inappropriate, e.g. the perceived need of some communities to stop feeding a child when she/he has diarrhoea may be entirely inappropriate.

Has This Case Study Taken a Needs-Based Approach?

This case study illustrates a needs-based approach. People's needs were prioritized and gaps in knowledge for cost-effective action were identified, using ENHR methodology. The WHO–ARI study was an example of an excellent needs-based technology assessment: ARI is responsible for a large burden of disease for which there is an effective intervention. The study tested rigorously a diagnosis algorithm based on physical signs which mothers could easily identify (if respiratory rate > 50, then use antibiotics; if indrawing, then go to the hospital) compared with usual care.

The other example used, screening for proteinuria to prevent end-stage renal disease, clearly showed how a program implemented without a scientifically rigorous review, was both ineffective and very costly in a country with limited resources for health.

The contrast of these two examples underscore the need for NBTA.

What Were the Needs-Based Methodologies Used in This Case Study?

The needs-based methodologies used in this case study were

- *A country ENHR strategy with clear priority setting; and*
- *A community-based randomized controlled trail (RCT) to test a diagnostic algorithm.*

What Are the Emerging Overall Methodologies or Approaches to Needs-Based Technology Assessment?

There was discussion that the disability adjusted life years-based (DALY) method of defining need may be insufficient especially in developing countries, because

- *It is exclusively quantitative;*
- *The economic values of the country may not be properly reflected in the DALYs calculations; and*
- *Of the serious risk of underestimating problems which are difficult to quantify or under reported, such as violence against women, for example.*

Several participants felt that both qualitative as well as quantitative methods should be used. Epidemiologists and social scientists should join hands and use interdisciplinary approaches to needs-based technology assessment (NBTA).

Methods for priority setting for research and action may have to be different. While the disease burden may be adequate for research priorities, both disease burden and cost-effectiveness should be considered for action and should be combined with community perception (community concern).

It is important to be aware of, and prepared for, resistance and opposition to the rational priority setting methods from various interest groups; for example, some pharmaceutical industries may object to the concept of an essential drug list. At the same time, it may be prudent to involve the industries in the technology assessment (TA) as they may support the activities and may help in meeting the objectives of TA. The industries have felt the need to get involved in the process because they are increasingly being asked to produce evidence for cost-effectiveness of interventions which they may come up with. An example of successful collaboration was between WHO and manufacturers of cold chain equipment.

NBTA should preferably be carried out before, rather than after, the production program for a new technology is started.

Work is needed to develop better methods and skills to involve communities in needs assessment and in taking ownership of their health and health services. A potential problem may be the lack of a common language between various researchers, policy makers and communities.

Did the Technology Transfer Actually Take Place?

Yes. In the WHO–ARI example, the low cost technology of ARI management was successfully transferred from usual providers to village health workers and to some extent even to mothers of the children.

Were the Case Study Results Linked to Policy Making? If So, How?

The WHO–ARI management scheme is being considered for wider dissemination across the country by the Government. This is apparently easy and the main reason for this was the involvement of the policy-makers in the project from its very beginning. As a result the policy makers were already primed to the results of the study: they were already prepared to make it a policy if the results of the project were positive.

Key Issues Identified Through This Case Study

This case study reminds us that we are just beginning to address needs-based cost-effective health care: in the Philippines, despite a recent increase in emphasis on primary health care, still 60% of its health dollars continue to go to hospital care.

Rigorous research methods (in this case a well executed community-based randomized controlled trial) can provide clear answers about the cost-effectiveness of new interventions or management strategies.

The needs vary depending on who is doing the assessment; whether it is the provider versus the community, one might come up with very different assessment of the needs. An almost universal

opinion of the participants was that the communities should be involved in needs assessment and that community perception was the most important aspect of identifying needs. Nevertheless, the comment was that the community was a multisegmental entity, full of distinct interest groups; it is important to recognize and describe this phenomenon. One therefore needs significant qualitative research to sort out the beliefs and the priorities of the community.

An excellent example was presented during the discussion of an HIV prevention project in Haiti in which qualitative research found out that actually a significant number of individuals in Haiti believed that AIDS was a curse; and if you believe that AIDS is a curse, you are not necessarily going to think that condoms are going to work. Knowing this then allowed the more rational design of quantitative studies and intervention programs targeted at reducing HIV transmission.

How do you prioritize needs? From a national perspective one would want to look at the burden of disease using standard epidemiological techniques (mortality, morbidity, etc.) but also examine the issues of concern to the communities.

If in these high-burden illnesses, there is evidence of cost-effective interventions (both treatment and preventive interventions), one might want to go ahead and introduce these interventions as one may not need do a lot of local research. It was pointed out, however, that we may have evidence about the cost-efficacy of an intervention but that the cost-effectiveness in an individual community may not be known and therefore there might still be the need for some local research. However, if one does the research in too small a community, the results may not be generalizable to the whole country and the study may not be that useful from a more general point of view.

If the evidence for cost-effectiveness does not exist, one probably should do research in areas where there is as reasonable likelihood of success. Having a high-burden illness is not in-and-of-itself sufficient to warrant research; you need a reasonable prospect for a cost-effective, acceptable intervention.

To ensure sustainability, community involvement is crucial; opinion leaders and funders must also be involved. There is, however, often a problem with lack of common definitions & goals. Also, one often tends to focus on the process and less on the outcome.

Methods of communication need to be improved from the community to the health care sector and from the health care sector to the community. New methods and approaches need to be developed in this area.

To date, little has been done to evaluate the cost-effectiveness of the Essential National Health Research (ENHR) process. There is still relatively little emphasis on quality adjusted life years (QALYs) or disability adjusted life years (DALYs) and often one is confronted with a paucity of good epidemiological data.

CASE STUDY 4.
PART I — THE COMMUNITY-ORIENTED PROGRAMME FOR THE CONTROL OF RHEUMATIC DISEASE

John Darmawan[1]

Abstract

The WHO–ILAR–APLAR COPCORD is a program on community-based epidemiology, treatment, and prevention of rheumatic disease. It is divided into three stages and each stage is subdivided into several phases. The completed phases in Stage I indicated the appropriateness of the skilled manpower and time and cost estimates. Stage II addresses the manpower problem and patient education. Stage III looks into the etiological aspects of common chronic rheumatic diseases.

Stage I has identified the following five health problems:

- *Perceived need for treatment of more than 80% of the patients with recent musculoskeletal pain;*
- *Primary health care was inadequate for management of patients with chronic rheumatic disease due to lack of undergraduate rheumatology teaching of the primary health care professionals, lack of laboratory and rehabilitation equipments, and the limited supply of antirheumatic drugs;*
- *The majority of rheumatic patients resorted to nonofficial health care inclusive of self-medication, which proved unsatisfactory;*
- *Rheumatic disease entities, which were thought to cause major health problems were low back pain, osteoarthritis, gout, and osteoporosis, due to their high prevalence rates;*
- *There was rampant abuse of corticosteroids and their combinations with local and imported antirheumatic herbs in capsules.*

A pilot study to test the feasibility of COPCORD Stage II and III on gout is ongoing.

Introduction

During the seventies the International League Against Rheumatism (ILAR) urged the World Health Organization (WHO) to launch a major programme for control of rheumatic disease. On the request of ILAR, World Rheumatism Year was declared in 1977 by WHO. WHO is principally interested in a world-wide programmatic approach of disease control with emphasis on the majority of the world population living in the rural areas of developing countries. Their main concern is with the common rheumatic disorders such as osteoarthritis and extra-articular rheumatism (low back pain). These musculoskeletal disorders are believed to be the major cause for most of the suffering and pains (Frank 1993; WHO n.d.a, b;).

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In spite of the importance of musculoskeletal disorders both to society and to the many individuals affected, attention generally tended to focus on disorders associated with high mortality rate in the developing countries. It can be foreseen that improving life expectancy within the coming decades in most developing countries will increase the burden of chronic conditions such as rheumatic diseases with all the psycho-socioeconomic consequences. Evidently, but not realized, chronic musculoskeletal disorders may already have partially hindered the development of third world countries.

Status of Arthritis Care

Between 70 and 75% of the world populations live in the developing countries (Nakajima 1992). What is the status of arthritis care for more than four billions people in the developing world? The psycho-socioeconomic burden of rheumatic disease has been established in some developed countries (Pincus et al 1989; Eklund and Fuglmeyer 1991; Eklund et al. 1991; Barquero et al. 1992; Frank 1993). The results of COPCORD Stage I revealed rheumatic pains are ubiquitous when age and sex adjusted (Darmawan et al. 1992b).

WHO–ILAR–APLAR COPCORD

WHO–ILAR–APLAR COPCORD (World Health Organisation, International League Against Rheumatism, Asia Pacific League Against Rheumatism, Community Oriented Programme for Control Of Rheumatic Disease) is a comprehensive three-stages program for the assessment of the need for arthritis care and the short term and long term solution of the problems for the developing world. It consists of three stages (Grabauskas 1983) and each stage may be subdivided into several phases.

COPCORD Stage I

Stage I is the collection of epidemiological data on rheumatic disease and comprises three phases. The main reason for the different phases is saving of manpower, time and cost, which is mandatory in developing countries. **Phase 1** is the screening of a minimum of fifteen hundred people 15 years of age and over of the total population of a designated area for recent (within one week) and past rheumatic pain. A simple questionnaire, which queries musculoskeletal pain, disability, and help seeking behaviour is applied by Primary Health Care Workers in illiterate or self-administered in literate population samples. The minimal sample size of fifteen hundred people 15 years and over provides adequate statistical power and 95% confidence interval for the analysis of the prevalence rate of the various common rheumatic disorders.

In **COPCORD Phase 2**, the respondents with rheumatic pain are interviewed with a more detailed questionnaire by a nurse to select the serious or chronic arthritis cases for physical examination by a physician who is familiar with rheumatic disease in **Phase 3**. Depending on the local availability of skilled personnel and resources, **Phase 1 and 2** can be combined into one phase and **Phase 3** can be extended with serology and radiology if funding is available. Serology and radiology are applied to arrive at more definite diagnoses.

Of the 1,500 respondents interviewed by the primary health care workers or self-administered in Phase 1, approximately 25% (± 375 subjects) needed to be reinterviewed by the nurse in Phase 2. In

Phase 3, less than 5% (fewer than 75 patients) had to be physically examined by a physician skilled in the management of commonly encountered rheumatic disease. A significant saving of personnel (nurse and physician skilled in handling common rheumatic disease), time, and costs were achieved in the completed COPCORD Stage I study.

Analysis

Analysis of the data of COPCORD Stage I has identified the following five health problems (Darmawan 1988; Darmawan et al. 1992a, 1993a).

- There was perceived need for treatment of more than 80% of the patients with recent musculoskeletal pain.
- Primary health care was inadequate for management of patients with chronic rheumatic disease due to lack of undergraduate rheumatology teaching of the primary health care professionals, lack of laboratory and rehabilitation equipments, and the limited supply of antirheumatic drugs; official health care comprises visit by the patient to the community health center and to the physician, the nurse and primary health care workers.
- The majority of rheumatic patients resorted to nonofficial health care inclusive of self-medication, which proved unsatisfactory; nonofficial health care covers treatment by self-medication, masseur, acupuncturist, acupressurist or reflexologist, traditional healer, herbs, faith healer, etc.
- Rheumatic disease entities, which were thought to cause major health problems were low back pain, osteoarthritis, gout, and osteoporosis, due to their high prevalence rates.
- There was rampant abuse of corticosteroids and their combinations with local and imported antirheumatic herbs in capsules.

Arthritis care is inadequate or nonexistent for most of the people in the developing and less developed countries. The main reasons are lack of manpower, service infrastructure, supporting resources, and the absence of undergraduate and postgraduate rheumatology and patient education. In most developing and less developed countries Western trained and local self-didact rheumatologists can be counted with the fingers. Rheumatology health professionals (rheumatology physiotherapists, occupational therapist, and social workers) are nonexistent. The primary and secondary health care centres are not equipped to cope with rheumatic disease. Only a few tertiary health care centers, which are understaffed, have some facilities for rehabilitation of chronic arthritis. Inadequate and lack of social security and health insurance make treatment of chronic disease a hit and run operation. Nonexistent or fledgling arthritis foundation is not of much help. The state and the number of teaching rheumatology units in several Asian countries preclude the training of adequate number of rheumatologists in the short term (Table 1). China with a population of 1.2 billion people may be

Table 1. State teaching rheumatology and private rheumatology units in some Asian nations.

	India	China	Iran	Taiwan	Japan	Pakistan	Bangladesh
Total rheumatology units	7	–	6	4	129	–	–
Total divisions of rheumatology	7	30	20	14	111	–	–
Total divisions and units	14	30	26	18	240	–	–
Units/million population	57.1	36.7	2.6	0.9	0.5	–	–

satisfied with two understaffed teaching rheumatology units. India with almost 900 million people has only one understaffed rheumatology teaching unit. Indonesia with 186 million people has only one rheumatology teaching unit. Pakistan and Bangladesh, each with more than 120 million populations have no rheumatology unit. The table shows the average number of people per million served by one rheumatology unit.

COPCORD Stage II

The other option left is to carry out a feasibility study in a pilot project on the appropriateness, cost-effectiveness, adequacy, and efficiency of rheumatology undergraduate teaching for primary health care professionals in COPCORD Stage II. COPCORD Stage II comprises education in primary arthritis care by primary health care professionals and patient's education, and the attempted identification and control of environmental risk factors of musculoskeletal disorders.

Identification of the most frequent used coping strategies applied arbitrarily by patients with chronic arthritis may induce the development of improved coping techniques. If education in primary arthritis care improved quality of primary health care through improved knowledge, and controlled of environmental risk factors by improved coping strategies reduces morbidity, and disability, then the model COPCORD Stage II education can be disseminated in the developing countries. This includes the printing and distribution of the field-tested education booklets, each separately for the education of primary health care physicians, the paramedics, and the patients.

Arthritis Community Education adjusted to the local culture such as by the leather puppet shadow play (*wayang kulit*) improved knowledge of the patients compared with controls (Darmawan et al. 1992c). Therefore, coping strategies of patients with chronic arthritis should be adapted to the local cultural characteristics, beliefs, values and language of the people to ensure successful application.

COPCORD Stage III

Stage I has shown that chronic interactions between an environmental risk factor and a predisposed individual can induce the manifestation of a musculoskeletal disorder (Darmawan et al. 1993b). By cooperation with an advanced research center, COPCORD Stage III will attempt to identify genetic risk factors of rheumatic disease by molecular biological or other technology to attain a better understanding of the chronic process(es) of interaction(s) between or among environmental and genetic risk factors in the causation of the manifestations of chronic rheumatic disease. Due to the high prevalence rate of gout in adult males, a pilot study has been launched on December 18, 1993, in the province of North Sulawesi, Central Indonesia, to test the feasibility of COPCORD Stage II and III.

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CASE STUDY 4.
PART II — A QUALITATIVE APPROACH TO TECHNOLOGY ASSESSMENT: THE COMMUNITY ORIENTED PROGRAM CONTROL OF RHEUMATIC DISEASES IN BRAZIL

Marcos Bosi Ferraz[1]

There is an urgent need for high quality data about the magnitude and impact of rheumatic disorders in developing countries, especially in Latin America. Such data can bring attention to the substantial health impact of this group of disorders and can inform decisions regarding appropriate services for detection and treatment.

In order to evaluate the burden of illness attributable to rheumatic disorders in Latin America, a group of rheumatologists and clinical epidemiologists (all members of the International Clinical Epidemiology Network Program) decided to use the WHO–ILAR–COPCORD (Community Oriented Program for the Control of Rheumatic Diseases) approach.

It consists of three stages:
- Stage 1: Epidemiological data of rheumatic diseases are collected;
- Stage 2: The primary health care professionals are educated in the management of the most common rheumatic diseases;
- Stage 3: The aim is the improvement of heath care and health status.

The COPCORD Questionnaire is a single screening instrument intended to identify individuals with a high probability of rheumatic diseases who are referred for a further detailed clinical examination by a rheumatologist. Therefore, the goal of the selection is to maximize screening accuracy through the selection of items with a predictive value, rather than to ensure comprehensive sampling of all possible domains and/or items.

The domains related to rheumatic diseases included are
- Pain and symptoms;
- Disability;
- Coping;
- Seeking behaviour; and
- Treatment.

After initial group discussions, the original COPCORD Questionnaire was slightly modified aiming at the achievement of a greater face and content validity when applied to a latin-american environment. A Pan American League Against Rheumatism (PANLAR) English version was defined.

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As every crosscultural project involves the uses of language and potential problems may arise with the translation of the most simple sentence, the investigators decided to translate the instrument into Portuguese and Spanish as well as to evaluate the new instrument measurement properties.

The following study phases were conducted in Brazil, Chile, and Mexico:

1. Translation of the instrument
   - Primary translation;
   - Evaluation of the primary translation;
   - Evaluation of cultural equivalence; and
   - Definition of the Portuguese/Spanish version.

2. Evaluation of reliability — Hospital based sample
   - Intra-observer; and
   - Test–retest.

3. Community validation study
   - Sensitivity;
   - Specificity; and
   - Number of physical exams avoided.

I will now present the results of the study entitled "Validation of ILAR/COPCORD Core Questionnaire (ICQ) against physical examination" that was performed in Embu, Sao Paulo, Brazil. The objective of this study was the evaluation of the sensitivity and specificity of the Portuguese version of the ILAR/COPCORD Core questionnaire in terms of screening rheumatic diseases.

Six streets of one district of Embu were randomly selected and had 76 houses chosen also at random and visited by interviewees. 204 individuals were interviewed and examined (110 females, age 16–81, mean = 38 years and 94 males, age 16–79, mean = 41 years). One hundred and seven individuals reported pain, tenderness, swelling or stiffness in their bones, muscles or joints (50 at present and 57 in the past). Of these, after the physical examination, 68 individuals had 72 rheumatic diseases diagnosed. The following diagnoses were made: lumbago, 18 patients; hand osteoarthritis, 9 patients; wrist tenosynovitis, 6 patients; painful shoulder, 6 patients; knee osteoarthritis, 5 patients; tension neck syndrome, 3 patients; rheumatoid arthritis, rheumatoid syndrome, gout, and rheumatic fever, 1 patient each; and other diagnosis 21 patients.

In addition, 18 individuals reported some disability due to the rheumatic disease at the time of the interview. The Health Assessment Questionnaire Scores ranged from 0.11 to 1.88, with a mean value of 0.71.

Based on these data, the Portuguese version of the ICQ presented a sensitivity of 92% and a specificity of 70%. The prevalence of rheumatic disease in the population screened and examined was 36.2% and the positive predictive value of the ICQ was 63.5%. By using this screening questionnaire, 476 physical exams/1,000 individuals interviewed can be avoided.

The conclusion of this study was that the Portuguese version of the ICQ is able to accurately screen rheumatic diseases.

Similar studies with coinciding conclusions were reported in Chile and Mexico.

The following problems still remain to be solved before starting the full scale COPCORD Stage I survey:

- Diagnosis criteria for the soft tissue diseases;
- Diagnosis criteria for back pain; and
- Diagnosis of cases screened with normal physical exam at the time of examination.

The Clinical Epidemiology Committee of the PANLAR is presently working to solve the remaining methodological problems and soon the full scale COPCORD stage I survey will be launched in some Latin American countries.

GROUP DISCUSSION OF CASE STUDY 4

The beginning of attention to rheumatic diseases in developing countries dates back to 1977 when WHO declare 1977 World Rheumatism Year. The WHO Community Oriented Program for the Control Of Rheumatic Diseases (COPCORD) was conceived in 1980. The first field testing of survey instruments occurred in 1981 in the Philippines and followed in 1982 by further testing in Indonesia.

What was the rationale for focusing on this specific category of diseases? Perhaps the rationale became obvious in the presentation by Helen Saxenian, earlier in the Conference entitled "Technology Assessment and the World Development Report 1993*" because indeed in the 1993 World Development Report, there is very little attention paid to rheumatic diseases.*

One of the explanations for this absence of attention to rheumatic diseases was given as being that there is little information on the epidemiology of rheumatic diseases in developing countries: it has not really been quantified to any extent. This lack of data, therefore, prevents rheumatic diseases from competing for attention with other diseases in the policy making context, such as infectious diseases, cardiovascular diseases, cancer, and AIDS. It was felt that some quantification of these problems would certainly be extremely helpful.

This case study presented information on two countries in which this program was implemented: Indonesia and Brazil.

In Indonesia, this program occurred in three stages.

The first stage was quantification of the burden of illness; the survey instrument that had been developed in the early 1980s underwent several validation exercises and reliability assessments. This being done, it was possible to come up with some prevalence estimations of these diseases and it was found that osteoarthritis and low back pain were the two most important problems in Indonesia; this was also verified in other developing countries,. With respect to low back pain, the prevalence estimates were 20% and 25% in rural and urban areas respectively.

Through this stage of the project, the emphasis was on the use of quality of life measures and more specifically disability indices as opposed to using mortality indices and this was becoming extremely important in view of putting rheumatic diseases on the policy agenda in competition with other diseases that would use mortality indices as a measure of burden of illness. Also, it became extremely apparent that when we think of rheumatic diseases, the socioeconomic impact of these diseases is extremely important in all countries.

They then moved to the second stage of the study, stage in which the focus shifted to

- *The study of interventions (efficacy, effectiveness, and efficiency or cost-effectiveness);*
- *Manpower issues, that is what type of health care professionals would be needed to provide services for these conditions: physicians, nurses, traditional healers; and*
- *A specific focus was on the issue of self-medication, over-the-counter medications, and abuses of medications (such as steroids) with respect to these specific diseases.*

This latter focus of attention lead to some policy action.

And finally, the third stage is currently unfolding; the focus here is much more on the development of etiological studies to try to understand what are the etiologic factors, genetic and environmental, with respect to these diseases.

What is the policy context in Indonesia right now with respect to these diseases? Indonesia is in a phase of change, that is the policy making process which was mostly "political" is progressively becoming more "technical" or "technocratic." It is therefore believed that the gathering of this information will probably become much more usable in any future policy debate.

The same project is unfolding in Brazil, although at a different pace; it is currently in the first stage (validation of the survey instruments and quantification of disease). The second and third stages of the Program are in planning. Again, concerning the policy making context, it is observed that this context is changing and that probably the policy making process will become more technocratic in the next 5–10 years.

This discussion focusing on a specific issue carried as the ultimate objective to reflect on the utilisation of technology assessment as a tool for decision making. The starting point for this reflection is to realize that in some ways, what is at issue here, is whether we are able to cross this bridge between knowledge and decisions and to what extent we can really use objective information in the policy making process. In the case of rheumatic diseases in fact, we have started to gather information on the burden of disease through these survey instruments, prevalence is being documented, quality of life indices are being used, the focus is on osteoarthritis and low back pain and increasingly studies dealing with the effectiveness of the interventions are being developed. Issues of manpower are being looked at, the etiology of diseases is being examined, and policy issues are being increasingly addressed.

Now in thinking of policy making, we could view the policy making process as a spectrum; a spectrum that goes from a process that is purely technical and in which technology assessment information (TAI) would certainly be welcome to a process that would be absolutely political in which TAI would not be welcome.

Now given that TA can be viewed as an instrument for policy making in which the technical component is important as the policy making style of countries moves from being a political process to a process that will give more space to the technical component.

From what we have heard during the Conference, it is clear that in several countries around the world, there are changes occurring, changes that will allow the technical component of decision making to become more important.

Key issues identified through this case study

Chronic conditions such as rheumatic diseases, which cause considerable suffering, are highly prevalent and may have important socioeconomic repercussions through lost productivity, have received little attention until recently as compared to diseases which have been important causes of mortality. Although indicators such as Disability adjusted life years (DALYs) should take this morbidity into account, the lack of quantitative information on the magnitude of these disorders may have lead to a significant underestimation of the burden of disease caused by these conditions.

We are only beginning to study the effectiveness and cost of interventions for chronic conditions such as rheumatic diseases in developing countries.

Many countries are evolving from a purely "political" to a more "technical" process for decision making, thus providing fertile ground for needs-based technology assessment as a tool for decision-making and, in so doing, enabling us to cross the bridge between knowledge and decision-making.

CASE STUDY 5.
PRACTICAL TOOLS FOR IMPROVING NEEDS-BASED HEALTH MANAGEMENT AND TECHNOLOGY ASSESSMENT
—
THE PHC MAP SERIES

Ronald G. Wilson[1]

Need for Information for Health Management and Technology Assessment

The Primary Health Care Management Advancement Program (PHC MAP) was initiated by the Aga Khan Foundation (AKF) five years ago in response to a major conclusion of the "International Workshop on Management Information Systems and Microcomputers in PHC" that improved management information systems are needed to enable PHC program managers to take

> *informed* management decisions, being fully cognizant of constantly changing health conditions, health status of the local population, health risks, priorities for health actions, service coverage, and the effects and outcomes of health activities and interventions.

In the same year (1987), the World Health Organization's (WHO) report on the global "Evaluation of the Strategy for Health For All by the Year 2000" concluded that there was (and, indeed, there remains today) a crucial need for improved information for needs-based management of health programs:

> The main constraint reported by practically all countries is *inadequate information for the managerial process* ... to provide systematic and analytical information for continuous assessment of the situation, determination of priorities, improvement of management, and evaluation. The Health for All strategy demands an integrated managerial approach ... and also monitoring and evaluation with a view of modification or readjustment of the strategy as part of a continuous cycle.... The information generated by the traditional health system is in most countries quite insufficient.

By 1989, the situation had worsened: a WHO report on *The World Economic Situation and the Prospects for Health for All by the Year 2000* confirmed that, in addition to inadequate information for the managerial process, inefficient management was compounding problems of shortages in the health sector created by the deteriorating economic situation.

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> Economic trends since the Declaration of Alma Ata have retarded progress towards health for all in many countries. In developing countries, expenditures on health have fallen while demands have continued to increase. The impact on health services is increasingly conspicuous, and the effects on health status give cause for serious concern. Shortages of resources in the health sector are often made worse by inefficient management.

In 1993, the need for improved information and for practical tools to generate information for needs-based management and technology assessment was highlighted by The World Bank's *World Development Report 1993 — Investing in Health* (see "Generating Information and Strengthening Research," p. 148–155, in Chapter 6, "Health Inputs," and sections in Chapter 7, "An Agenda for Action").

> ... Simple management information systems for measuring costs, inputs, and production could be helpful for monitoring program efforts over time and for making decisions about how to combine inputs efficiently. Yet many public facilities operate without such information [p. 151].
>
> ... Governments have a twofold role in health information systems and operational research: generating the information necessary to guide health policies and public spending and providing certain types of information about provider performance that would be too costly for consumers to collect. To this end, governments can
>
> - Gather and synthesize epidemiological and other information necessary to monitor health status, detect disease outbreaks, and guide public policy and program design;
> - Support research, where needed, to generate local solutions to local problems;
> - Facilitate standardization of information about health production and health outcomes by district health systems and other major health providers; where necessary, synthesize and publicize this information to aid consumers in making informed choices about health care [p. 151–152].

The PHC MAP Series was developed and field-tested in 13 countries of Asia, Africa, Latin America, and the Caribbean to help meet the crucial need for practical tools to generate high-quality information for the managerial process. Because the PHC MAP Series focuses on both **health services** and **management services**, and contains useful **"what-if" analyses** of cost and sustainability variables (among other variables), these tools can contribute substantially to the design of more effective, efficient, and affordable health programs, as well as to the assessment of health service and management service technologies and to the preparation of highly valuable presentations for effective advocacy of improved health policy and reform.

What is Included in the PHC MAP Series?

The PHC MAP Series contains 21 printed volumes and 3 high-density computer diskettes with compressed files; these products are organized around nine thematic modules, each of which includes a User's Guide, a Facilitator's Guide, and computer programs, such as Epi-Info.

The PHC MAP Series can collectively enable health management teams to assess the effectiveness, efficiency, equity, quality, costs, and sustainability of both health services and management support services. And the "what-if" analyses contained in the modules on Cost Analysis and Sustainability

Analysis enable health management teams to assess the effectiveness, efficiency, equity, quality, costs, and sustainability of alternative options in terms of health services and management support services.

Therefore, the PHC MAP Series can have both strategic and tactical applications, and the "what-if" analyses included in the modules on Cost Analysis and Sustainability Analysis can be used as powerful tools for advocacy with: 1) the policy-making "generals"; 2) the middle-level "corporals" who provide management support services, and; 3) the "lieutenants" who lead the front-line tactical operations of health service delivery and of management service support for front-line health workers and volunteers.

Modules

1 *Assessing Information Needs*
Helps health program managers identify information needs; set priorities; and use modules.

2 *Assessing Community Health Needs and Program Coverage*
Tools to help gather data on community health needs for planning strategies and resource use; and assessing program effects on health status, knowledge, behaviour, and coverage.

3 *Planning and Assessing Health Worker Activities*
Helps supervisors and managers to assist health workers plan their work; set realistic targets; assess performance; and take corrective action.

4 *Surveillance of Morbidity and Mortality*
Describes basic indicators of morbidity and mortality, how to set up surveillance systems, how to identify causes of mortality and morbidity, and how to use that information to improve program planning and implementation.

5 *Monitoring and Evaluating Programs*
Indicators and guidelines for monitoring service and management activities, and constructing a project-specific "mini-MIS."

6 *Assessing the Quality of PHC Service*
Checklists of essential service resources and processes to use to assess the quality of care provided and set priorities for improving service.

7 *Assessing the Quality of PHC Management*
Checklists for assessing management functions, e.g., planning, training, and supervision.

8 *Cost Analysis*
How to set up simple cost accounting systems to monitor costs and to project future income and costs.

9 *Sustainability Analysis*
Guidelines and tools on developing and analyzing alternative strategies for sustaining health improvements, services, processes, and the related human and financial resources. The "what-

if" analysis used in Modules 8 and 9 can help managers design a sustainable program, as well as produce powerful presentations for purposes of more effective advocacy.

Guides

1 *Problem-Solving*
Helpful hints from PHC managers on solving common problems; e.g., how to help illiterate health workers, how to be sure there are enough supplies.

2 *Better Management — 100 Tips*
Helpful hints from managers and management experts on how to become a better manager; how to get the most out of staff; conduct meetings; monitor and assess activities; plan operations.

3 *Computers*
Up-to-date information on how to select the most appropriate computers, printers, related equipment, and computer software; and handy hints for making sure it all works.

Computerized Version of the PRICOR Thesaurus
A computerized list of key steps in the provision of each type of PHC service, with suggested questions, indicators, and data sources for monitoring the steps in each process.

Technical Reviews and Field Tests of the PHC MAP Series

As PHC MAP aimed to develop and field test practical tools to help management teams collect, process, and analyze information needed for the managerial process and thereby enable them to improve coverage, effectiveness, efficiency, and sustainability of their health programs, a broad range of international health experts and health program managers reviewed the PHC MAP materials independently and through participation in such workshops as the AKF-sponsored "International Workshop on the Management and Sustainability of PHC Programs" in Thailand in 1992, hosted by the Ministry of Public Health. Technical reviewers of the PHC MAP Series have included health professionals at the University of Ottawa and McMaster University in Canada; the Ministry of Public Health, the Somboon Vachrotai Foundation (SVF), and the ASEAN Institute for Health Development (AIHD) in Thailand; the Aga Khan Health Service and the Indian Institute of Management in Ahmenabad, India; the Ministry of Planning, the Aga Khan University Faculty of Health Sciences, and the Aga Khan Health Services in Pakistan; the African Medical and Research Foundation (AMREF) and the Aga Khan Health Services in Kenya; the Center for Disease Control in Atlanta; and WHO headquarters and the AKF Head Office in Geneva.

Field tests were conducted by PHC management teams operating in a variety of settings (urban, rural, and remote areas) and with different levels of managerial experience and technical sophistication in 13 countries of Asia, Africa, Latin America, and the Caribbean, where health conditions and resource limitations compel health organizations to try to operate more effectively and efficiently: Bangladesh, Chile, Colombia, Dominican Republic, Guatemala, Haiti, India, Indonesia, Kenya, Pakistan, Senegal, Thailand, and Zaire.

The PHC MAP Series, which can be used with or without microcomputers, has been shown to be highly valuable to NGO and government health service management teams serving small populations (10–20 thousand), medium size populations (20–50 thousand), entire districts (50–500 thousand), and provinces (0.5–1 million+).

PHC MAP Training in Asia and Africa

In August 1993, a 3-week PHC MAP Master Trainer's course was conducted by AIHD in Thailand, sponsored by AKF, SVF, and UNICEF. Some 30 participants from Bangladesh, China, Mongolia, Myanmar (Burma), Nepal, Pakistan, Philippines, Thailand, and Vietnam took the course and judged the PHC MAP Series to be highly relevant and useful. Significantly, participants from Bangladesh, China, Mongolia, Myanmar (Burma), Thailand, and Vietnam have recommended the broad application of the PHC MAP Series by the government health services in their respective countries. The PHC MAP Master Trainer Course has been institutionalized by AIHD and, with support from UNICEF, will be offered again in August 1994.

In East Africa, the African Medical and Research Foundation (AMREF) plans to launch a PHC MAP Master Trainer Course for the government's District Health Management Teams in Kenya. AMREF and other organizations are also considering the development of similar training programs in Uganda, Tanzania, and/or Zanzibar to enhance the capacities of District Health Management Teams to improve the effectiveness and efficiency of district health services in these countries.

Broad Applications of and Growing Demand for the PHC MAP Series

The Ministry of Public Health in Thailand has indicated that it will use the PHC MAP Series nationwide at provincial, district, and subdistrict levels. In Bangladesh, the Directorate of PHC in Bangladesh plans to use the PHC MAP Series in Government health programs. The American Refugee Committee is using the PHC MAP Series in its worldwide refugee assistance program. In India, two premier institutions — the Indian Institute for Health Management Research and the Indian Institute of Management, Ahmmedabad — are using the PHC MAP Series; the US Agency for International Development (USAID) is promoting the use of the MAP Series among many PVOs *(PVOs = NGOs)*, and the World Bank has expressed its interest for the States implementing the India Population Projects. And many other health training institutions and technical assistance groups are finding the PHC MAP Series highly useful.

It is worth noting here that all printed PHC MAP material and computer programs are in the public domain and can be freely copied and distributed.

The demand for the PHC MAP Series has grown substantially since the field-test period when over 120 copies of the draft PHC MAP modules were shared with many NGOs and government health services.

Within 5 months after the first order of 5,000 sets of the PHC MAP Series had become available, nearly 4,000 sets had been requested by over 507 institutions in 50 countries. Only about 1,000 sets of the 21-volume, 3-HD diskettes MAP Series are now available from the distributor, the Somboon Vacharotai Foundation (SVF) in Thailand.

Given this limited supply, orders should be placed quickly with the Somboon Vachrotai Foundation. Kindly use SVF's fax number and coordinates, given at the end of this article, should you wish to place an order.

Summary and Conclusion

The PHC MAP Series can collectively enable health management teams to assess the effectiveness, efficiency, equity, quality, costs, and sustainability of health services and management support services, as well as the health care and management technologies applied. The "what-if" analyses contained in the modules on Cost Analysis and Sustainability Analysis enable health management teams to assess the effectiveness, efficiency, equity, quality, costs, and sustainability of alternative options in terms of health services, management support services, and the health care and management technologies applied.

Now that the PHC MAP Series has become available, what is most needed is to broadly promote the use of the PHC MAP Series by health training institutions, health consultants, the development and donor communities, and, most important, NGOs and government health services who are in the business of providing management support services and health care services which are equitable, effective, efficient, affordable, and sustainable.

Donor Acknowledgement

PHC MAP has cost over US $1.7 million, which has been provided by AKF(Geneva), AKF Canada, CIDA, the Commission of the European Communities, the Rockefeller Foundation, the U.S. Agency for International Development, and AKF USA.

Dedication

The PHC MAP Series is dedicated to Dr Duane L. Smith (1939–92), Associate Director of Health Programs, AKF Geneva, formerly of WHO Geneva's Division of the Strengthening of Health Services; and to Dr William B. Steeler (1948–92), Director of PHC, Secretariat of His Highness the Aga Khan in France; and to all other health leaders, managers, and workers who follow their example in the effort to bring quality health care to all in need.

> One of the strongest motivations for ensuring the quality of information being collected is a personal interest in its local use. Improving the understanding and use of information by those who collect it, particularly in communities, at health centres, and among the district health management teams, thus contributes not only to better management, but also to improving the quality of information itself." (Dr Duane Smith, 1987, at the International Conference on Management Information Systems and Microcomputers in PHC).

How to Obtain PHC MAP Materials

Information on acquiring PHC MAP materials is available from the distributor:

The Honorary Secretary-General
Somboon Vacharotai Foundation
101 Prapinklao-Nakornchaisri Road
Talingchan District
Bangkok 10170,
THAILAND
TEL: (00662) 448 60 50 / 448 69 42 / 448 64 61
FAX: (00662) 448 64 62 / 448 6662

Shipping costs vary by destination but should be about US $40 by surface mail or US $100 by air.

Note: All PHC MAP material has been placed in the public domain by its producers: it is therefore free of copyright. Both software and text components can therefore be reproduced freely for noncommercial use, with the appropriate acknowledgement of its producers.

GROUP DISCUSSION OF CASE STUDY 5

Unlike previous case studies, the emphasis here is on management advancement of health programs. PHC MAP is a management tool for improving primary health care management. It is often forgotten that in diffusion and appropriate utilisation of technology, the management aspect is essential.

Furthermore, one is more likely to find policy levers in the management aspect of the technology, thus contributing to policy development.

This case study illustrates a broad range of areas in which technology assessment can play an important role in improving health services: from the qualitative analysis of patient satisfaction to the more intricate and controversial aspects of developing practice guidelines to change provider behaviour.

The PHC MAP was designed to be flexible and easily adapted for local use. While a computer is not necessary, it makes the ***Cost analysis*** *and* ***Sustainability analysis*** *modules more useful and can save considerable time and energy in the adaptation of the material for local use.*

PHC MAP has identified ways to reallocate health workers' time to more effective use, e.g., growth monitoring without services for individuals identified as not growing is of dubious value.

In the ***Sustainability analysis****, one attempts to capture policy climate, community involvement, etc. in addition to the usual financial issues related to sustainability.*

The discussion concentrated on the information centred modules (Modules 5, 6, and 7) where the focus was on systematically soliciting and developing an information basis to support the management decisions being made.

It was mentioned that the information collected should be relevant to the needs of persons collecting data and not just to another level higher up. The relevance of the data at the local level (at the point of collection) will increase the likelihood of its high quality and of the sustainability of the information system.

The group noted that the planning and assessing health worker activities was one area in great need for TA.

Like other groups, this group also raised and discussed the questions of: whose needs? and what needs? The group went further in addressing the following issues: how are community needs to be reconciled with the mismatched skills for service/program provision? How does that identification of needs feed into the training of care providers and managers so that, in the future, they will be better prepared to meet those needs?

The important role of supervision in the training of PHC managers was highlighted. Community Health Worker (CHW) retention is enhanced by supportive interaction every few months and opportunity for CHW-defined training needs, particularly in curative services.

In considering community involvement and participation, how are reasonable expectations to be elucidated, particularly given the emphasis on hospitals? For donors, stressing sustainability after donors depart may lead to better decision making in the allocation of scarce resources for health.

So conceptualising PHC MAP as a technology points to the need for assessment; to date, this has included extensive pretesting in 13 countries on several continents.

Assessing PHC MAP as a technology requires evaluating outcomes of PHC MAP use; this would address elements such as

- *To what extent does PHC MAP increase the quality of information available to managers who use it?*
- *To what degree are managers able to improve their functioning with use of PHC MAP, specifically, can quantitative evaluations of management performance be undertaken in locations where PHC MAP is being used?*
- *What is the effect of using PHC MAP on the health of the populations served by managers using PHC MAP?*

The Aga Khan Foundation is interested in the quantitative evaluation of the usefulness of information in management; to what extent will this material improve management performance? So again, this presents a big challenge to the field of TA, in terms of designing the kind of study that would be able to actually relate the information technology to not only management performance but ultimately to changes in health outcomes.

CASE STUDY 6.
ASSESSING LAPAROSCOPIC CHOLECYSTECTOMY
—
THE GVHS EXPERIENCE

Donald W.M. Juzwishin[1]

It is a pleasure for me to have been invited to describe the technology assessment process and its application to the introduction, implementation and evaluation of laparoscopic cholecystectomy at the Greater Victoria Hospital Society. I will first describe the development of technology assessment at the GVHS, describe how it functions, provide a case study of the assessment of laparoscopic cholecystectomy and finally describe some of the politics, myths and pitfalls that are common in technology assessment.

Why is Technology Assessment Necessary?

The following example of uncontrolled technology acquisition in a large nonteaching urban health care setting illustrates the problems surrounding the diffusion of new technology.

A core of physicians would like to see a new technology introduced into their hospital. The physicians are well intentioned, high achievers in their speciality and risk takers when it comes to adopting new technology which is promulgated to ease the burden of illness in the community. The advocate for the group is soon considered the expert on this technology in the organization after a visit to a symposium in California. The physicians search for studies describing the success and problems with this new technology. The literature contains nothing conclusive — only that the jury is still out, but that the technology shows promise. However, the hospital administration is now perceived to be speaking against a new technology merely by asking critical questions about a technology for which there is yet not proven evidence of benefit for the community.

Some of the physicians attend conferences where users of the technology describe the results of their experimental work and the preliminary results appear positive. The advocate is given the opportunity to visit the factory overseas where the technology is manufactured and is given hands-on experience. The vendor, seeing an opportunity for the introduction of a new technology in Canada, provides brochures and any information requested.

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[1] Don Juzwishin studied Political Science and Health Services Administration at the University of Alberta. He worked at the Royal Alexandra Hospitals in Edmonton in various positions from 1979 to 1986 at which time he relocated to Greater Vancouver Hospital Society. In his position as Assistant Vice President, he is responsible for the Diagnostic and General Service departments. Don's other responsibilities and interests are accreditation, technology assessment, freedom of information and protection of privacy. Don teaches a course on "Fiscal Management in Health Services" at the University of Victoria and is the Senior Editor of a national publication, "Canadian Health Care Management." He is also an instructor in the BCIT course on "Canada's Health Care System." Don is a member of the Advisory Committee of the Canadian Society for International Health and is currently assisting the newly emerging Eastern European democracies with the development of their health services, Don has published over 30 articles, chapters and monographs on current issues in the Canadian Health Care System.

In the meantime, the hospital administration searches the literature and polls other facilities which are exploring the application of the same technology. Nothing helpful is uncovered other than that the technology is still at a developmental stage and unproven. There are no plans underway to evaluate the effectiveness of the technology. The province's Ministry of Health has no policy on this type of technology, nor will it support the acquisition. The provincial health association is not able to provide any advice on the need for this kind of technology. The price of the technology is identified and made common knowledge. The technology becomes a capital equipment request for the department in the next fiscal year.

With the knowledge gleaned so far, the physicians begin to identify patients who might benefit from this technology. These patients are ones who would not benefit from the conventional methods currently available, and are therefore at some risk and would have "nothing to lose" in trying an "unproven" technology. There may also be another class of patients who may wish to reduce their risks involved with existing treatment modalities.

As the momentum for the adoption of the new technology increases, a few influential citizens and opinion makers in the community (some of whom may benefit from the new technology) decide to mount a fundraising campaign to ease the financial burden for the hospital. The fundraising would provide visibility to the philanthropic activities of the individuals, as well as add an impressive piece of equipment to the city's hospital, which would be one of the first in Canada to provide this service.

The media is recruited by the specialists to provide coverage of the fundraising activity. The hospital administration, while reluctantly appreciative of the community support, is still uncomfortable with the lack of hard empirical data to support the acquisition. The fundraising is an unprecedented success, and raises the entire amount necessary to purchase the equipment. The presentation of the cheque for the full amount is made to the hospital board chairman who expresses appreciation to the community.

The equipment is identified in the capital equipment list for the next year, and is approved for purchase under the following conditions: there are to be no additional operating costs resulting from the introduction of the technology and the equipment is to receive Canadian Standards Association approval before it is commissioned and used on a patient. Continued insistence by the administration for hard data showing the benefit of this equipment is met with disdain by the medical staff who perceive it as an unnecessary bureaucratic step which is irrelevant to the fact that the technology is "needed." In spite of these concerns, the new technology is installed and commissioned.

It would be a pleasant surprise if anyone reading this scenario could not identify with some of the facts of this fictitious example which illustrates how we have not yet learned to control technological diffusion.

Technology Assessment at the Greater Victoria Hospital Society — the Process and the Benefits

The Greater Victoria Hospital Society originated in 1984 as a result of a legislated amalgamation of two acute care facilities in Victoria, British Columbia, the Royal Jubilee Hospital and the Victoria General Hospital which had a downtown long-term care satellite, the Fairfield Health Centre. The Gorge Road Hospital, a rehabilitation facility, was added to the corporation in 1985. The multihospital structure is now thought of as one hospital on four sites. The organization has 5,600 staff, 700 medical

staff, with 1,016 acute care beds and 750 extended and continuing care beds. The Society has an operating budget of $265 million in 1993–94 and a capital equipment allocation of $4.5 million. The initial request for equipment, however, starts at about $8 million.

Technology Assessment

The technology assessment process was initiated in 1989, sparked by the leadership of the President and Vice-President, Medicine who came to realize that there was not a rigorous framework for evaluating the appropriateness of new technology. A Technology Assessment Committee (TAC) was established to assess all methods used to prevent, diagnose or treat illness. Technology was interpreted in its broad sense to include drugs, devices, medical or surgical procedures used in clinical care, as well as the organization and support systems within which such care is provided.

Responsibilities

The responsibilities of the TAC are

- To review proposals for new patient care services and programs with regard to their technological impact — a "Technology Assessment Instrument" has been developed based on the New York State technology assessment methodology;
- To assess the impact of new technologies on medical staff, credentialling, and other significant aspects;
- To screen proposals to the Hospital Executive Committee (HEC) for technological impact, and accept referrals from the HEC as appropriate. The HEC is the senior planning and decision making body in the organization, made up of the executive, clinical chiefs and functional officers;
- Upon referral from Pharmacy and Therapeutics, to review recommendations of the Director of Pharmacy concerning new drugs and pharmaceutical products with significant cost or organizational impact;
- To review recommendations from the support services concerning new hospital supplies and products with significant cost or organizational impact;
- To conduct pre- and post-review of new technologies and their impact on staff, space and resource utilization;
- To keep abreast of relevant literature on technology assessment; and
- To facilitate the creation of a communication network to promote the exchange of technology information between hospitals, researchers, and policy makers.

Membership and Accountability

The membership of the TAC is intended to be multidisciplinary and broad in its representation. The chair is held by the Assistant Vice-President, Diagnostic and General Services, and is supported by the Director of the Quality Improvement Resource Office who acts as secretary of TAC and chair of the Technology Assessment Working Group (TAWG) which will be described in greater detail later. Other members are the Vice-Presidents of Medicine, Finance and Patient Care; the Chair of the Medical Advisory Committee; three medical staff representatives, one of which is a member of the credentials committee, Director of Pharmacy and the chair of the Research and Review Committee.

The TAC is accountable to the Corporate Executive Committee, which is the senior policy making entity in the organization. The TAC also has liaison relationship to the Hospital Executive Committee and Medical Advisory Committee. The TAC also makes periodic progress reports to the Patient Care Committee of the Board of Trustees.

Progress Report

In order to ensure timely and effective communication to all managerial, medical staff and employees of the organization, a TAC Progress Report was developed. The progress report identifies along the vertical column all of the technologies which have been or are being considered for introduction and on the horizontal row we identify the originator of the request, the date on which it was presented to TAC and the current status of the technology. The progress report has become a focal point in the organization of disseminating the developments taking place around technologies being reviewed. If management or staff identify a technology about which they want more information, they are able to contact the originator or a member of the TAC for further information. The Progress Report, which serves as an attachment to the TAC agenda, is to help members of the committee keep informed of developments.

Technology Assessment Working Group

It is the TAC which considers the broad questions of the appropriateness of introducing a new technology in the GVHS, but it is the Technology Assessment Working Group (TAWG) that does all the work to ferret out all of the clinical, operational and financial implications of introducing a new technology. The role of the working group is to research the outstanding issues and questions surrounding the health care technology in question.

The group's membership is comprised of the Director of the Quality Improvement Resource Office as Chair, representatives of nursing, biomedical engineering, the capital equipment manager, director of patient placement and registration, a case mix analyst and resource people as necessary to respond to specific issues or problems.

The group conducts its business of assessing a technology through the application of a TAWG "Framework of Analysis" which was developed by the TAC based on the New York State technology assessment methodology.

Technology Assessment and Medical Administration

One of the major challenges in the last several years has been to work with medical administration and medical staff to ensure that a good working relationship was established between the TAC process and the medical staff. This effort was made a priority because of circumstances that would arise when a medical staff member would simply attempt to raise the need for a technology outside of his or her department.

A process is now being established that requires a physician to introduce the concept of the technology at a section level and then with consensus take it through to the appropriate department where support must also be solicited. The clinical chief then has the responsibility to introduce the technology at Medical Advisory Committee meetings for information, explore issues of credentialling, develop a standard for the application of the technology with the Quality Improvement Resource Office and then finally make a presentation to the TAC.

If the technology arises outside of the medical staff, it must work its way through the formalized organization structure to the TAC. A checklist has been developed which itemizes all of the steps necessary to formally introduce a technology and this has been shared with the clinical chiefs in an attempt to standardize the approach, and a policy and procedure is currently being developed to formalize the structure.

I will now describe an example of a technology , laparoscopic cholecystectomy, which was assessed in GVHS and then approved for implementation. The case study highlights the problems and issues encountered during the process of assessment, implementation and evaluation.

Laparoscopic Cholecystectomy: a Case Study

The treatment of gallbladder disease by laparoscopic surgical removal of the gallbladder was introduced to the Greater Victoria Hospital Society in February of 1991, a year after it was introduced in the first facilities in Canada. The Technology Assessment Committee of GVHS, as a condition of the approval for introduction of laparoscopic cholecystectomy (lap. chole.), requested an evaluation of the first year since the introduction of the procedure and the procedure's impact on the Hospitals' resources, the operating rooms, the nursing units, the surgeons and on the patients. Input was requested from the various areas impacted by the introduction of the technology. The following is a compilation of the input received from Health Records, Patient Registration and Placement, Case Mix Analysis and Reporting, Biomedical Engineering, Nursing, the Surgeons, Medical Imaging, Infection Control and the Quality Improvement Resource Office.

Impact on Hospital Resources

Volume of patients/length of hospital stay

The statistics set out in this section were obtained using the MedisGroups reporting system resident in the Health Records Department. MedisGroups (Medical Illness Severity Grouping System) uses objective clinical findings, such as lab tests, as a basis for classifying a patient's severity of illness at admission and as a basis for identifying the patient's health outcomes.

Pre-introduction

In the year immediately preceding the introduction of laparoscopic cholecystectomies (1 February 1990–31 January 1991), a total of 545 patients had open cholecystectomies as their principal procedure. Their average age was 54.3 years and their average length of stay was 8.9 days. The average length of stay is broken down into an average pre-operative LOS of 2.0 days and an average post-operative LOS of 6.9 days.

Post-introduction

During the first year following the introduction of laparoscopic cholecystectomies (1 February 1991–31 January 1992), the total number of patients having cholecystectomies as a principal procedure was 575, an increase of 5.5%. Of these 575 patients, 163 (28.3%) had open cholecystectomies as their principal procedure and 412 (71.7%) had laparoscopic cholecystectomies as their principal procedure.

The 163 patients who had an open procedure had an average age of 61.5 years, an average length of stay of 13.1 days, an average pre-operative LOS of 2.8 day. The 412 patients who had their surgery performed laparoscopically had an average age of 51.7 years, an average length of stay of 3.2 days, an average pre-operative LOS of 0.9 days and an average post-operative LOS of 2.3 days.

Of the 412 patients who had laparoscopic cholecystectomy, 72 (17.5%) patients were admitted through the Emergency Department and 340 (82.5%) patients were admitted through the O.R. elective booking system. The average length of stay of the 72 patients who were admitted through the Emergency Department was 6.7 days, with an average pre-operative LOS of 2.7 days and an average post-operative LOS of 3.9 days. The average length of stay of the 340 patients whose laparoscopic cholecystectomies were elective bookings was 2.4 days, with an average pre-operative LOS of 0.5 days and an average post-operative LOS of 1.9 days.

Second year post-introduction

During the second year following the introduction of laparoscopic cholecystectomy (1 February 1992–31 January 1993), the total number of patients having cholecystectomies as a principal procedure was 604, an increase of 10.8% over two years. Of the 604 patients, 96 (15.9%) had open cholecystectomies as their principal procedure and 508 (84.1%) had laparoscopic cholecystectomy as their principal procedure.

Impact on Booking Model/Operating Room/Post-Anaesthetic Recovery Room Time

Skin-to-skin time

Using a random sample of 50 patients who had an open procedure during the year preceding the introduction of laparoscopic cholecystectomy, the average skin-to-skin duration of the surgery was 55 minutes. The average skin-to-skin duration of laparoscopic surgery for a random sample of 50 patients during the first year of the procedure was 76 minutes, an average increase of 21 minutes. It is expected that this difference would have decreased during the second year of the procedure as surgeons and O.R. staff became more experienced.

Anaesthetic time

The average anaesthetic time for open procedures in the year preceding the introduction was 83 minutes, while post-introduction the average anaesthetic time increased to 111 minutes for laparoscopic procedures.

Post-anaesthetic recovery-room time

The average time spent in the Post-Anaesthetic Recovery Room, however, decreased from 139 minutes prior to the introduction to 109 minutes for laparoscopic procedures.

O.R. staffing

In anticipation of the commencement of laparoscopic cholecystectomy, it was proposed that the O.R. staffing budget be increased during the first three months by 0.23 FTE to allow for a second "circulating" nurse, deemed to be essential due to the unfamiliar instrumentation and procedure.

Procedure set-up time

Initially, the set-up time was increased, however, with experience the set-up time decreased to the designated changeover time for a regular cholecystectomy procedure. Generally, the equipment needs

constant attention. There are more components to each instrument to be included in the instrument count and more attention must be given to replacement of washers, springs, etc.

Education of O.R. nurses

- Nurses attended inservice sessions to learn about the procedure;
- Two nurses (General Charge Nurse and O.R. Instructor) attended Saskatoon City Hospital to observe procedures, set-ups, preparation, etc.
- Head Nurse worked with suppliers to establish equipment requirements, including identification of all the accessory equipment.
- Orientation of some nursing staff for involvement with the evaluation of trial equipment.
- Orientation of nursing aides to cleaning and preparation of the new equipment.
- O.R. Instructor involvement with documentation of total procedure from identification and cleaning of equipment, to setup and use of equipment, to development of equipment tracking system.
- Liaison with other departments, such as Biomedical Engineering for equipment check before use.
- Participation in practice sessions by surgeons and nurses to allow for familiarization of each supplier's equipment.
- Orientation of all nurses to use of equipment.

Impact on Surgical Nursing Units

Short length of stay

The surgical nursing units involved in the post-surgical care of the patients are 7A and 7B at Victoria General Hospital and 3 Royal at the Royal Jubilee Hospital. Nursing reported that in their experience, the majority of the patients who stayed longer than 24 hours stayed because of complaints of nausea. Complaints of shouldertip pain, from retained $C0_2$ used in insufflation, are now rare; initially these complaints occurred more frequently.

Patient/nurse ratio

The shorter length of stay of patients having laparoscopic surgery made it possible to close several beds which in turn served to decrease the patient/nurse ratio and make the workload on the unit more manageable. This benefit was realized on 7A when four beds were closed in the period from June–December 1991 and on 7B since July 1992 when a fifth bed was closed. The patient/nurse ratio decreased from 6:1 to 5:1, thus decreasing the need for workload relief on 7B. The laparoscopic cholecystectomy patients are very suited to a short stay program (24–48 hours LOS); however they do serve to lighten the heavy workload felt on the General Surgery units.

Issues

Shave preparation. Patients are advised in the Pre-Admission Clinic not to shave at home if they do not have an electric razor. As most of the laparoscopic cholecystectomy patients are Same Day Surgical Admissions, this can cause a problem with those male patients who must be shaved "Nipples to Pubic Hairline" when they arrive 2–3 hours pre-op. Since few laparoscopic cholecystectomies are converted to open choles, consideration should be given to modifying the prep manual or the wording of the procedure.

Patient teaching.

- Because patients see four puncture wounds instead of a long surgical incision, many patients view the surgery as a "minor procedure" rather than as abdominal surgery. As a result,

patients fail to be conservative in progressing their diet and ensuring that their bowels move pre-operatively and regularly post-op, sometimes resulting in readmission due to impaired bowel function. Extra emphasis on patient teaching in PAC and on the unit is needed. A printed patient instruction sheet would be helpful for patient reference post discharge and physician instruction regarding bowel care pre and post-operation would also alleviate this problem.

- A number of patients comment on their way to the O.R. about the videotape that they are shown in PAC or on the unit pre-operatively. The video shows an actual surgery being performed and is too technical and graphic for patient-teaching use. Consideration should be given to a video outlining what the patient can expect to happen pre-operatively and a description of the procedure using diagrams would be more useful and less threatening to the patient.

Impact on Biomedical Engineering

The purchase of the laparoscopic cholecystectomy equipment resulted in an increase in the total medical device inventory because it did not replace existing equipment. It is anticipated that the yearly cost to GVHS to support this equipment will be approximately $15,400.00.

Impact on Medical Imaging

Cholangiogram

In the year preceding the introduction of laparoscopic cholecystectomy (February 1990–January 1991), of the 545 cholecystectomies performed, 378, or 69.4%, of the patients also had an intraoperative cholangiogram . During the first year of performing laparoscopic cholecystectomies (February 1991–January 1993), 163 open cholecystectomies were performed. Of these patients, 101 patients, or 62.0%, also had an intraoperative cholangiogram. Of the 412 laparoscopic cholecystectomies performed during the first year since its introduction, 83 patients, or 20.2%, also had an intraoperative cholangiogram.

C-Arm

Based on the above statistics, there has been a significant decrease in the number of cholecystectomies requiring Medical Imaging services. However, all laparoscopic cholecystectomies require the C-Arm set up because of the possible need for fluoroscopy. The technologist requires approximately 10 minutes to set up and if the case does not need fluoroscopy, no procedure count or workload units are generated. A review of the need for all cases to have C-Arm set up should be considered because of the need for C-Arm availability for other O.R. procedures.

E.R.C.P.

According to the Radiology Information Management System (RIMS), during the year prior to the introduction of laparoscopic cholecystectomy, a total of 186 E.R.C.P. procedures (177 inpatient and 9 outpatient) were performed in the Medical Imaging Department. During the first year of performing laparoscopic cholecystectomy, a total of 311 E.R.C.P. procedures (292 inpatient and 19 outpatient) were performed, an increase of 125 procedures, or 67.2%.

However, in linking the E.R.C.P. procedures to those patients who had had a cholecystectomy, it was reported that in the year preceding the introduction of laparoscopic cholecystectomy, of the 545

patients who had had a cholecystectomy, 28 (5.1%) patients also had an E.R.C.P., either during a previous admission, during the same admission as the cholecystectomy, or in a subsequent admission.

In the year subsequent to the introduction of lap. chole. (February 1991–January 1992), of the 163 patients who had had an open cholecystectomy, 20 (12.3%) patients also had an E.R.C.P., again either during a previous admission, during the same admission as the cholecystectomy, or in a subsequent admission. During the same timeframe, of the 412 patients who had had a laparoscopic cholecystectomy, 48 (11.7%) patients had also had an E.R.C.P. procedure. Based on the total of 575 cholecystectomies during the period, 68 (11.8%) patients also had an E.R.C.P., an increase of 6.7%.

Impact on Laboratory Medicine

The Department of Laboratory Medicine does not currently have a mechanism for comparing workload statistics or testing costs on a procedure-specific or test-specific basis. The logical assumption would be that the longer length of stay of those patients who had an open cholecystectomy would give rise to an increased frequency and extent of laboratory testing. However, at the present time, no data is available to support this assumption.

The laboratory tests currently being ordered (serum amylase, bilirubin, alkaline phosphatase, SGOT, LDH and HGB) would be the type of analysis expected in patients suffering from biliary disease. Prior to a laparoscopic cholecystectomy in an otherwise normal individual with no clinical evidence of obstructive disease, it is important to rule out pancreatitis or pancreatic obstruction: a bilirubin test confirms the presence or absence of major obstruction; an alkaline phosphatase test confirms the presence or absence of minor obstruction. The alkaline phosphatase test is used to discern any evidence of cholestasis. If LDH and SGOT tests are used for assessing hepatocellular disease, these tests could be replaced with Alanine Aminotransferase (ALT) and SGPT. Hemoglobin and hematocrit would be used to assess the state of the patient's hemodynamic and quantitative status, and a white count could usefully monitor cholecystitis.

It is therefore recommended that, within 48 hours of laparoscopic cholecystectomy, a serum amylase, bilirubin, alkaline phosphatase, alanine aminotransferase (ALT), hemoglobin, hematocrit and white count would be the appropriate testing panel. Providing there are no clinical indications subsequent to the laparoscopic cholecystectomy procedure, there should be no need for further laboratory investigations prior the patient's discharge.

Impact on patient registration and placement

Pre-admission clinic

The present standard requires that all laparoscopic cholecystectomy patients who are admitted either the night before their surgery or on the same day as their surgery be seen in the pre-admission clinic. This is new workload for the clinic, but to date has been accommodated within the existing staffing. As the majority of these patients fall into the ASA I or ASA II categories, this level of PAC involvement may not be required and should be examined.

O.R. booking

Wait list. The volume of cases that are suitable for this procedure appears to be higher than anticipated and, as a result, the wait lists are growing despite a greater number of cases being performed. The current wait time for laparoscopic cholecystectomy is up to a year.

O.R. times. For a standard open cholecystectomy, 45–75 minutes of O.R. time is booked; however, for the laparoscopic procedures up to 2 hours total time is booked. This represents a significant increase in O.R. hours.

Impact on Health Records

The major impact on the Health Records Department has not resulted from the introduction of the technology but rather from the evaluation process, including both the GVHS evaluation and GVHS's contribution to a national database being compiled by Dr. Litwin in Saskatoon.

Data retrieval

The data was accessed 19 times between October 1991 and October 1992, at a cost of 64.5 hours labour.

Record retrieval

Patient records were pulled three separate times for data collection, using two systems. The record review process, using the incomplete record system (PRT), processed 300 records at a cost of 75 hours labour. The record retrieval process, using sign-out slips, processed 611 records at a cost of 71 hours labour.

Administrative support

Both Health Records managers spent at least 4 hours each facilitating these activities in the Department. The Health Records analysts, primarily through meetings with QIRO staff, spent at least the equivalent of 5 days each.

Nonmonetary impact

Other data requests were deprioritized; and difficulty was experienced in accommodating requests made outside the established record retrieval procedure.

Recommendations

- Continue to involve data providers at the earliest possible time in the process.
- Continue to determine specific information needs in the planning phase of implementation.
- Budget for cost to support departments of implementing new technologies.
- Evaluate, or establish, formal approval process for participating in external databases, such as the National database.
- Continue to monitor quality control procedures in Health Records to ensure accuracy of data.

Capital Expenses

The purchase of the laparoscopic cholecystectomy equipment was approved by the Hospital Executive Committee on 13 January 1991, and was incorporated into the 1991/92 Capital Budgeting process. A Decision Package was submitted for startup and ongoing instrument/supply costs and for an additional 0.84 FTEs. The staffing increase was not approved. The following amounts (Table 1) were included in the 1991/92 Operating and Capital Budgets for the purchase of laparoscopic cholecystectomy supplies and equipment for the Operating Rooms and the Royal Jubilee Hospital and Victoria General Hospital (combined).

Table 1. Budgeted startup and ongoing costs.

		Amount (CA$)
Startup costs		
Capital equipment	Cameras, light sources, etc.	82,000
Operating supplies	Instruments	139,000
	Sutures, staples, and clips	15,000
	Medical/surgical miscellaneous	15,000
Total 1991/92 startup		**251,000**
Annual ongoing cost estimate		
Operating supplies	Instruments	15,000
	Sutures, staples, and clips	15,000
	Medical/surgical miscellaneous	15,000
Estimated annual operating costs		**45,000**

Laparoscopic cholecystectomies are a success, in financial terms, when the incremental costs in the O.R. are less than the actual savings in the nursing units. While the potential savings are significant, actual savings will only be achieved if the nursing unit staffing is downsized proportionally to the lower occupancy. To date, while some savings may have been achieved in Relief costs, no adjustments related to these procedures have been made to the Nursing Staffing budgets.

Case Cost Comparison

Open cholecystectomy cases cost approximately CA $3,700 per case, while laparoscopic cholecystectomy cases represent about CA $1,750 per case. This comparison does not include pharmacy or laboratory cost components. It is important to note that the difference between the two cost figures does not represent actual recovered dollars. The difference represents the high end of potential recoverable costs. Impact on hotel and institution related services (food services, housekeeping, nursing administration, finance) are marginal and do not translate into significant recoverable dollars.

Bed day savings are significant. More than 2,300 bed days were saved when the 412 laparoscopic cholecystectomy cases (average LOS 3.2 days) are compared to the average length of stay for an equivalent number of open cholecystectomy cases (average 8.9 days LOS in 1990/91).

Impact on Quality Improvement Resource Office

The introduction of laparoscopic cholecystectomy has been a major focus in the Quality Improvement Resource Office (QIRO). The staff assisted the Section of General Surgery to develop and record the criteria for the procedure, to develop and coordinate the credentialling process, and to coordinate the data collection for the credentialling and evaluation processes.

In the initial phase, preparatory to the introduction of the technique, the major resource allocation was in the time spent by the QIRO associate, with secretarial support, in preparing the criteria, the

credentialling process, and in liaison with other GVHS Departments. Once the credentialling process was underway, resource utilization shifted to the QIRO analyst. The analyst liaised with the Health Records Department with requests for data using the MedisGroups reporting system. The data was used to monitor the impact of the technique on an ongoing basis and was also used by the surgeons on an ad hoc basis for presentations made to various organizations. The analyst also played a role in organizing the pulling of charts from Health Records to obtain data for evaluation of the procedure for two data collection systems: the Section of General Surgery's evaluation process; and GVHS's contribution to a national comparative database situated in Saskatoon, Saskatchewan. Once the data was collected, the information was entered into a computer in the Quality Improvement Resource Office and reports were run, again for a twofold purpose: the Section of General Surgery evaluated the experience on an ongoing basis using surgeon specific data; the information was also utilized for the purposes of the evaluation process.

Surgical Process

In the planning stages of the introduction of the laparoscopic technique, the Department of General Surgery developed a data collection form with which to track certain elements of the surgery. Each surgeon would fill in the surgery-related portion of the form at the time of surgery and then complete the outcomes portion of the form at the time of chart completion. The data were then entered into a computer and reports were run on an ad hoc basis to provide the surgeons with feedback. The following is a summary of the first year of laparoscopic cholecystectomies.

Volume

In the first year following the introduction, completed forms were received for the 448 laparoscopic cholecystectomies which were attempted; 411 (91.7%) were successfully completed laparoscopically while 38 (8.3%) were converted to open procedures.

Duration of Procedure

When the laparoscopic technique was initially utilized, procedures frequently took 1.5–2.5 hours to complete; however, over the course of the first year, the average duration of the procedure was brought down to 76 minutes. It has been noted that during the second year, many laparoscopic procedures are done in less than 30 minutes; it is therefore anticipated that the average duration of the procedure will also be decreased further.

Indications for Procedure

Of the 411 patients who had laparoscopic cholecystectomies, 91.7% had biliary colic as an indication for the procedure, 79.6% had radiographic evidence and 47.0% had recurrent chronic cholecystitis cited as indications for the procedure. Far fewer (17.3% and progressively less) patients had acute cholecystitis, intermittent jaundice, ERCP evidence, and so forth, cited as indications for the procedure.

Complications of Technique

The most commonly cited complication of the surgical technique was perforation of the gall bladder: 75 patients, or 18.2% had their gallbladder perforated during the procedure. There were 6 (1.5%) incidents of bleeding of the liver, and 6 (1.5%) incidents of bleeding of the cystic artery; 3 (0.7%) of the patients suffered a laceration of the liver, 2 (0.5%) of the patients had a laceration of the common bile duct and 1 (0.2%) had the bowel perforated.

Post-Operative Complications

Of the 411 patients who had laparoscopic cholecystectomies, 17 (4.1%) patients complained of referred shoulder pain as a complication of the surgery, 12 (2.9%) patients developed pyrexia greater than 38.5°C., 6(1.5%) patients had bile peritonitis and 3 (0.7%) patients suffered delayed haemorrhage.

Pathology

Of the 411 laparoscopic procedures, 93.7% of the patients had evidence of gallstones at surgery, 15.1% of the patients had evidence of acute inflammation, 7.8% had obstruction and 1.2% had evidence of internal infarction. Eighteen (4.4%) patients had other outcomes, such as a gangrenous gallbladder.

Outcomes

The MedisGroups database was utilized to obtain information comparing outcomes prior to the introduction of laparoscopic cholecystectomy to the outcomes of the laparoscopic procedure.

Pre-Introduction

Of the 545 patients who had a cholecystectomy in the year immediately preceding the introduction of laparoscopic cholecystectomy, 503 patients, or 92.3%, were nonmorbid (or clinically stable) post surgery, 38 patients, or 7.0%, patients suffered morbidity or major morbidity (a degree of clinical instability) post surgery, while 4 patients , or 0.7%, died.

Post-Introduction

Of the 412 patients who had a laparoscopic cholecystectomy during the first year after its introduction, 403 patients (97.8%), were nonmorbid post surgery, 7 patients (1.7%) were morbid, and 2 patients (0.5%) died.

Conversions

Of the 37 patients who were converted to an open procedure, the two most commonly cited reasons for conversion were the patient's anatomy and the presence of stones in the common bile duct. Sixteen (43.2%) patients were converted because their anatomy precluded laparoscopic surgery and 6 patients (16.2%) had stones in their common bile duct.

Infections

The Infection Control Practitioners at Victoria General Hospital and Royal Jubilee Hospital track surgical wound infections. During the year preceding the introduction of laparoscopic cholecystectomy, they captured 8 infections in patients who had had a cholecystectomy. During the first year since the introduction of laparoscopic cholecystectomy, 7 infections were captured in patients who had had an open procedure and 3 infections were captured in patients who had had a laparoscopic procedure. However, due to the short length of stay associated with the laparoscopic procedure, post-operative infections would likely only be captured if the patient required readmission to hospital for treatment of infection.

Procedure Validation

The MedisGroups reporting system, in addition to providing a tool to measure a patient's severity of illness on admission and response to treatment, uses objective criteria to document validation of procedures. The Health Records Department and the Quality Improvement Resource Office are in the process of introducing to the various Medical Departments the use of MedisGroups' Procedure Monitoring Reports as one tool to assist in evaluating quality patient care by monitoring conformance to the validation criteria. As the timing of the introduction of laparoscopic cholecystectomy coincided with the timing of the introduction of the Procedure Monitoring Reports, the cholecystectomy was chosen as the procedure with which to introduce the Reports to General Surgery. In view of the evaluation of the laparoscopic cholecystectomy, Health Records differentiated the results between the laparoscopic procedures and the open procedures.

Using MedisGroups Procedure Monitoring Reports to identify the non-validated cholecystectomy procedures, the Health Records Department conducted an analysis of the charts of patients who had had a cholecystectomy but whose procedure was not validated according to the MedisGroups validation criteria. Although a different timeframe and a different sample of patients was utilized (any patient who had had a cholecystectomy as either a principal or a secondary procedure), it was felt that the practice trends would not have radically changed during the timeframe of the evaluation. The analysis indicated that, using MedisGroups validators initially and then further applying GVHS validators, 10% (82 of 817) of the cholecystectomies were not validated. The MedisGroups comparative database, consisting of the combined databases of all contributing hospitals, indicates a comparative rate of 9.2% non-validated procedures. Of the 10.0% which were not validated, 58% were laparoscopic procedures and 42% were open surgeries.

The charts of the non-validated surgeries were reviewed for the pathological diagnoses: 61% of the patients had chronic cholecystitis; 16% had a normal gallbladder; 7% had cholesterosis; 5% had mild inflammation; 5% had benign cholesterosis; 5% had other diagnoses; and 1% had no pathology report on the chart. The sample was not limited to those patients whose cholecystectomy was the principal procedure; a further review of the charts is planned to ascertain the impact of the principal procedure or diagnosis. The Section of General Surgery is also currently reviewing the radiographic indicators for surgery.

Impact on Surgeons

In preparation for the change of surgical technique and as part of the credentialling process, a copy of which is annexed, each general surgeon attended an out-of-Province course on laparoscopic surgery. Upon completion of the course, the surgeons performed their respective first 12 surgeries under the supervision of a surgeon who had already been credentialled. This credentialling procedure was difficult for surgeons and their patients, particularly those surgeons coming "on stream" later in the process, as it was difficult to find a previously credentialled surgeon who was available to supervise. For the supervising surgeon, there were also financial implications in this process of booking two surgeons as the supervisor was neither compensated for his time nor was he available to his own practice.

When the procedure was initially instituted, the long duration of the procedure limited the number of surgeries, either cholecystectomy or other, that could be booked into the available booking model. This has now ameliorated to some degree due to the greater speed with which the laparoscopic cholecystectomies are completed.

Impact on Patients

As part of the evaluation process, a telephone survey of 25 randomly selected laparoscopic cholecystectomy patients (18 female and 7 male) was conducted. The average length of stay for the 25 surveyed patients was 1.8 days (1.9 days for females and 1.6 days for males).

Sixteen of the patients (64%) did not require medication for pain following their discharge from hospital, while 9 (36%) patients did require pain medication.

Thirteen (52%) patients were able to return to their normal diet within one day of their discharge from hospital; 6 (24%) patients returned to their normal diet within 2–4 days of discharge; 3 patients (12%) required 1 week, and 2 patients (8%) required longer than 1 week.

Twenty (80%) of the surveyed patients indicated they have had no recurrent symptoms of gallbladder disease, but 5 (20%) of the patients responded in the affirmative.

Four patients (16%) returned to their normal daily activities within one day of discharge; 7 patients (28%) resumed their normal activities within 2–4 days after discharge; 5 patients (20%) took 1 week and 5 patients (20%) took 2 weeks to resume normal activities; 3 patients (12%) took 3 weeks or longer to resume normal daily activities, and 1 patient did not know. (Of the 2 patients who required 3 weeks to return to normal activities, 1 had been readmitted for jaundice and 1 followed the recommendation of his surgeon).

Out of the sample of 25 patients, 12 did not work outside the home. Of the 13 patients who did work, 4 were able to return to work within 2 days of discharge; 2 patients were able to return to work within 4–5 days of discharge; 1 patient returned to work within 1 week, 4 patients returned to work within 2 weeks and 1 patient returned to work within 3 weeks of discharge. There was also 1 patient who returned to work 6 weeks post discharge, but the patient stated that this was on the recommendation of his surgeon and was not necessarily required by the patient.

When queried as to whether the patients had had any problems with their surgical wound after discharge, 19 patients (76%) said they had no problems. Six patients (24%) stated they had had a problem, for example: redness/infection; aching; aggravated area; allergy to stitches; staple poked through wound; and one patient stated that the "dissolving stitches do not dissolve easily."

Overall satisfaction with the surgery was expressed by all the patients surveyed.

Recommendations Appurtenant to Laparoscopic Cholecystectomy

- Consideration should be given to including laparoscopic cholecystectomy patients in the Short Stay Program and to booking them into the Short Stay beds.
- Unless post-operative symptoms indicate otherwise, patients should be routinely discharged within 24 hours post-operatively.
- The level of involvement of the Pre-Admission Clinic should be examined as to whether or not it is necessary to screen all laparoscopic cholecystectomy patients who are part of the Same Day Surgical Admission Program.
- Upon reviewing the skin-to-skin operative times from the second year of data on laparoscopic cholecystectomies, the O.R. booking times should be reviewed to coincide with the average skin-to-skin times.
- onsideration should be given to modifying the "preparation" manual as it pertains to shave preparation of laparoscopic cholecystectomy patients who are admitted under Same Day Surgical Admissions Program.
- atient information pamphlets appurtenant to the laparoscopic cholecystectomy procedure and process as practised at GVHS should be made available. The information pamphlets should address, inter alia, pre and post-operative bowel care and diet progression.
- patient teaching video outlining pre- and post-operative expectations and the minimal access surgery process as practised at GVHS should be made available.
- he Department of Medical Imaging should monitor the number and impact of ERCP's and Cholangiograms so that their Booking Model could be reviewed and any appropriate changes made as necessary.
- The Department of Medical Imaging should review with the Department of General Surgery the current practice of C-Arm setup.
- Consideration should be given to making tests for serum amylase, bilirubin, alkaline phosphatase, alanine aminotransferase (ALT), hemoglobin, hematocrit and white count, conducted within 24 hours prior to the procedure, as the appropriate pre-operative testing panel for laparoscopic cholecystectomy.
- Distribute identified issues and recommendations to the appropriate Departments for followup.

Recommendations for Future Technological Advances

- Consideration should be given to the reallocation of staffing for the procedure and the instrumentation in any future changes in minimal access surgeries.
- Consideration should be given to the education requirements of nursing and nursing aides, both in the Operating Rooms and in the Nursing ward.
- The credentialling process should be identified prior to the introduction of technological changes, followed, evaluated and revised as necessary.

- An evaluation framework should be developed prior to the introduction of any technological changes and the procedures should be monitored within the framework.
- Infection monitoring should be incorporated into the current Infection Control Program process.
- Procedure validation should be linked to the evaluation framework and process.
- The Impact Analysis Process of the Technology Assessment Committee's Working Group should be followed.
- Biomedical Engineering should be linked with the Technology Assessment Committee's Working Group process and should coordinate with the Purchasing Department and the Operating Rooms for the assessment, trialing and purchase of equipment.
- Continue to involve data providers at the earliest possible time in the process.
- Continue to determine specific information needs in the planning phase of implementation.
- Budget for cost to support departments of implementing new technologies.
- Evaluate, or establish, formal approval process for participating in external databases.
- Continue to monitor quality control procedures in Health Records to ensure accuracy of data.
- Continue to distribute identified issues and recommendations to the appropriate departments for followup.

The recommendations identified point to the need to treat the technology assessment process within the organization dynamic so that it is able to respond to new information acquired.

Organizational Politics and Technology Assessment

In Canada, the acquisition of technology is partially controlled by the allocation of funding to health care facilities. The concern is that there is not a rational strategy to ensure that technology is introduced based on need. In a recent paper, three University of Toronto faculty members, Raisa Deber, Gail Thompson and Peggy Leatt, described the experience of technology acquisition within the national and provincial health systems and identified the shortcomings which cause rational decision-making to fail. The authors focused on Ministry of Health policies related to the acquisition of CT scanners in Ontario hospitals. The pattern appears to be: hospitals acquire "illegal scanners" in violation of Ministry of Health policy; the Ministry of Health commissions an external study by an expert task force; the task force recommends a revision of the policy to encourage more scanners and to legitimize the CT scanner in question. The authors conclude that "CT diffusion suggests that governments: (a) often lack the political will to penalize offending hospitals, and hence retroactively rewards faits accomplis; (b) are hampered by their dependence upon experts who are potential users of the technology being evaluated; and make relatively little use of formal technology assessment in acquisition decision" (Deber et al. 1988).

The scenario described above should not be over generalized because of Saskatchewan's contrary policy method of controlling CT diffusion, but it does point out the strong temptation for decision-makers to introduce technology on an ad hoc basis.

The rationalization of the diffusion of technology is being welcomed. Health service executives should ensure that the best possible information is available to guide decisions on the diffusion of technology. What must be recognized, however, is that we live in a pluralistic society where democratic action may at times run contrary to rational decision-making. Health service executives must be sensitive to political circumstances. Since all of our endeavours are of a public nature, we must be prepared for political factors to mitigate. This is not to condone a "wrong" political decision, but rather to suggest

that the political cost of condemning it is great. Health service executives make allocation decisions on technology based on some question of values. "Value-based decisions that affect the public have to be made with considerable support by that public. That support is more likely when the public views itself as having a role in the process" (Blank 1988, p. 176). This does not invalidate contributions made by technology assessors, but rather presents a context for information to be shared with the community and to gain their support.

Perverse Economic Incentives

University of British Columbia economist Robert Evans (1984) identifies several factors which detract from a rational assessment and diffusion of technology in health care. Evans claims that the public perception of what a technology can do is as important, if not more so, than what it is actually capable of doing. This would go some distance in explaining why today's methods of ensuring smoking cessation and weight reduction which purport significant results without any compelling evidence are so successful. Other perverse incentives Evans identifies are

- The temptation to define health care "needs" in terms of technology which is available;
- The existence of a natural bias towards costs — and utilization-expanding technologies and away from cost reduction — particularly if the incomes of the physicians are subsequently increased;
- Excessive and inappropriate utilization, as is the case with prescription drugs and diagnostic procedures; and
- Testing new technology soley for safety and not efficacy.

Physicians and hospitals share an economic interest with technology manufacturers in exploring opportunities for new technology without consideration for efficacy. Evans summarizes his views by stating, "Just as a new piece of equipment will be more marketable if it is economically rewarding for providers to buy and use, and will thus have allies against challenges to its efficacy, so a breakthrough which reduces billing opportunities for professionals or needs for hospital care is likely to meet much heavier resistance" (Evans 1984, p. 228).

In a recent article, professor Pran Manga, from the University of Ottawa, reminded us that "among the most cost-effective medical technologies is the technology that promotes health, prevents disease, permits self care to be effectively given by primary care professionals or delivery systems. Many technologies that save money are not medical. For example, occupational health, safety and environmental health" (Manga 1989). Future emphasis should, Manga argues, be toward health promotion initiatives.

Myths of Technology Assessment

There are many fallacies and myths about health care technology which are either prevalent in the health system or perceived by the public. One of the most pervasive fallacies is that adopting more technology will mean an improved health status in the community. This thought is based on the assumption that all the community's maladies can be addressed by health care technology. Studies undertaken in the past 15 years have shown this to be false. However, a recent American survey revealed that, given the choice of a surgical operation or a change in lifestyle to arrest ill health, the majority chose surgical intervention.

A second myth is that more technology means better care. An example of this would be the use of limited dollars on a nuclear magnetic resonance imaging unit. Although this technology is able to more precisely measure and illustrate pathology, such an expenditure foregoes opportunities to improve other equipment or services which may benefit a larger group. The delivery of home care for the elderly, for example, would also benefit from such funding.

Another misconception is that wiser decisions are made when new technology is acquired. The diffusion of technology is based on many complex factors, only one of which is whether the technology actually improves the health status of the community.

A fourth fallacy is the theory that science will provide us with answers on how to deal with disease and, thus, we do not need to worry about scientists having a vested interest in misdirecting public policy. This fallacy is easily debunked by simple asking, "Who represents science?" Is it the physician, the research scientist employed by a large corporation manufacturing diagnostic imaging equipment or members of the community who are attempting to understand scientific contributions to health care technology? Often political factors have more to do with disease prevention policy than any other influences.

There is also a belief that because man created technology, he is the master of it. It has been demonstrated in the literature that the introduction of technology changes man's relationship to what that technology does. (When we look at the introduction of CT scanner in Canada, we see an example of technology diffusion out of control.) In addition, technology has become so powerful and has developed so quickly, that it is literally beyond human capacity to control it.

A sixth misconception is that the Canadian health care system is technically advanced. However, much of the technology used in Canada's health care facilities is from the United States, Japan, Britain and Europe. Canada is a resource-based economy that exports raw material and buys back technology.

The final fallacy is that if a technology is safe, it should be used. In other words, whether a technology is shown to be effective or not, it should be used because it does not have perceptible negative effect on patients. This has been shown to be very costly and, in the long run, often harmful.

Pitfalls to Avoid in Utilizing Technology Assessment

There are several problems and issues to avoid when introducing a technology assessment process in your organization:

- The process may be initially interpreted as being a "tactic" or "stonewall" in the diffusion of new technology. Involve those who are likely to be the distracters and ensure that the process is rational, analytical and objective.
- The senior members of the organization must be committed to the importance of the process.
- Avoid overloading the committee with too much work at the outset.
- Some will accuse the technology assessment process as being "antiscience" or "antitechnology." Involving respected members of the medical staff who have a broad vision of health care delivery in the 1990s will help to ameliorate this criticism.
- Take the time to assess existing technology already in use in the facility as well as the new technology arising.

- Recognize that strong departments with good organizational skills will be able to accommodate to the technology assessment process easily, and ensure that good ideas that do not have a champion do not get lost.
- Finally, it is useful to recognize that introducing a technology assessment process does not avoid the necessity for tough decision to be made. In fact, the process really forces the organization to look very carefully at what trade-offs can be made to achieve the objective of introducing a beneficial technology.

Conclusion

I have attempted to provide a broad description of the context in which the technology assessment process was introduced at GVHS. The model developed at GVHS may not be appropriate for other facilities, and organizations should assess carefully which characteristics would be useful in their settings. What has become clear since the introduction of the process is that it must become well integrated into the culture and functioning of the organization to be successful. The case study of the Laparoscopic cholecystectomy example provides evidence that a rational approach to assessing technology can facilitate a rational introduction and continuing evaluation of technology.

Good luck with meeting the challenges of technology in the future!

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GROUP DISCUSSION OF CASE STUDY 6

This group looked at the implementation of a new technology, laparoscopic cholecystectomy, in a community hospital not affiliated with a university, the Greater Victoria Hospital Society (GVHS), in Victoria, British Columbia.

How do we define a needs-based technology assessment approach?

The first question which came up was: whose needs are we talking about? Needs were identified from three different perspectives: those of the consumer or client, the needs of the provider and the needs of the policy-maker.

With respect to the consumer or client, there was information from the popular literature, that the consumers or community could easily access, in such magazines as MacLean's, the Red Book, etc. In terms of the advent of this "new and wonderful technology," there were issues of interest to the consumer or client such as: shorter hospital stays, much less suffering in terms of pain, getting back to work much faster than with an open cholecystectomy and this of course for clients, including ourselves, would be very enticing. It was difficult to assess what their information was in terms of efficacy or safety of this particular procedure; from the popular literature, it almost seemed like a "magic bullet."

Turning now to the health care providers (the surgical staff and people who work with the surgical staff), there was an awareness of this procedure; this technology was developed in Germany in the early 1980s and was brought into North America in the late 1980s. By then, there were some hospitals that had invested in training their surgical staff to perform this procedure. At the GVHS, there was an interest among the surgeons who would perform this intervention at this particular hospital. There was also a commitment by the surgical staff to contribute to cost savings: the surgeons were committed to actually closing the beds saved by the shortened length of stay.

In terms of the policy makers, there was a strong interest generated because policy makers are continuously looking for safe and efficacious interventions that are much more cost-effective.

Has This Study Taken a Needs-Based Approach?

In terms of this second question, the rates for cholecystectomy were well known in the general population and the volume of procedures and their resource utilisation were well documented at this particular hospital. Needs of the three constituencies mentioned above were taken into account.

What Were the Needs-Based Methodologies Used in This Case Study?

The methodologies used for the implementation of this new technology included literature reviews and site visits to hospitals that had already implemented the technology; furthermore, in this particular hospital, there was already a Technology Assessment (TA) model in place, used to evaluate existing interventions both in medicine and in surgery.

What Are the Emerging Overall Methodologies or Approaches to Needs-Based Technology Assessment?

Many models already exist. The Technology Assessment process at the GVHS was described.

Did the Technology Transfer Actually Take Place?

Yes, there was a technology transfer. There was a commitment to training and to certification. This hospital invested in the training of their staff from other institutions in Canada. They came back and taught their own staff. Certification of physicians was a hospital-based procedure and not a college-based procedure. There is ongoing monitoring of outcomes (rate of complications, conversion rate from closed to open procedure, infections, patient satisfaction, cost-saving measures).

Were the Case Study Results Linked to Policy Making? If So, How?

The policy of this institution is to provide the best possible care at the least cost possible. Improved patient outcomes and clear cost reductions were shown in the interim analysis.

The money saved from closing hospital beds was plowed back into the institution. Were these true cost savings? There were a lot of questions about whether or not this was appropriate. Who are the persons who decide what to do with the money that is being saved?

One interesting outcome was the formal adoption of clinical guidelines. This specific activity generated a broad interest in practice guidelines. It also demonstrated the success of this TA process which, in this case, was hospital-based and which was not limited to this particular procedure but was used for other technologies being considered by the hospital.

This case is particularly interesting because of the fact that this is a hospital-based TA model as opposed to any model linked to a regulatory agency or an academic institution. This is one of the first such models and this has clear implications for policy. The GVHS is a large community hospital with no formal ties to teaching institutions which would be in a position to supply epidemiological and biostatistical support for TA. In spite of this limitation, it was suggested that this case study demonstrated the success of the TA process developed and implemented within an institutional setting.

Finally, the issue of the broadening of indications was raised, as the annual number of cholecystectomies had gone from 575 in the previous year to 620 in the current year. It was mentioned that it appeared that there may be some asymptomatic gall bladder disease which is being responded to. This will require some further analysis and was one of the reasons for continuing the monitoring and pursuing the analysis. It was also mentioned that one had to be careful in examining the numbers as these could reflect patients coming from other areas to this hospital in order to get the newer procedure or patients having waited to have surgery until the new procedure was available.

PART III

—

OPPORTUNITIES AND CHALLENGES FOR COLLABORATION

BUILDING A NEEDS-BASED TECHNOLOGY ASSESSMENT TOOL KIT — THE CONCEPT AND KEY IDEAS EMERGING FROM THE CONFERENCE

Elizabeth McGregor and Yves Bergevin[1]

Rationale Behind the Concept

The challenge confronting conference participants was to translate the debates and discussions of the conference into action-oriented recommendations for health development. The concept, around which a rich range of ideas crystallized, was the idea to create a "tool kit" — a mobile, interactive, electronic "tool box" containing a selection of "best-practices" and tested tools to assist health care policy-makers in the planning and provision of health care to communities and countries.

Enthusiasm to assemble a "Needs-Based Technology Assessment Tool Kit" containing best practices, tested methodologies and case studies from around the globe was expressed by participants who wished to promote globally consistent and standardized approaches to community-based health development.

The tool-kit concept was also supported by participants involved in development who sought support from their colleagues to facilitate "knowledge-brokering" to communities and countries without immediate access to the already researched range of options in order to avoid wasting scarce resources on reinventing the wheel while at the same time promoting a sound policy process and needs-based decision making.

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An additional advantage to seeking support for the development of such a generic, internationally accepted "tool kit" was the apparent need for donor agencies to have available to them a generic guide for their discussions with countries concerned with community health development and the allocation of precious and scarce resources.

Such a standardized source of information and accepted approaches has predecessors in the health field. In a process similar to the "tool kit" concept for needs-based technology assessment, others have already operationalized the concept of "essential drugs" and "essential equipment" in health delivery. Policy and planning methodologies are advanced enough to promote and disseminate a standardized set of "essential methods" in decision making.

The creation of a user-friendly tool kit containing such a set of "essential methods" for community-based health development would promote an orderly approach to sound policy decision-making. The use of such a kit would lead to more community-based health development, "needs-based" health policies, services and technologies incorporating the concepts of equity, consensus building, accountability, cost-effectiveness, priority setting, community involvement and community-based governance.

Characteristics of Desirable Tool Kits

First and foremost, the tool kit is intended to be interactive and ever-evolving. With sufficient tools at hand now, a "starter kit" could be designed to promote international cooperation. In different disciplines, there exists already a rich range of decision-making tools. Some, which could be placed into the tool kit are robust, well researched and ready to be applied. Other tools, in earlier stages of development, could be placed into the tool kit to be fine tuned and substantiated by added case studies and inviting partnerships in furthering research and application.

Such a tool kit should be adapted for the three strata of the health system; the institution or health centre/hospital; the district entities; and federal or Ministry agencies. Tools should also be selected to serve decision-making across the whole spectrum of health professionals involved in the policy process from practitioners to public servants.

Tools placed into the kit should be generic and sufficiently adaptable as to be tailored to suit local environments in different communities globally. Designed to set out "essential methods" in needs-based technology assessment for communities, the kit should promote simple, rapid assessment techniques. Methods should lead to choices of "appropriate technologies" in the community context. Additionally, the tools should be used together to the degree possible since technology assessment is a synthetic or systemic process. Each tool interacts dynamically with the others in the system.

A "living" and evolving tool box requires designing the network to provide users the freedom and capability to provide feed-back and contribute to the fine-tuning of the tools. Furthermore, participants envisaged a network where users could seek advice and expert opinion by activating various nodes on the network. Several suggestions were tabled. Internet and the global information highway could play an important role in achieving this dynamic vision. Access to MEDLINE should be included and in

this regard, participants suggested that information available under the "Devices" heading would be useful.The HEALTH Planning and Administration database, a companion of MEDLINE provides references to biomedical literature addressing nonclinical aspects of health care delivery.

Ultimately, the tool kit must remain flexible, "portable" and user-friendly. The challenge to the design team will be to make available a broad range of rapid decision-making techniques without weighting down the system with cumbersome details. The reward to reap, well beyond resource savings, is the expectation that a health system which currently suffers from a lack of predictability or accountability can become grounded in a set of guidelines leading to an equitable and "needs-based" policy process in health.

Contents of the Tool Kit

What might a tool kit contain? Discussions among participants suggested that such a "Needs-Based Technology Assessment Tool Kit" should contain at least the following "tool sets";

- Assessment of "Burden of Disease" and "Needs";
- Technology Assessment Priorisation (for services, education, and research);
- Measuring Cost-Effectiveness;
- Tools for "Equity" and "Distribution";
- Management Training Tools;
- Policy Formulation Tools; and
- Practice Guidelines Incorporating "Evidence-Based Technology Assessment."

Physically — the form of the tools within the kit could take the form of software packages, such as PHC MAP (described in Case Study 5); networks of resource persons; catalogue or inventory of existing resources; videos; leading articles and books; case studies from around the world; and electronic networking and information systems such as the "Cochrane Collaboration."

Elaboration on Each Tool Set

Assessing "Burden of Disease" and "Need"

Conference participants recognized that different constituencies could arrive at quite different assessments of "needs" and lists of "priorities." Communities and users, health care providers, public health specialists and politicians — each have their own objectives and approaches to "needs" identification. Good health program decisions require judicious partnership between these different stakeholders.

Conference participants recognized the invaluable contribution of the World Development Report 1993 "Investing in Health" (World Bank, Oxford Press, 1993) — particularly in its approach to the assessment of "burden of disease" through the use of disability adjusted life years (DALYs). Readers are referred also to one of the key background documents entitled *Disease Control Priorities in Developing Countries* (Jamison, D.; Mosley, T.; Measham, A.R.; Bobadilla, J.L., ed. 1993. Oxford University Press, New York, NY, USA.). This approach builds upon that of others using "Potential Years of Life Lost" (PYLL) or "Quality Adjusted Life Years" (QALY's).

Caution was expressed, however, in employing these methods indiscriminantly in the context of developing countries. These methods are relatively cumbersome. They require quantitative information and usually focus on "disease entities" rather than on "health determinants." The absence of good data, or the biases in existing data (e.g., referral bias from health facility-based providers) for important conditions such as violence against women, trauma from road accidents or physical violence); and the near impossibility to quantify the effects of health determinants such as education, sanitation and water, housing, nutrition, status of women and fertility could potentially lead to important miscalculations of the "ranking" of burden of disease or contributing factors.

Furthermore, it was noted that the focus on disease entities could lead to a skewing of policy towards health service interventions where alternative health development strategies might have been more cost-effective. Tools addressing alternative "health development" strategies could be far more cost-effective and should be placed into the kit in a balanced and complimentary fashion.

Likewise, the "wants" of consumers — and the "needs" identified by health care providers, if combined with politicians' wishes to please all constituencies, could lead health systems to bankruptcy while not having an optimal impact on the health status of the population. "Wants" and "needs" must be kept in check through a rigorous quantitative population approach. In this context, the integration of a "public health" perspective starting in the early stages of the curricula of future health providers appeared essential to symposium participants.

Assessment tools tailored to the specific conditions of different socioeconomic subgroups within communities, such as street children or displaced persons, should be supported.

"Rapid assessment methods," drawing upon a mixture of qualitative and quantitative methodologies (such as key informant interviews, and focus groups) and including sufficient community representation and representation of providers — linked with rapid epidemiological methods such as community surveys or sentinel site surveillance could provide a useful set of tools.

As an initial step in priority setting, tools to ensure "feed-back" of information obtained from all sources — and from consensus building methods — can be included into the kit to help policy makers.

The conference also elevated the issue of "power relationships" between various groups in the decision process like politicians, health care providers and various groups in the community. Where power is disproportionately distributed, decisions taken can end up serving selected power groups rather than the "basic needs" of the community as a whole. While the power of consumer activism can be persuasive, it is based upon an informed choice between alternative policy options and therefore, requires concerted effort and resources dedicated to public information.

In summary, it appeared essential to include in the kit tools to facilitate participatory decision making, consensus building and public information. Such tools are an essential part of the kit and the objective to achieve a health system responsive to the needs of the population which it serves. Such a strategy requires tools for communication and a commitment to a networking strategy among consumers, providers and policy-makers.

Interesting resource materials mentioned during the group discussions included *Guide to Health Needs Assessment: A Critique of Available Sources of Health and Health Care Information* (revised ed. Larry W. Chambers, Christel A. Woodward, Caroline M. Dok. Canadian Public Health Association, Ottawa, ON, Canada. 1983).

Technology Assessment Priorization: Services, Education, and Research

Building a "tool box" to assist policy makers with priority setting in "needs-based" community health decision making should take into account at least the following factors: burden of illness (current situation and future trends); community concern; health development strategies; and the availability of cost-effective interventions. A range of sensitivities including political circumstances, the social environment and the economic context are must be considered in the decision process.

Tools should be adaptable to priority setting at the local, district and national level. The use of consensus-building methods such as those promulgated by the Institute of Medicine and the Office for Technology Assessment (USA) are important tools to ensure sustained commitment to adopted strategies. Examples of important priority setting exercises mentioned at the conference included the US "Health Objectives of the Nation" and the priority setting work carried out by Oregon State.

Education of health providers should include sufficient public health training from an early stage to ensure appropriate "needs-based" priority setting by these future health providers. The training should also be task-oriented, taking into account the priority health problems and appropriate technologies chosen to address them.

Priority setting in research can also be facilitated by developed tools. Examples are available to policy makers to build upon such as the work of the Commission on Health Research for Development (*Health Research: Essential Link to Equity in Development.* Oxford University Press, 1990). The Task Force on Health Research in Development Report (*A Strategy for Action in Health and Human Development*, Geneva, Switzerland. 1991) is a further example of methods to employ in setting priorities in research. The concept of "essential national health research" implies priority setting for a nation. The Commission also emphasized the determining role of "research capacity building" in developing countries to ensure that each country can address its own "essential national health research" agenda.

Measuring Cost-Effectiveness

Conference participants reviewed the difference between the concepts of "efficacy" (theoretical and under well controlled conditions), "effectiveness (as applied in communities); and the similarity between "efficiency" and "cost-effectiveness." Strengths and weaknesses of different research designs were reviewed including case-control studies, cohort studies and randomized controlled trials (RCTs).

Often, the cost-analysis component can be added to a community-based RCT without significant additional cost or effort. This enables the policy maker to secure cost-effectiveness information without carrying out further studies. While the RCT remains the gold standard and should be strived towards wherever possible, field conditions and ethical considerations often preclude its use. Other designs, if carefully planned, executed and analyzed with appropriate caution, can often lead to important results at lower costs. Useful resources include the book entitled *Economic Evaluation in the Development of Medicines* (Michael Drummond, Office of Health Economics, London, UK. 1988) and also selected World Health Organization (WHO) publications.

Equity and Distribution

The concept of equity-centred health development permeated the deliberations of the conference. In order for cost-effective technologies and health services to have the maximal impact on the health of populations, they must be readily accessible to all. Access to quality health programs should be equitable in terms of geography (adequate distribution of appropriate health facilities), in terms of financing (at a cost which communities can afford and subsidized for the poor); and responsive to sociocultural considerations such as language, ethnicity, religion, and education.

Equity was accepted as fundamental to community based health development. To concerns that true equity was uneconomic, the clarion response was that anything which fell short of this standard was not only unethical but also unsustainable in the long run. Furthermore, participants noted that the concepts of "cost-effectiveness" on the one hand, and "equity" on the other can be complimentary and linked to advantage. As one conference participant said:

> If we are efficient, then it is much easier to be equitable in our distribution of services.

The concept of allocative efficiency is defined in the "World Development Report 1993," as the "extent of optimality in distribution of resources among a number of competing uses." It includes not only the concepts of equity and distribution, but also the optimal mix and packaging of health technologies and programs which will have the maximal health status impact per unit of resource invested.

Useful resources mentioned include Guyatt's "Technology Assessment" book and, in particular, the chapter written by Roberta Labelle and David Bantas on technology assessment in developing countries. (Reference: Feeny, D.; Guyatt, G.; Tugwell, P., eds. *Health Care Technology: Effectiveness, Efficiency and Public Policy*. Institute for Research on Public Policy, Montreal, PQ, Canada. 1986.)

Management Tools

Conference participants pointed out the need to include in the kit, management training tools. Often, management does not receive the attention it deserves in developing countries. Frequently, it is the weak link in the chain between "needs-based" technology assessment and the delivery of effective and efficient services. The hierarchical structure and authoritarian style of administration in many countries does not foster managerial leadership or commitment to reform. The lack of gender-balance in management or lack of presence of other minorities also limits the likelihood that management appreciates the full range of issues and options.

Yet, managers are the key link between policy decisions taken at the "top" of structures, and the actual operations of health services at the "bottom" — the community. Also, the district level was recognized to be essential in ensuring linkages between policy makers and those who implemented policy in developing countries and developed countries alike. The tool kit design, therefore, should address the needs of district managers.

Tools should facilitate effective delivery and feed-back mechanisms. The "communication" skill set of managers was viewed as critical to successful strategies in the implementation of community health development. Flows must be facilitated between the decision makers, the managers, and the

community of care. "Feed-down" and "feed-back" are both important in effectively influencing decisions and implementing policy.

A superb example of a "tool set" for inclusion in the "tool box" is the Primary Health Care Management Advancement Programme (PHC MAP) of the Aga Khan Foundation. The software version of modules includes reference documents and allows for easy adaptation of material to local needs.

Some participants felt that effective management tools could be borrowed from successful examples in the private sector. The obvious caution expressed by others to this strategy was to keep in mind the difference in end objectives between "public" and "private" pursuits. Public policy is directed towards achieving the greatest good for the greatest number. Private sector policy is driven by the profit motive.

Policy Formulation: Roundtables, Consensus Conferences

Tools are also available to facilitate effective "policy formulation." Like management, policy formulation has not received the attention it deserves, especially in developing countries. In many cases, this has lead to decision-making based more on political expediency rather than community-based needs.

Policy is often influenced by pressure from international agencies without taking sufficiently into account the needs of the population. For example, without questioning the need for structural adjustment, most would agree now that structural adjustment programs have been implemented to date with insufficient attention to the needs of the most vulnerable groups or key development sectors such as education and health.

If policy formulation is truly to reflect needs, it must take into account community concerns. This "democratization" of the policy formulation process is fundamental to building commitment and achieving a sustainable result. This consensus-building from the grassroots up requires significant community involvement; and the use of consensus-building tools including documents, focus groups and policy roundtable exercises. Community participation has to be developed in a systematic way, particularly when it comes to the priorization process.

Research must be relevant to policy formulation. The Essential National Health Research (ENHR) effort has not yet lead to significant policy formulation. Some Conference participants suggested that this global effort be renamed "Essential National Health Research and Policy (ENHR-P)." Universities could build on their traditional strength in research by focusing on essential research and its attendant policy formulation aspect, thus contributing further to the advancement of the society.

Unlike other aspects of technology assessment, the "science" and "methods" of policy advocacy are in their infancy. Policy advocacy tools are essential components for the tool kit. The development and testing of such tools was identified as a priority. Readers are referred to the work of Jonathan Lomas, the presentation of Dr Davidson R. Gwatkin, later in this publication, on the "International Health Policy Program," and the material produced by this Program.

Practice Guidelines Incorporating "Evidence-Based Technology Assessment"

Practice guidelines, previously focused on physician "providers," should be developed for all categories of health professionals — and expanded to apply to a variety of settings within the health system. Useful resources in this field include the work of John Ferguson and that of the "International Technology Assessment Society."

Conclusion

Conference participants welcomed the action-oriented recommendation to seek support for the design and dissemination of a ***"Needs Based Technology Assessment Tool Kit."*** Lively discussions led to the design of some elements of such a "starter kit." Agencies like the International Development Research Centre (IDRC) in Canada are particularly active at this interface as agents of "knowledge-brokering."

The conference urged support for the ***"Tool Box"*** as a critical next step. The need is urgent as national health care resources evaporate and critical choices between technologies loom large. The time is ripe. Tools are already on the shelf. Others are in the making.

The conference concluded that the design and implementation of a health in development ***"Tool Box"*** was an essential next step — toward achieving equitable and sustainable "needs-based" community health policies and programs globally.

INTERNATIONAL HEALTH POLICY PROGRAM

Davidson R. Gwatkin[1]

Please allow me to make a few comments on the topic of health policy as it relates to needs-based technology assessment. I am associated with the International Health Policy Program. This Program provides grants in Africa and Asia to groups of policy-makers and researchers. Our explicit objective is to try to bring about policy change; which is not to say that we always succeed.

Our experience and the experiences of others leads me to make a set of suggestions: four of them have to do with how to work in an environment where there is a reasonable chance of attracting the policy-makers' interests: in other words, how to build bridges and; three other suggestions on how to work in hostile environments, where only politics count. Let me say that none of these suggestions is magic and they all have their down sides.

Working in a Receptive Environment

How do you build bridges with policy-makers when the environment is receptive? First of all involving them from the beginning; this has been mentioned previously and is fairly straight forward. This means not just going to them with topics that you think are important and seeing if you can get them on board, but rather going to them and asking what is on their mind and then using that as the basis for selecting a topic. In other words, their interests rather than yours should be the determining factor in what sets the policy research agenda.

The second point, which has also been mentioned, is reliance on policy round tables and other dissemination techniques for research results. The third point is: be flexible in formats; do not think just or even primarily in terms of scientific publications, the standard approach taken. But think of mechanisms such as memos and conferences. I, for example, have argued that the International Health Policy Program should be prepared to support the preparation of confidential memos between the researcher and the Ministry that we would never see.

Fourth, focus more on personal relationships than on policy products. I would argue that individual studies very rarely bring about any significant policy change. Policies are made through endless rounds of committee meetings and private discussions over dinner. The point here is to get somebody at the table where the decisions are made so that he/she can participate on a regular, on-going basis.

Working in a Hostile Environment

In this second part, we will deal with ways of working in hostile environment where only politics rule. Here again, there are three suggestions and I would stress they are even less perfect. They convey no guarantee of success, rather they just change the odds slightly.

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The first suggestion is to take the long term view: remember that times change, settle in, and bet on the chance that there will be change. As Dr. Battista said earlier in the Conference, the policy climate does seem to be changing. Concern yourself with getting the capacity developed, the work done, and your recommendations ready to go for the day when conditions change and you can put them into effect. A dramatic case example of that came in Chile with the overthrow of the Pinochet regime. Jorge Jimenez, who had been working on policy reforms during the previous five years, became Minister of Health and was able to move quickly on a set of reforms.

Second, be an opportunist: look for opportunities and find a niche in a hostile world. Now not every Government is inevitably hostile to everything. A dramatic instance of this was in El Salvador where UNICEF got a day of truce in the warring factions. You would have thought that a country in the middle of war is not a time where you can bring about interventions. But UNICEF managed to persuade both sides that it would be to their political advantage to hold a day of truce and run an immunization program.

A third suggestion would be don't think of just **cooperating** with Government. Instead, you can go into opposition and use empirical information to reveal scandals and embarrass governments into change. Here is an example again citing UNICEF. In *The Progress of Nations*, issued just recently, UNICEF ranks countries by their performance on each of selected health, education and development indicators, in an explicit effort to embarrass the governments at the lower end of the accomplishment pattern to do something. They have had hostile reactions, but they are getting change.

I hope that these few suggestions for policy influence might prove useful.

SYNTHESIS AND RECOMMENDATIONS FOR ACTIONS
—
ONE PERSPECTIVE

Chitr Sitthi-Amorn

What should we take away from here, where we should go?

During the Conference, we discussed "whose needs?" — those of the consumer and the point of view of the society, those of the provider or of the policy-maker. I would like to suggest that the society view point must be the most important one because, in the end, consumers might want services that benefit them. The perception of the society should be incorporated into the needs assessment.

I would like to suggest however, that, although these views may be important, they might reflect only the felt needs and not the unfelt needs; they might reflect supply-induced demand and therefore represent a misconception of true need.

We should consider three kinds of needs: need for action, need for research and need for education. In terms of need for action, not only do we have to focus on treatment modalities but also on the preventive approach. Furthermore, we must focus on equity-centred health development. Who does the assessment? is it the influential card holder or the social activists? How do we prioritize the needs identified by different stakeholders?

We should try to apply the existing methodologies and tools together, bearing in mind that a balanced perspective is the most important, without reflecting the viewpoints of any specific interest group while, at the same time, not ignoring the cultural context.

What do we want to achieve out of policy development? we are striving for equity, efficiency and quality services. The policy debate must progress from the political expediency to a more technical approach. This would be possible through the early involvement of the politicians in the policy formulation process with the support of the policy and planning division of the ministry of health. Start with the interests of the politicians, build consensus, be flexible on format, be prepared for the long term approach or to go into opposition. Better policy advocacy tools need to be developed and tested.

At the program level, we should address allocative efficiency including optimal facility planning and manpower planning, that is trying to match the distribution of the available technology with the needs of the population.

Certain technologies are already available and we should make better use of them. One of the instruments mentioned during this Conference is the National Account Expenditure versus Health Status. This tool, I believe, has been underutilized; it can provide considerable information. As an example, one can examine the production function: output versus expenditure, for different categories of health facilities .

Let us turn now to management efficiency. The Primary Health Care Management Advancement Programme (PHC MAP) is an excellent tool, especially for certain levels of the health system. Given the importance of sound management of the health system, more management tools are needed.

Concerning technical efficiency, we discussed cost-effectiveness, efficacy and safety. I would suggest that we also need to look at the quality aspect using total quality management methodology. This should allow a critical appraisal of the quality of services provided within the health institution; the appropriate feedback to management and; the setting of targets for continuous quality improvement.

The tools discussed during this Conference should be in the hands of competent craftsmen; solid training of health professionals is one of the most important health service investment a country can make. The linkages between the tools are just as important as the tools themselves. Communication is therefore very important.

Finally, we need both North–South and South–South collaboration. For example, Thailand has certain capacities to help countries like Laos and Vietnam, yet at the same time Thailand also needs to collaborate with countries such as those in North America. These transfers bring technology to bear on local problems in the South. This, I believe, is one of the most important themes as it will contribute to better health in developing countries.

SYNTHESIS AND RECOMMENDATIONS FOR ACTIONS
—
ONE PERSPECTIVE

Judith Maxwell[1]

Being a newcomer to health research, I want first to express my admiration for what you have done here in the last 2 days. I also want to say that I am immensely proud of the prominent role of women in these proceedings. In the kind of economics that I do on a regular basis, there are far too few women in leadership positions.

If I had to summarize the meeting in three words, they would be "knowledge is power." Power here being the capacity to allocate resources rationally. Knowledge also shifts the locus of decision-making: who makes the decisions and whose concerns are accounted for when those decisions are made.

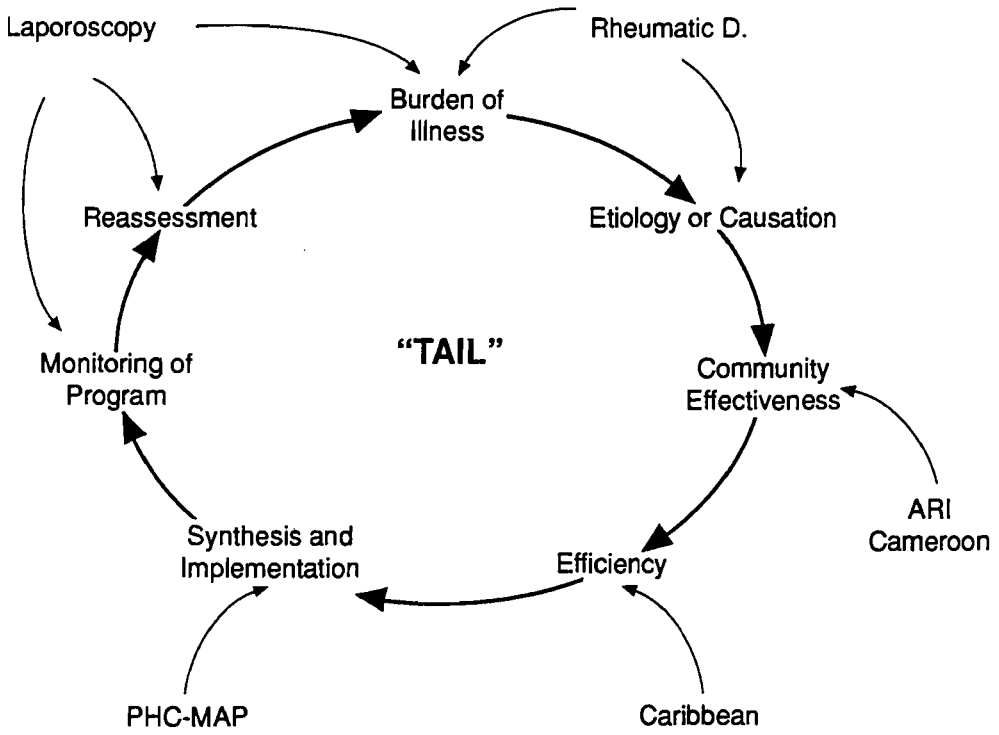

Fig 1. The Technology Assessment Iterative Loop or "TAIL." Source: Tugwell.

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Health Technology Assessment is, as we defined it in our last discussion group, an orderly way of thinking, a way of organizing information for policy but also for practice. Here, there is much shared territory between South and North.

Going back to the opening of the Conference, I would like to remind you of this slide which Peter Tugwell used earlier (Fig. 1). The case studies we have discussed have taken us through the whole loop of Technology Assessment.

- We have looked at studies where we were trying to identify the burden of illness and some of its causation (Rheumatic Diseases).
- We looked at studies where we focused on community effectiveness (ARI in the Philippines and the Cameroon case).
- The Caribbean case looked at the efficient use of resources.
- And the last two cases examined management issues (PHC MAP and Laparoscopy).

This shows excellent planning on the part of the organizers and has permitted us to work on a wide range of Technology Assessment issues around the whole Technology Assessment Iterative Loop.

Borrowing another slide from Peter Tugwell's presentation (Fig. 2), it strikes me that we really concentrated our debates on the issues of systems compliance and the patient–subject compliance. These are all community issues.

We learned about the importance of the village health worker in the South as being the key agent transmitting knowledge into the community. She/he is also the agent with the capacity to collect the primary data necessary to move the information back up the loop to policy-makers.

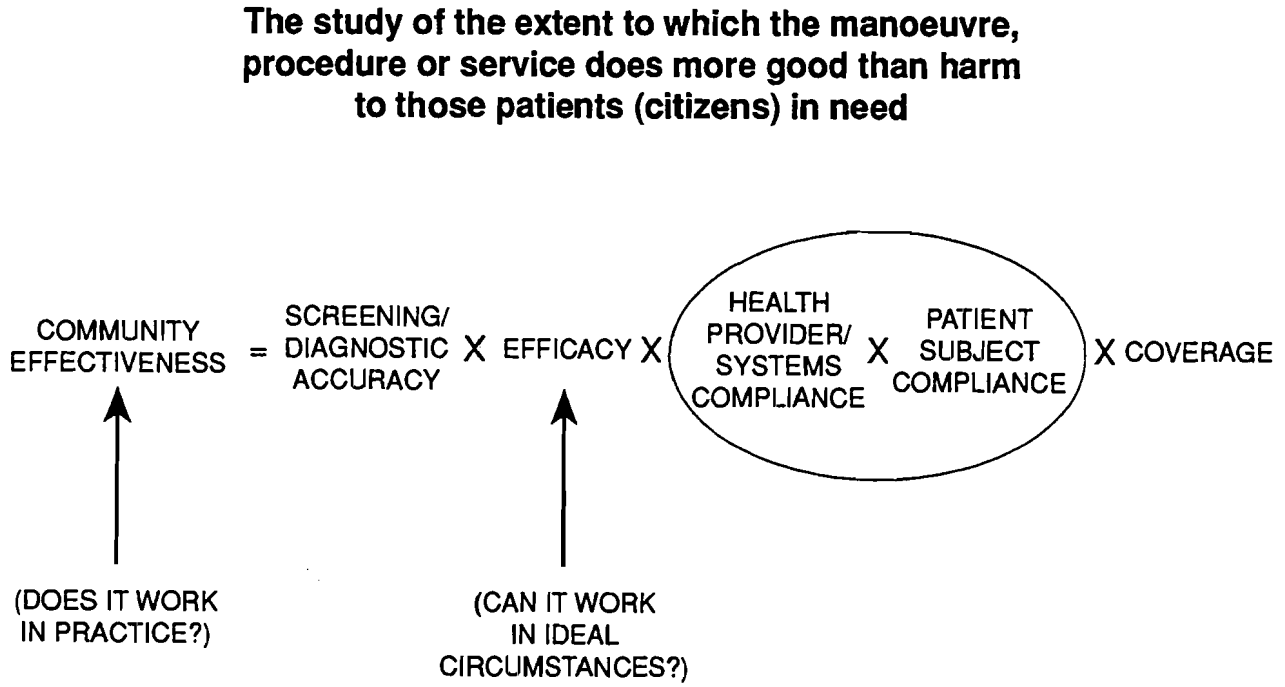

Fig. 2. Community Effectiveness. Source: Tugwell.

We have heard anecdotal information about the importance of culture, values, and beliefs as barriers to community-effectiveness. Once the researcher understands that culture, she/he can often be the agent of change in the health status in that community.

Here in Canada, a high income country, community and culture are also critical issues that tend to be underestimated by both providers and researchers. We too need to develop better tools for under-

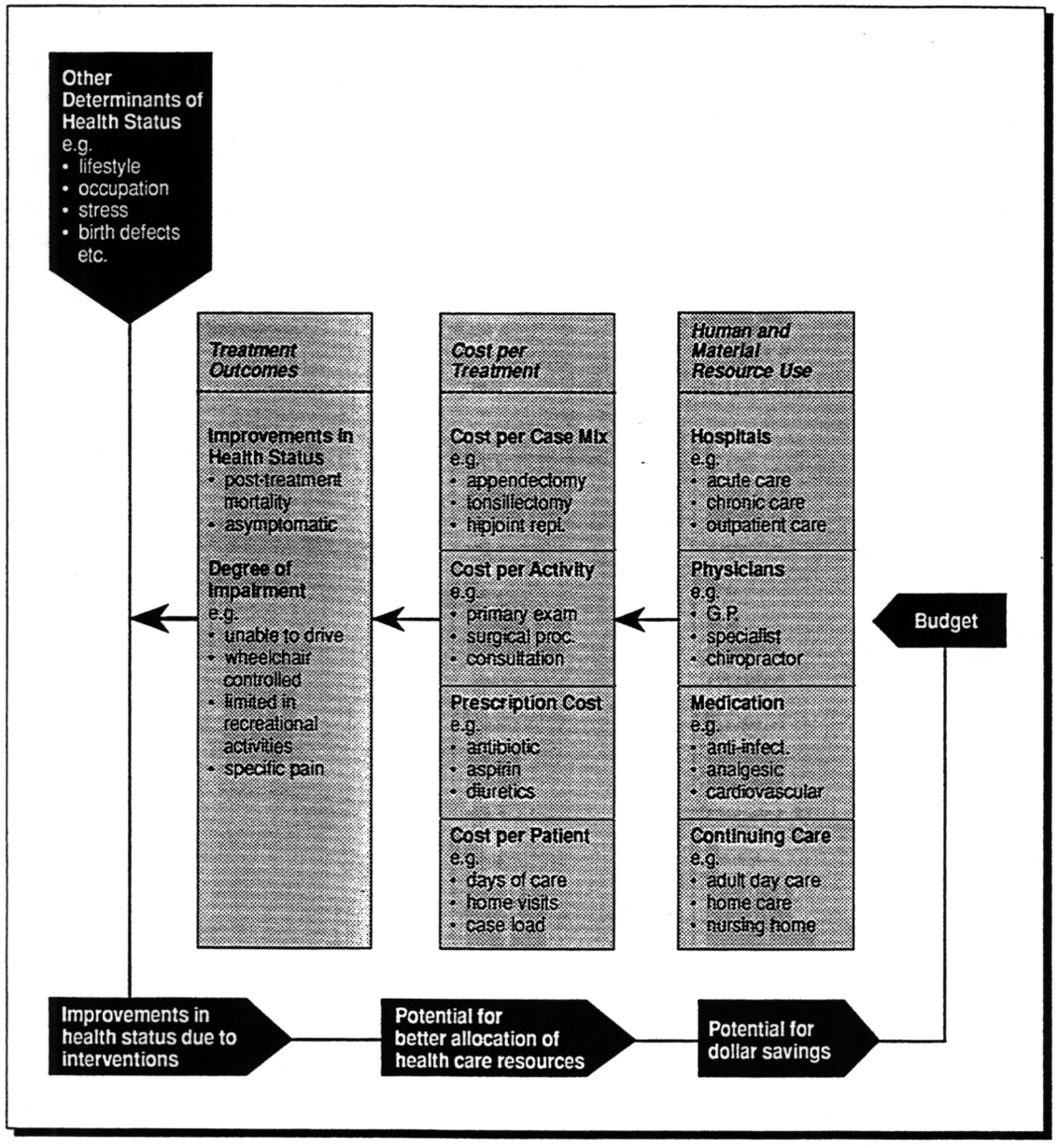

Fig. 3. A Framework for Cost-Effectiveness of Health Care. Source: Project on the Cost-Effectiveness of the Health Care System.

standing what the community beliefs are, why things are not happening, how we can better transmit information into the community, and how we can make policy more sensitive to community needs.

Other common issues between South and North include

- First of all, that there is an important role for the social scientist in technology assessment. Not just economists like me, but also anthropologists and sociologists, who can help us deal with cultural beliefs.
- Second, there are common gaps in knowledge about the burden of disease; about client concerns; about community-effectiveness and system performance.
- Third, the tensions in the system are remarkably similar. We are debating whether to focus on health or on illness. We are concerned about whether we have over allocated resources to the tertiary sector versus the primary sector. And many of us wonder whether sustainability is more important than achieving a biomedical breakthrough.
- Finally, on the policy-making side, there is a common concern as to whether information will govern decisions or whether it will be strictly a political process.

In essence, we are all aiming to improve health status and to reduce costs. So, I am going take time for a short commercial and show you the framework that we are using in the project on the cost-effectiveness of the Canadian health care system, directed by Doug Angus (Fig. 3).

In Fig. 3, we are looking here at the health care system; we have, if you want, stove pipes. One describes the Human and Material Resource inputs that go into health care; the hospitals, physicians, the medications, and the continuing care. Then, we have the Cost per Treatment, which is a huge gap in information in Canada, so we have invested a lot of research time in linking costs to the inputs. Then, we want to link that to the outcomes from the system, using the Oregon system of Quality Adjusted Life Years (QALYs) and adapting them for Canada.

The objective is to assess the cost-effectiveness of the current system, and then to explore changes in the allocation of health care resources that would lead to improved health status or to dollar savings. Now, we recognize that there are many other determinants of health status that will not be quantified in this project. It is, nonetheless, a broader picture of the health care system than anyone else has produced to date.

We call it a "patchwork quilt" because we have to take proxy information from so many different places. But, like the World Development Report, what we are really trying to do here is to be the pioneers. We want to make policy-makers and researchers realize where the information gaps are. This should help to drive the research and data collection process in new directions.

Again, I want to thank you for inviting me to participate, and to thank the organizers for 2 fascinating days.

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