INTRODUCTION

There are several levels of policies relevant to the discussion. These include the public policy, the system policy, the facility policy, the practice policy and the empowerment of the public and other stakeholders to balance technology development, optimisation, dissemination and utilization with the expectations and values of the stakeholders.

There are two key requirements for promoting technology policy, strategies and management. The first requirement is to develop strategies through partnerships of stakeholders to make sure that needs-based cost-effective technologies within the constraints of health systems are available and adopted for appropriate use in all levels of health care (public, system, facility, practice). Secondly, in a democratic system, we need to empower the public to make rational choices of the technologies and to ensure the accountability of the distribution and use of technologies according to the objectives of the different types of health policy. (1 f23)

The linkage between the production, assessment and utilization technologies has long been a concern among the producers, assessors and users of technologies alike. Producers frequently lament the fact that potential assessors and users frequently downplay the cost of the development of technology. Assessors and users of technologies argue that the technologies generated are not needs-based and therefore become irrelevant and not useful. Many times, these technologies are produced where there is a potential market value and not needs-based. The adoption of non-needs-based technologies in the public system can only amplify the hunger pains from an empty stomach. Therefore, a management system is required and should involve the broad groups of people affected by the technologies. Such a management system should take into account the characteristics of needs, depending on the levels of operation of the technology (i.e. the public, the system, the facility, the practice). Among these groups are the producers, assessors, users of technologies and anyone who can empower the consumers and is the true advocate for the public, including the consumers themselves. Early dialogues with these groups will help the producers understand the types of technologies required, guide the incorporation of needs and objectives of health care systems into technology development plans, and assist in using technologies for improving, expanding and sustaining higher levels of health status, equity of access to services and high quality living. Dialogues must be based on mutual respects, appreciation of the motivation of others, and the desire to foster proper national and international partnership through a productive rolling process.

FACTORS INFLUENCING TECHNOLOGY POLICIES, STRATEGIES AND MANAGEMENT

To develop appropriate strategies for technology management, it is important to understand the factors influencing policies, strategies and management relating to technology. These factors are essential for the development of strategic plans for assessment and management of technology within a given institution taking into consideration the mission and mandate of institutions. These factors include:

- political commitments and national obligations;
- national development policy;
- health needs and demands of the people for health services;
- constraints and catalyst for technology policies, strategies and management;
- globalization and intellectual property right;
- donors; and

- vested interests of stakeholders.

Political Commitments and National Obligations

The political commitments and national obligations which can influence national development policy and national health policy, strategies and management. For example, if the national obligations have put an emphasis on health for all (HFA) and PHC; equity, acceptability and efficiency of care, etc, the technology policy and strategies have to follow the obligations at least at the public policy level. In some resource-rich countries, such as Brunei, more technology policy can be more directed for curative services. Recently, there is a trend for privatization of health services and health care reform in many developing countries; the role of technology management to clarify the objectives of such privatization will be even more important. The critical issues here are the concerns for equity, especially certain characteristics of developing countries such as the health disparity between the social groups, the low coverage of finance and provision of services, the limited ability of the people to pay, the increasing needs and demands in relation to supply. In India, with the rapid advancement in medical technology over the last decade, the government is finding it increasingly difficult to keep government teaching hospitals updated compared to some sophisticated private sector hospitals, especially at the sub-specialty level. (2-f624)

National Development Policy

The overall national development policy, including agricultural policy, education policy, industry policy, energy policy, and housing policy, can affect health and thus the requirement for high technology. Sri Lanka, for example, has much lower GDP compared to Thailand but they have lower infant mortality rate and higher life expectancy. (3- f5, 4-f576)

Health Needs and Demands for Services

Existing, emerging, re-emerging needs are important. Also important are the demands of the people. The demand can influence the decision-makers to satisfy the public. The low education level and restrictive media in many developing countries make the underprivileged community incapable of voicing their needs. In technology policies, strategies and management, some prime movers must have the moral obligation to help them voice their needs; both expressed and felt. (5-f549, 6-f557)

Constraints and Catalysts

The constraints and catalyst for technology policies, strategies and management can be sub-classified into:

Hard and Soft Constraints or Catalyst

Hard constraints occur when there are no resources to carry out the tools for technology policies, strategies and management. Soft constraints occur when we have some resources but have to prioritize them for technology policies, strategies and management for use in particular areas.

Socio-economic, culture and traditions of the people

Different countries have different political systems and socio-cultural and economic status. The use of tools for technology policies, strategies and management will be different among countries with government domination and those with more freedom of choices by the consumer of health care. Also, income disparities between different social classes limit the ability to apply a market mechanism and freedom of choice in countries. These have a lot of implication on technology policies, strategies and management.

Resources

Important resources include the information and knowledge, manpower, facilities, and commodities. These include the new diagnostic and therapeutic possibilities as well as new possibilities of access to information system and network. New technologies provide great opportunities for good health and development. However, not all new technology are cost-effective and some health technology gap may be underdeveloped because of poor market value since the poor who do not have power to access these technology, and cannot pay for the development and use.

If we examine the whole family of constraints and catalysts using the toolkits, including the strategic management tools, we can better allocate resources to attain what is possible. Also, what is a constraint today may be a catalyst tomorrow.

Globalization and Intellectual Property Right

We do not yet know the long-term consequences on equity and health of the people by globalization and intellectual property right on health. This also includes the major powerful forces of industries and foreign governments impinging on countries and affecting them in different ways. Many hospitals and medical facilities of the West are considering franchising their activities to developing countries. New drugs have been increasingly expensive. Globalization can create the supply-induced demand. This will require high priority and deep analysis using some of the tools developed. New tools may also need to be developed for further use to adequately understand and control the problem.

Donors

International donors have their own agenda and may lack coordination among the donors. These donors can influence the health technology policies, strategies and management in developing countries. A so-called AID package of free health technologies might induce future dependencies of developing countries on reagents and spare-parts to run them.

Vested Interests of Stakeholders

The vested interests of some stakeholders include the community and investors. Members of parliament in Thailand have fought for new medical schools for their constituencies without adequate analysis of needs. Private and public hospitals are competing to install high tech equipment to induce patients to use their facilities. Caesarian sections in private hospitals have been particularly high on the King's Birthday. (7-f1120)

TRANSLATING TECHNOLOGY ASSESSMENT INTO POLICY - VALUES AND JUDGEMENTS

In the rest of this toolkit, you have learned a number of ways to use evidence to assist in making policy. This section accordingly acts as a reality check. The best designed policy will fail if it cannot be implemented.

The term "policy" is used to mean a wide variety of fundamentally different concepts, ranging from a set of formal actions taken by government, through to the sorts of procedures set out in "policy and procedures" manuals. The definition we have found most useful borrows from that of Jenkins:

"A set of interrelated decisions taken by an actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation where these decisions should, in principle, be within the power of these actors to achieve."[1]

In other words, policies involve making choices, both about what to do ("the selection of goals") and about how to achieve those goals. Policies are not the same as programs - decision makers might decide to do nothing. Policies are not laws - there are many ways to achieve particular goals, of which passing laws is only one. Neither are policies the same as outcomes - policies may fail to achieve their desired goals. Finally, policies are not restricted to government, particularly when responsibility over particular situations rests with non-governmental actors.

Computer programmers learned what they termed the GIGO, which stands for Garbage In, Garbage Out. A related concept is what might be termed The First Law of Evidence: Seemingly technical details can often camouflage major assumptions. We will illustrate that by looking at the family of techniques often referred to as Economic Analysis, or Technology Assessment[2-4]

This family of techniques involves the balancing of costs and consequences. One fundamental requirement for these techniques is that we cannot assess an intervention in isolation. To see whether one course of action is "worth doing," we must compare it to its alternatives. For this discussion, we will take the simplest case, where we are comparing two alternatives, which we will call A and B. We then perform the following steps.

1. Define the alternatives being compared (Option A vs. Option B)
2. Compute the costs of A and B
3. Compute the consequences of A and B
4. Do the math
5. Select the "best" option

Each of these steps, however, can conceal a number of assumptions.

Measuring Costs

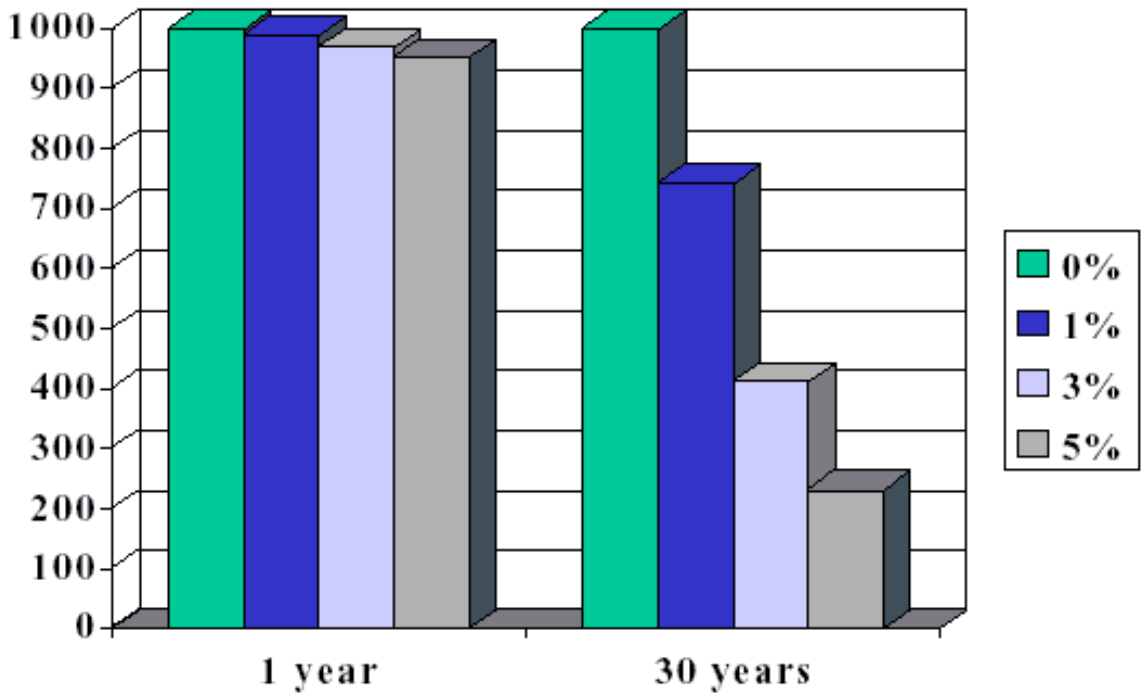
Measuring costs is relatively straight-forward (which is not to say that it is easy). But even "costing" can hide assumptions. For example, what is the cost of a visit to a hospital emergency room? The simplest approach would seem to be to take the costs needed to run the emergency room, and divide this by the number of patients seen, to generate an "average cost." There is a considerable literature on how best to do this, including how to allocate costs which cannot be attributed to any particular program (e.g., the cost of maintaining a library, operating and heating a building, and so on). The resulting number is useful for some policy purposes, but can be seriously misleading for others. Assuming the average cost of an emergency room visit works out to $250, you cannot conclude that you can save that amount for each visit you discourage.

Most of the cost of running the emergency room is what economists refer to as a "fixed cost" - that is, the cost of having a building, heating it, cleaning it, and hiring staff. Within a fairly wide range of caseload, these costs will not change. The "marginal costs"of seeing an extra patient may be as minimal as the cost of an x-ray film, or a bandage. Similarly, the average cost for a day in the hospital can be very different from the actual cost; for relatively healthy patients (e.g., mothers of newborns), this may amount to only the food and laundry costs. For that reason, savings will not occur unless visits are reduced by enough to allow a reduction in staff, or the outright closing of a facility.

There is also room for disputing which costs (and whose costs) should be included. For example, if a patient must take time off work, or incur travel expenses, these costs do not show up on the budget of the hospital; should they be counted? What of the future health costs incurred by a person whose life is "saved" by a transplant? (The current convention is to count those costs associated with care for the transplant, but not unrelated medical costs.) The approach taken is to specify whose "viewpoint" will be taken. The analysis from the viewpoint of a hospital may differ from that using the viewpoint of patients, or payers, or society as a whole. (The preferred option among experts in economic analysis is to look at societal costs, but to specify other viewpoints in addition if these are likely to differ.)

When evaluating prevention programs, an even more serious dilemma arises, which hides under the technical name of the "discount rate." Assume that your friend asks to borrow $1,000 from you, and agrees to pay it back at a future date. What would that money be worth? Even if there is no inflation, you have been unable to use that money. Economists accordingly assign a "discount rate" to the money. Figure 1shows what your $1000 would be worth 1 year from now, and 30 years in the future. If you assume a discount rate of 0 (i.e., that the money retains the same value), the money would still be worth $1000. If you assume a discount rate of 1%, then your $1000 would only be worth $990.09 in one year, and would drop to a value of $741.92 thirty years from now. The expected value of that $1000 with a 3% discount rate would be $970.87 in one year and $411.98 after 30 years. If you accept the customary discount rate of 5%, which most analyses do, your money would be worth $952.38 in one year, and $231.37 in thirty years.

Figure 1: Impact of varying time periods and discount rates on expected value of $1,000

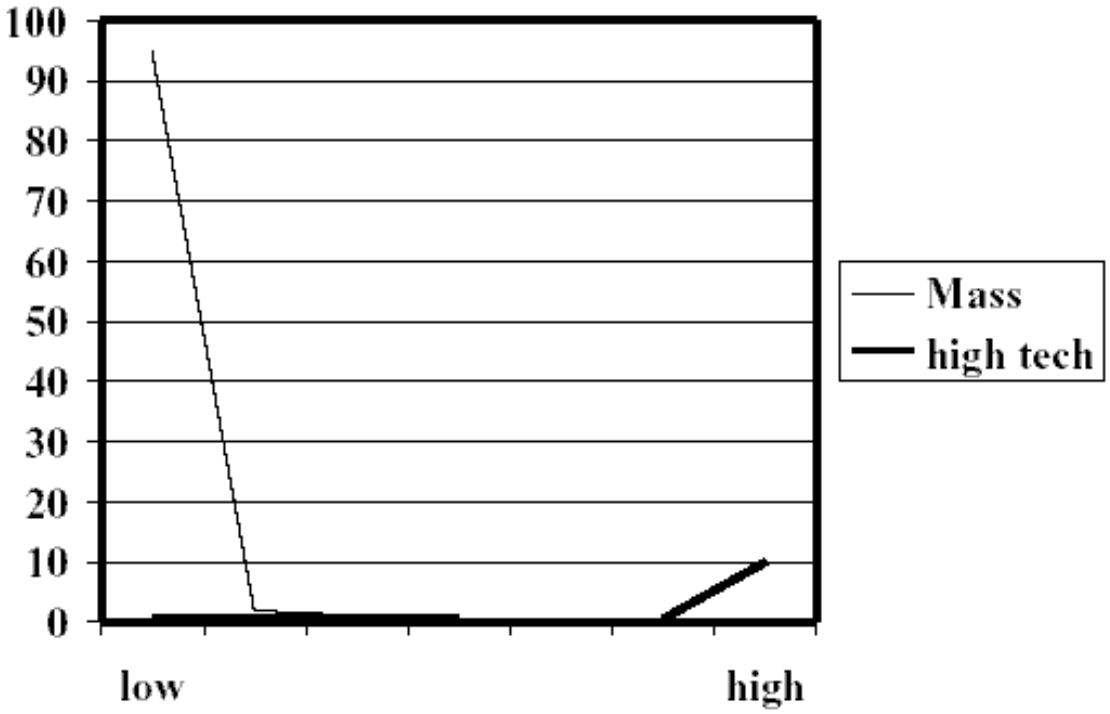


On the cost side, one can compensate for this loss of purchasing power by charging interest, or making other arrangements (e.g., shares of the business) to bring the expected value back to $1000. However, as we will note, this same concept of discounting can have a major impact when we seek to evaluate the consequences of an intervention.

Measuring Consequences

Many types of consequences could be examined. Most clinical studies begin with clinical impact (e.g., the safety and effectiveness of a pharmaceutical). Just as it was important to clarify whose costs were being counted, it is important to clarify whose consequences matter. In particular, there is a difference between examining the consequences for an individual and the consequences for a population. Statistically, we need to know how great, and how likely, benefits are. However, telling an individual that he or she has a 90% chance of survival is useful only as a general guide; after the intervention, that individual is either dead, or alive. In that connection, populationbased studies often fail to distinguish between two different types of small benefit. Figure 2 illustrates it hypothetically. In the "mass" intervention, denoted by the dotted line, every individual in the population receives a small benefit (e.g., 3 fewer sick days as a result of an improved treatment for the common cold). In the "high tech" case, a small number (or proportion) of individuals receive a very large benefit (e.g., a person with a successful transplant). In general, the public values this second type of benefit considerably more. Policy analysts continue to be surprised that the public is often willing to purchase these sort of "small" benefits, without recognizing the difference between the perspective of the individual (to whom the benefit is not small at all) and that of a population[5]

Figure 2: Two types of interventions, each with a small population benefit



Types of Economic Analysis

There are four basic types of economic analysis, which are termed:

- Cost minimization
- Cost benefit
- Cost effectiveness
- Cost utility

To oversimplify, these types all compute costs in the same way, but differ in how they compute consequences.

Cost Minimization is the simplest. It can be employed whenever it is safe to assume that the consequences of A and B are the same (e.g., a brand name pharmaceutical vs. a clinically identical generic drug). Under those circumstances, it is not necessary to bother measuring consequences at all. The analysis can just compare costs and select the lowest cost alternative.

Cost Benefit, in contrast, attempts to convert both costs and consequences into the same monetary unit (e.g., dollars, pounds, euros, or yen). For example, one can compute the monetary cost of contracting out a service as opposed to providing it by internal staff. If it is possible to assign a monetary value to all consequences, one can then compute "return on investment" and pick the most favourable option. In practice, health benefits are often difficult to quantify in this manner. What is the value of extending someone's life by one year? The simplest approach is to assign their income (or, for population-based studies, the average industrial wage). This can lead to unacceptable conclusions, such as placing zero value upon the unemployed, and even a negative value on retired people who would otherwise have collected a pension. In consequence, few analyses use straight cost-benefit analysis when the consequences involve health benefits. Indeed, even in the example we used of contracting out,

it may also be difficult to place a dollar value on such consequences as having in-house expertise available, or preserving local jobs. One less than desirable consequence has been the tendency to ignore those factors which are not easily measured, which in turn can lead to sub-optimal policy recommendations.

Cost Effectiveness analysis uses a single measure for all consequences, but does not try to put this into monetary terms. For example, one might measure the life years gained by interventions A and B. In a screening program, one could measure the number of cases found. Once the outcome measure is agreed upon, one can select the option which would give the best "bang for the buck"

Cost Utility resembles cost effectiveness, in that it also measures the consequences of A and B in the same (nonmonetary) unit. This approach selects life years as the outcome variable, but does not assign the same value to all health states. Since most people would prefer to have perfect health, without any impairments in the ability to conduct activities of daily living, cost utility analysis adjusts for the "quality of life." The resulting measure is often referred to as a QALY (for quality-adjusted life year), although other variants (the DALY, the HYE, and so on) can be substituted. These measures accordingly vary in how one adjusts the life year to account for varying quality. Issues include how to measure the "utility" of a particular health state, whose utilities should count, and so on.2,6. Just as the technicalities of measuring cost can often prove difficult, it is not simple to measure the value attached to a particular health state. For example, many well-accepted approaches (standard gamble, time trade off, willingness to pay) measure the importance of an outcome by what an individual would be willing to sacrifice to achieve it (risk of death, life expectancy, money). These measures can systematically undervalue outcomes which are unpleasant, but not so unpleasant that someone would rather be dead6. For example, if someone with cancer is willing to put up with chemotherapy and unwilling to sacrifice any life expectancy for fewer side effects, can we really claim that they find life on chemotherapy nearly perfect? However, although it is frequently claimed that a QALY approach devalues the disabled, this is not true. Indeed, one advantage of this approach is that it places a value on quality of life, rather than mere survival. Consider an interventions which would not increase life expectancy, but which would greatly improve quality (e.g., restoring mobility for a person in a wheel chair). This sort of intervention would not add life years, but would add QALYs.

But Which Consequences Should We Include?

To examine a sampling of the sorts of issues which may arise, let us consider how we might evaluate a new intervention, shortening length of stay by discharging new mothers early, with or without home care. We will compare this to "usual care" - that is, to the normal length of stay which these mothers would have received. An additional complexity is that we are dealing with two "patients" - mother, and infant - in addition to their family, the institution, whoever is paying the bills, and society as a whole.

Ideally, we would conduct a randomized controlled trial. After all, if we allowed hospital workers to select who could receive early discharge, they would select the healthiest infants and mothers. This would make our results difficult to interpret. In the real world, of course, this may not be possible, and we may be forced into some of the other approaches noted in this and other toolkits. Nonetheless, regardless of how we collect our data, we must also decide which consequences we wish to measure, that is, what our outcome indicators will be.

The most obvious consequence to examine is mortality (of mother, and of child). This is quite easy to measure. We will have to define the time period we are considering; after all, in the long run, everyone dies. We may decide to look at mortality over a 30 day time period. We may also want to include some controls. Would we want to attribute mortality from an automobile accident to the intervention? Would we need to control for health status, or age? Once we have clarified our definitions - which we must do beforehand to avoid the temptation to massage the data - we are ready to collect this data. Assuming good vital statistics, this should be relatively easy. However, in most industrialized countries, rates of infant and maternal mortality are fortunately very low. Furthermore, mortality alone does not capture all of the outcomes we would consider important. We will have to go beyond mortality.

Another relatively easy-to-measure consequence is hospitalization; did the patients require readmission? Again, we will have to deal with the questions of what time period, and what if any controls. We will also have to work with other institutions; we can measure re-admission rates to our own institution fairly easily, but a dissatisfied patient may choose to go elsewhere. Again, these issues are manageable, but the portrait of consequences is rather limited.

However, there are a host of potential outcomes for which data is not routinely collected, and which are difficult to measure (and often little agreement about what measures would be seen as valid). Managers might be interested in the impact on quality of care. A number of important outcomes might be addressed: Did the woman learn to breast feed? Is the baby jaundiced? This sort of data is rarely routinely collected. Neither is there agreement on appropriate measures, although progress is being made. Even more difficult to address would be the impact on quality of life. Now, ethical issues arise, such as determining the value of a life spent with a disability. They might also want to look at satisfaction with care. These outcomes often are related to "intangibles" and "process variables" - such factors as continuity of care, and provision of information. These variables usually have little direct relationships to clinical outcomes, but are nonetheless often very important to patients and providers. Even farther afield, should we consider the impact on family? Did other family members have to stay home to help care for the early discharged patients? Was this a net cost, or a net benefit? (After all, if they would have spent their time at the hospital, it might be easier at home.) A new set of ethical issue arise regarding the responsibility family members have for one another. Looking beyond patients, one might also want to assess the impact on health providers. This can be further sub-divided into impact on the institution, the professions, and on individual providers, and address in the short term or long term. How important is it to ensure well paid, skilled jobs? Finally, one can look at consequences for society. Here, one will try to address the broader societal and ethical implications of a particular innovation.

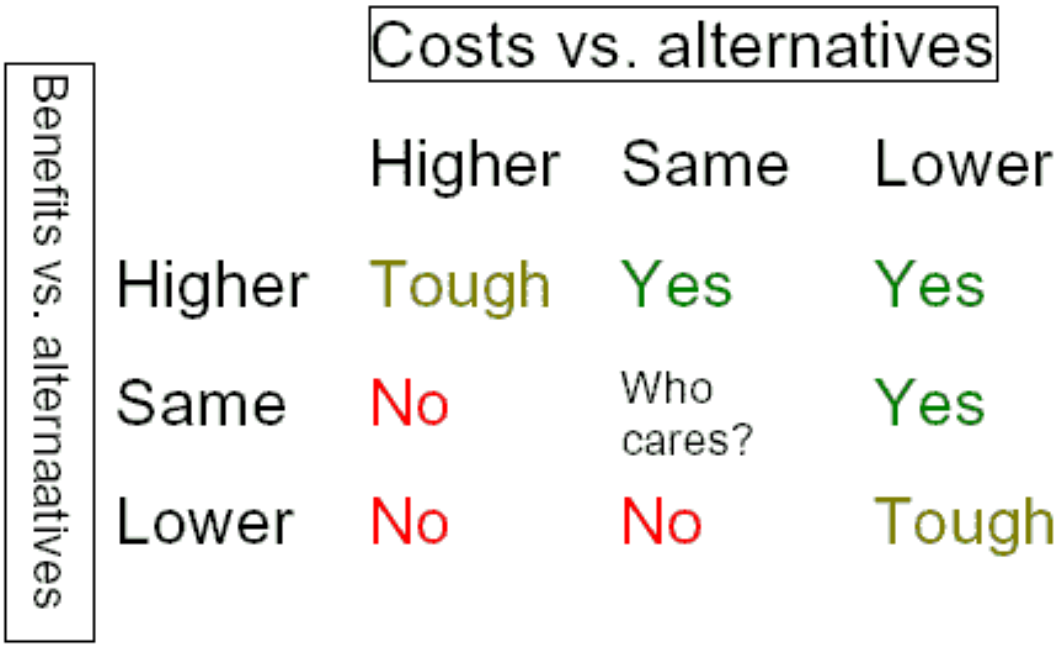
Translating Technology Assessment Into Policy

How should the results of these sorts of analyses be used? Clearly, there are enough uncertainties that one would not be comfortable using what is often called a "point estimate" - that is, the results of the computation. Instead, most analysts explicitly recognize the uncertainty by performing a series of "sensitivity analyses" in which they systematically vary the values attached to particular inputs. In the above example of evaluating early discharge, it is likely that readmission rates vary across institutions. For the baseline analysis, you will probably take some sort of midpoint as the value for readmission. However, a careful analyst will then go on to perform a series of "one way sensitivity analyses" which systematically vary the readmission

rates over the full range of plausible values. If the recommendation does not change, you know that your estimate is not particularly sensitive to the readmission rate. Alternatively, you may find a 'threshold' value, above which one option would be preferable, but below which your recommendation would change. In that case, it would be essential to have a better estimate of the true value in your population. Analysis can also simultaneously vary two inputs (called, not surprisingly, "two way sensitivity analysis") or even perform more elaborate analyses (e.g., Markov sensitivity) under which distributions are given for all inputs, and a series of analyses conducted which randomly select from each distribution. In this case, the output is a distribution of economic estimates (e.g., cost-utility ratios), and the policy maker can judge the stability of their recommendation by noting the proportion of the sample in which that option would be preferred.

One way to work with the results of economic analysis (or technology assessments) was suggested by Deber5. It compares options A and B on both the cost and consequence dimensions. In Figure 3, the resulting table notes whether option A is better, the same, or worse than option B on each dimension. A series of adoption zones result. In the upper right corner, one option buys the same or better results for less money - these innovations should be adopted. In the lower left corner, more money buys worse care - these innovations should not be adopted. In the centre, there is no difference, and no issues, except to those selling the two options. The tough choices arise in the corners - how much are we willing to pay to purchase additional benefits, and how many benefits are we willing to forego to save money.

Figure 3: Adoption Zones



But Is Evidence All There Is?

The most obvious difficulties in implementation usually occur when policy analysts assume that evidence dictates a unique recommendation. Two key dimensions are often omitted. What about values? What about politics? In that connection, seemingly technocratic issues can

disguise assumptions about values. As a classic example, let us return to the discount rate discussed in Figure 1 and its implications for prevention programs. Generally, one will wish to discount the cost side of the equation; after all, money in the future is worth less than money in one's pocket today. But this can lead to distortions if one does not also discount the consequence side of the equation. And that, in turn, means that future benefits are seen as far less valuable than benefits received today. The choice of a discount rate thus hides an assumption about what value should be placed on future benefits, and can have a major impact on whether a prevention program aimed at children - whose benefits may not be seen for at least 30 years - would be seen as cost effective.[7]

A technocratic approach can also ignore politics. Politics is defined as the "authoritative allocation of resources," or, in simpler terms, "who gets what, when, and from whom." Accordingly, a critical dimension of any resource allocation decision is who participates, and under which rules. This in turn is related to who gets to define the issues, and who decides. Clearly, the choice of decision maker will in turn help to determine whose costs and consequences matter. Since people are not equally likely to participate, the rules of the game become particularly important. As one example, decisions about whether pharmaceuticals will be approved tend to be made in expert tribunals, where neither payers nor patients have much of a voice. In those decisions, such questions as whether the drug is safe and effective carry far more weight than do such issues as affordability[8].

More generally, the late political scientist E. E. Schattschneider pointed out that interests in some kinds of goods are organized into politics, while others are not. Those with concentrated interests (e.g., providers) are more likely to be organized than those with more diffuse interests (e.g., those who might consume small quantities of that product). Similarly, those with greater resources are more likely to be organized than those without such resources. What was less well recognized is the extent to which power lies in defining what alternatives will be considered, and hence where (and under what rules) the decisions will be made, and who will participate, a concept often termed the "scope of conflict"9. Policy makers will try to define conflicts in such a way as to manage scope of conflict in order to ensure policy adoption. This is sometimes called "framing the issue." To a large extent, scope helps to determine the outcome of conflict. Wiktorowicz and Deber have combined these insights into what they termed the Rational Political Model of Policy Development8. Conceptually, this can be seen as two matrixes, plus a vector. Rationalpolitical analysis would accordingly follow these steps:

Step 1. Identify policy goals and potential policy actions;

Indicate the likelihood that each action would achieve each goal ("Facts" Matrix)

In this step, the analyst identifies the range of potential actions (rows), and the range of plausible policy goals (columns). The matrix entries are the result of the best available rational analysis, and designate how likely each potential policy action would be to achieve each policy goal.

FACTS MATRIX			
	Policy Goal 1	...	Policy Goal n
Potential Action 1	likelihood that action 1 will achieve goal 1		likelihood that action 1 will achieve goal n

...			
Potential Action m	likelihood that action m will achieve goal 1		likelihood that action m will achieve goal n

Step 2. Identify potential stakeholders and their goals ("Values" Matrix)

In this step, the analyst takes the same range of plausible policy goals from step 1 (columns) but substitutes as rows the range of stakeholders who might have an interest in this issue (rows). The matrix entries are judgements about how important each policy goal is to each of the stakeholders.

VALUES MATRIX			
	Policy Goal 1	...	Policy Goal n
Stakeholder 1	importance of goal 1 to stakeholder 1		importance of goal n to stakeholder 1
...			
Stakeholder k	limportance of goal 1 to stakeholder k		importance of goal n to stakeholder k

Step 3: Identify the mechanism being used for policy selection ("actor weights vector")

In this step, the list of stakeholders from step 2 is treated as a vector (that is, this is now a one dimensional matrix). The cell entries result from an analysis of how powerful each of the stakeholder is within whatever institutional mechanism will make the decisions. (If there are several possibilities, then one such vector should be constructed for each. For example, the extent to which particular stakeholders would be heard within a legislature may differ from their power within a courtroom.)

Actor Weights Vector
importance of stakeholder 1 within this institutional structure
...
importance of stakeholder k within this institutional structure

Step 4: Do the math

At this stage, the analyst can work backwards. First, the actor weights vector from step 3 should be multiplied by the cell entries in the "values" matrix of step 2 to generate a "goal weights vector," whose entries will be the importance that "should" be attached to each policy goal, given the relative power of the stakeholders which will be involved in decision making. Next, the "goals weights vector" should be multiplied by the facts matrix in Step 1 to generate numerical values for each potential policy. It now becomes simple to select the preferred policy. Nonetheless, none of these entries are carved in stone. In particular, this approach lends itself to 'thought experiments' about the likely impact of changing power relationships. Indeed, it might

be possible for those on the losing side to identify potential allies or alternative venues for decision making. The approach has the primary virtue of highlighting the roles of facts, values, and power, rather than assuming that these are somehow irreconcilable.

Example of Use

This model has been used by Wiktorowicz[8] to look at three decisions in the area of pharmaceutical policy: the decision to develop a particular drug, the decision to approve it, and the decision to purchase it. She then examined a series of potential policy goals (e.g., safety, efficacy, cost-effectiveness, fair return to investors, encouraging research and development, encouraging economic growth, ensuring that drugs were developed for those at highest need, etc.). Wiktorowicz surveyed a number of stakeholder groups, including regulators, payers, drug company employees, etc. to ascertain how important each of those goals was to each group (i.e., she developed the values matrix). Note that different stakeholders have a different "voice" in these decisions. The decision to develop a drug rests largely with the companies, the decision to approve rests with national regulators (e.g., Health Canada), and the decision to purchase is decentralized to those making formulary decisions, hospitals deciding where to spend their budgets, and so on. i.e., the goal weights matrix varies considerably. Wiktorowicz found that there was consensus on some goals, and not others. All stakeholders placed high weight on safety and efficacy. However, regulators placed far less weight on cost-effectiveness than did potential payers; unsurprisingly, issues of cost-effectiveness were not considered in making approval decisions. Similarly, payers were not very interested in fair return on investment or encouraging drug development. Certain decisions are thus likely to vary considerably depending on who is involved in making them, whereas other decisions are relatively robust.

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THE NEED FOR HEALTH TECHNOLOGY POLICIES, STRATEGIES AND MANAGEMENT FUNCTION AT THE NATIONAL LEVEL

For any effective technology management, there must be a prime mover or a network of prime movers for a systematic analysis of needs, resources and technologies, utilization of these technologies, cost and outcomes to identify gaps, fragmentation and opportunities of technologies to promote health and development. Health technology policies, strategies and management also require that new technology must be developed for neglected diseases in developing countries. These are technologies, such as orphan drugs, which have not been a priority for industries due to low market values (8).

Tools such as the DALYs and other needs-assessment methodologies (9-f444, 10-f1044, 11-t4, 12- t6, 13-t8, 14-t9) costeffectiveness analyses, systematic reviews, treatment guidelines and clinical decision rules must be used to optimize health technology policies, strategies and management for existing technologies in a given country. Optimized technologies can then be disseminated and used for appropriate indicator conditions according to needs and resources available in developing countries.

The tools for health technology policies, strategies and management will have to fulfill different objectives depending on the nature of policies, such as the public policy, system policy, facility policy and practice policies of individual providers. Empowerment of the consumer can be a mechanism to ensure that the efforts of health technology policies, strategies and management at different settings meet their objectives. Optimization of health technology policies, strategies and management at different levels is to ensure that different and diverse citizen groups get excellent, relevant and ethical care according to needs. This will bring trust of the society for the health care system.

THE FRAMEWORK FOR HEALTH TECHNOLOGY POLICY, STRATEGIES AND MANAGEMENT

To develop effective health technology policies, strategies and management, we need to identify the sequence of events which will help us understand to what extent and what body or partners could be responsible for the different activities and programs. The objective of the technology policies, strategies and management will be important. The public health organizations will have

to take note of the equity and efficiency as their key focus since the resources for their operation will come largely from taxation. Their mandate and mission will be different from the private health facilities whose mandate and mission is to produce efficient care to satisfy the consumers and purchasers of health care. The mandate and mission of a practicing physician is to make sure that the technology he/she uses is cost-effective, in line with the patient's choices, and reimbursable.

Demands, health policy and other policy imperatives will require that we think about how to identify needs and problems to be addressed by the policy, set priority among those needs using tools and involving essential partners. These will guide the allocation of activities within a certain set of criteria or principles. Changing activities to program areas will allow us to consider resource requirements and to optimize them into various implementation programs. We would need monitoring and evaluation not only in terms of individual projects but also in terms of the cooperative programs. We need to identify the kind of decision making on technology development and adoption that has been going on at the global and local levels. Health technology policies, strategies and management will require a mechanism to make a decision on the various steps is done in a democratic and accountable manner.

The sequence of process described here will reveal the decision points. Each of these points will require some criteria using some of the toolkit developed thus far and searching for new tools to be developed in the future. These criteria have to take into account a systemic analysis of catalysts and constraints to make the decision possible by involving the critical partners. The various steps requiring analysis using tools and involving critical partners include:

1. The identification of needs and demand should consider the factors influencing the technology policies, strategies and management. (See Chapter Two).
2. The process for priority setting for addressing needs and demands. Here we can balance the political and professional will and for people to come up with a priority acceptable by the stakeholders based on the moral obligation towards health for all.
3. The process of allocation of activities to different research and action groups. This will require the formulation of some criteria based on needs, cost-effectiveness, and a consideration of the mandate and mission of the organization.
4. The decision to transform the allocation of activities into program areas will involve both tactical and strategic consideration.
5. The identification of resource needs which will require consideration of policy imperatives, the concerns of health and other sectors, and the existing constraints and competitive advantage. Here, the use of a strategic planning tool is critical. It will involve a clear understanding of the organization mandate, mission, stakeholders, strengths, weaknesses, opportunities, and threats to be able to identify and prioritize issues for a successful management of technology. It will also involve the skills for setting priorities among competing issues and transform these priorities into strategic visions.

The strategic visions and plans will allow an optimization of resources through careful consideration of concerns, constraints and competitive advantage. The decision at the strategic planning step would result in the creation of options for implementation of policies. Once an implementation option has been selected, the operational planning tool will be needed to make sure that operations will meet the objectives of the strategic visions.

All the steps will require an appropriate balance between existing information or evidences and values of the partners involved. There is a need to establish a body or bodies that will take the responsibility for each step and to make decisions at a particular stage. There may be a different sort of bodies to deal with needs, demands, and priorities. Other groups would have the responsibility of allocating efforts among possible and appropriate actors and researchers. One of the responsibilities of the central coordinating group is to set up an independent operation to monitor, evaluate, validate and to see implementation and outcome of Health technology policies, strategies and management.

Examples of Technology Management at the Public Policy Level

Technology management at the public policy level should aim primarily at promotion mainly of equity and subsequently the efficiency of health services. The tool must be used in conjunction with the various policy instruments (ie: defining the target groups, opting appropriate financing schemes, developing a set of appropriate rules and regulations, and optimal facility planning for health systems). Each of these policy instruments entails a set of important stakeholders.

1. Defining target groups

Target groups may be classified by certain characteristics such as poverty, sex, age group, diseases and living places.

a. Special Population as a target group: These may include the poor or the near poor, the rural population, women and mothers, children, adolescents, adults, and the elderly. Emphasis of efforts on certain target groups at the expense of the well being of others will require some strategic planning and debates by the various groups in the society to arrive at a consensus for appropriate approaches.

b. Diseases as a target group: The TDR, for example, has identified certain infectious diseases as having high priority. Here, the public sector is mostly responsible for many vertical programs for control of infections. Most vertical programs represent the epidemiological approach to disease control. However, the difficulty of control of malaria along the border entails the need for inclusion of other paradigms in setting research priority. Health system for the control of chronic diseases will also require epidemiology, economics, behavioural sciences, ethicist, and the perceptions of needs to adequately set research priority. Emergency events and life threatening conditions are also possible target groups for research priority setting.

The inclusion of industries into research priority setting and funding of research is possible and need more proactive attention to needs-based health technology. A successful negotiation was made to gain price concession for an anti-malarial drug (from five to 0.5 US dollars per tablet) in Thailand through an agreement to test the drug in a third phase clinical trial. The testing is a prerequisite for the company to register the drug for widespread use and thus tap into a reasonable market. Similarly, WHO has negotiated with companies producing dipsticks for the

diagnosis of malaria to reduce the price drastically in an exchange for a recommendation from WHO to use the product nation-wide.

2. Appropriate Financing and Use of Health Technology

The public sector has four options in financing and delivering health services. First, it can opt to both finance and deliver some services, which may include services with public values, services with strong positive externalities and the so-called "merit goods" such as the emergency services. Second, the public sector may choose to finance the services and encourage the private non-profit sectors to deliver them to ensure greater efficiency through some competition. Third, the public sector can persuade the private sector to handle services which benefit the consumer directly, but the government must make sure that these services are of acceptable standards. Research will be needed to define the options for the various services, depending on the nature of the services, the ability and willingness of the people to pay for the services and the ability of the people to make appropriate choices. The parties, which must be consulted to set priority for research and actions, are, in addition to the government, the private sectors, the biomedical scientists, and the people themselves (15 -f1122).

There are certain guidelines suggested for taking options for the various services. First, is the adoption of the Robinhood rule, which is trying not to take from the poor and give to the rich such as giving tax incentives for expensive medical equipment while taxing the import of essential drugs. Second, public money should be given to public services. Third, it is the duty of the government to empower the people to make appropriate choices by giving valid information as a public asset. Fourth, if possible, the government might also try to apply the market approach to the public services. Finally, the government should resist the urge to take over the private services even if they are poor. How well these guidelines work in specific situations will need research backup (15-f1122).

3. Developing Appropriate Rules and Regulations

Knowledge is needed to help formulate rules and regulations by the public sector. This is to ensure that the standards of technology, pricing, facilities, staffing, practices and care are met by the providers in the private and the public sectors and to provide a framework for market competitions and the protection of consumers. In addition to setting standards, research is needed to harmonize the relationship between the public and the private sector in the health care system. Some regulations are required to oversee shifts of experienced providers who can attract patients to the private sector, thus, weakening the public sector. The public sector has to respond through increasing the compensations for the public sector physicians. This leads to the demand for increase in compensations for the nurses and other categories of personnel. This generates a greater fiscal pressure in the public sector, resulting in a rise in public expenditure for health and the inability of the public sector to fill up slots for health personnel which may reach up to 30% in some countries. Consequently, access becomes a problem. The second impact for private growth is the demand for insurance coverage to cover the more expensive care as well as the need to regulate the private industry. Initially, people go to the private sector to seek better service, higher quality, more convenient hours and better amenities. But they find the cost is very high. They are affluent people in the nation. They are professional people. They demand insurance. In response, either the government has to develop social insurance to cover the people or the private insurance begins to spring up to sell

the insurance to the upper 20% income group. If the private insurance springs up, it creates a major policy questions for a nation. How does the public sector regulate or should the private insurance industry be regulated at all? How can the public sector design an appropriate regulation to let market work in a harnessed and managed way?

The stakeholders who should be involved in developing rules and regulations for adoption and control of dispersion of technologies include the public sector, the private investors, the insurance, the providers in the public and the private facilities, the lawyers, the representative of the consumers and other appropriate parties.

Certain questions can be asked to get an idea on whether a regulation is appropriate for a certain technology or service to promote equity.

4. Optimal Technology Planning and Decentralization (15 -f365)

To guarantee equitable access to health technology, the public sector ideally has three choices. First, it can expand the government provision of services. Second, it may consider the expansion of the private provision of services, and finally it may decentralize health services to the local government. The public sector has a major role or perhaps the only players in providing public health, prevention, promotion and MCH. If the government is not doing enough of those now, the government should expand. For acute hospital care and outpatient care, there is a movement toward decentralization. However, this will depend on the capacity of the local government. The public sector does not have a definite conclusion yet about how well the decentralization really works because it is a nice concept but will require the capacity of the local government to manage and do the job properly.

Again, the discussion above underlies the importance of knowledge and management of technology described in the framework above to guide decisions about decentralization and deliveries of services. Those who must be involved in the dialogues include the local governments, the private sectors, the public, the academia (ie: economists, public administrators) and other relevant representatives of society.

The framework for optimal facility planning was initially proposed to balance equity and efficiency in planning for the number and distribution of health care facilities (15-f365). In essence, the following questions need to be addressed:

- Is a specific technology needed? To answer the question, these are the main points.
    - Is there an assessment of health needs and priorities?
    - Has the efficacy of the resources been assessed?

- How much health resources are needed? The following sub-questions are desirable.
    - What are the characteristics of the people with the health needs? If it is decided that measles vaccine is to be given to children, we must define the children who require the vaccine. Too often, vaccines are given to schoolchildren because it is convenient and not the under-privileged who could not attend school.

- What is the volume of the subjects with desirable characteristics? Estimates of needs outside the health care system is important here since most estimates of needs within the health system is only a part of the picture.
- What is the output capacity of the technology? Here, the technology itself should be considered jointly with the qualified human resource to provide the services using the technology. An MRI machines will not be useful without the radiologist who can read MRI and the technicians who can operate the machine. This seems to be a simple consideration but not very obvious in countries where accountability is still a problem.

- How should the technology be managed both in place and time? To meet the equity requirement, the resources should be distributed sufficiently where needed both in place (urban vs. rural) and time (24 hours for emergency services). Here, it is desirable to estimate the number of people with characteristics of health needs in major subgroups and to match the technologies with the needs in these subgroups. The needs for optimal distribution of CT scanners would have to be done by analyzing the volume of head injuries and strokes that require an emergency CT scanning.

- Are the technologies being used efficiently? A technology will be most efficiently used if the volume of health needs coincide with the volume of services where the average cost is lowest. In other words, when a technology is installed with too few patients who require it, the average cost will be high. In addition, the availability of a high-tech machine will encourage use without an adequate indication. On the other hand, too many patients who require the technology will cause a disruption of services due to breakdowns of the machine and exhaustion of human resources. Therefore, too few or too many services will increase the average cost.

5. Examples of the Problems Challenging Technology Management at The System Policy Level

The main objective of technology management to promote system policy, is primarily to promote the efficiency and the quality of the health system. In many developing countries, health systems are changing toward more privatisation. The costs of health care have constantly increased (16-f1121) . Many people including the poor still pay for care on fee-for-service basis. Hospital charges have been a barrier to inpatient care for those not covered by insurance. Drug charges are an important source of revenue for many health facilities especially the private facilities, highlighting the important role of the government in ensuring the equity of access to care and to guarantee the right for good health for citizens in the country (17-GU et al 93).

Regarding the socio-cultural context of care seeking behaviour, people in developing countries believe that illnesses result from the imbalances between the internal and external environment. Imbalances lead to illness symptoms and signs. Therefore, many people in developing countries are more concerned with the symptoms than the diagnosis. King Rama IV of Thailand had a fever after he came back from a trip to observe the solar eclipse. He was diagnosed to have been infected with malaria by a foreign physician who gave him quinine. He took quinine in the morning and expected the fever to disappear in the afternoon. The fever did not disappear. His

majesty the King stopped quinine because it could not restore the imbalances and finally passed away.

People also go to multiple providers for multiple symptoms. A person may go to an endocrinologist for diabetes and he may also go to a cardiologist for hypertension and a neurologist for stroke at the same time. If these providers are not aware of what drugs other providers are giving, drug interaction can occur. In addition, many patients take herbal medicine even when they are receiving care from "modern" providers.

People in developing countries have preferences for injection and saline infusions. Many patients with migraine ask for saline infusion.

Local beliefs about illnesses also affect how medications are advertised. In rural Thailand, diuretics are advertised as the "Kidney Purification Drugs." In the Philippines, many anti-TB drugs are labelled in such a way to give the impression that they are "vitamins for the lungs" because TB is considered to result in part from the "weak lung" syndrome. Like other vitamins, the vitamins for weak lungs are taken only for a short duration (18-Nichter94). The practice can increase the chance of drug resistance.

As discussed earlier, the aim of technology management in this context is to improve primarily the efficiency and then the quality of the distribution and use of health technology in the health systems. From the above discussions, it is evident that the health system encompasses the providers' systems for service provision, the consumer of health care, and the systems influencing the interactions between the providers and the consumers. The providers of health care can belong to the public and private sectors, the folk sector and the popular sector. The providers in the system operate in their own respective facilities. The system policies in the current context refer to policies governing the linkages between the various facilities to promote the efficiency and qualities of the system. Technology management leading to and improving the health system requires research work targeting at two types of efficiency: the allocative efficiency and the technical efficiency.

- **Technology Management to Promote The Allocative Efficiency:** Allocative efficiency is the allocation of resources, usually at the macro-level, to structures, organizations, facilities and special programs which is likely to yield maximal achievements of objectives for health system actions. Research for efficient allocative planning is focussed on the knowledge which will create the likelihood of inducing changes in terms of service standards, staffing standards, and facility standards of each level of health care facilities, as well as the referral standards between the different levels of health care. Allocations of resources to make changes happen to maximize the efficiency of health systems requires sound knowledge. The notion of changes carries the possibility of gainers and losers. Therefore, a careful analysis of different stakeholders to assess their support and hindrance will be necessary. These different "gainers" and "losers" should be taken on board in defining the types of knowledge needed to make changes and how to apply the knowledge when it is available. Understanding the mandate, mission, stakeholders, strengths, weaknesses and opportunities of the facilities within the system and of the system itself will be a prerequisite for appropriate allocation of resources to promote a desirable system. The important undertaking here is not to promote more the primary assessment on what technology works or does not work, but rather how could we gear existing evidences on the value of technology and the reality of health system to influence decision making.

The allocation of resources to influence optimal care requires monitoring and research support. Thus, increased access to primary care does not necessary reduce hospital readmission (19-TA346).

- **Technology Management to Promote the Technical Efficiency:** The technical efficiency aims at minimizing cost by trying to organize a given system in such a way that the appropriate services are given at an appropriate time, by an appropriate cadre of personnel, at an appropriate level of the health system. Thus, providers at a primary health service level with geographical proximity rather than providers in centralized and technologically intensive tertiary care facilities might better solve minor curative and uncomplicated health problems. The allocative and technical efficiencies seem to be highly related requirements to foster a proficient policy system and thus will require a similar set of "gainers" and "losers" in setting a priority for research (20-ta346).

TECHNOLOGY MANAGEMENT AT THE FACILITY AND PRACTICE LEVELS

There are several factors which influence the behaviours of providers of health services, including their attitudes, motivations, skills and knowledge; the interaction between patients and the providers; the social structures between the various categories of providers as well as between the providers and the patients; and the work environment such as the need to see fifty outpatients in a two-hour morning session. Drug information and marketing has been shown to influence the providers' behaviour. In 1993, one Thailand company which has generated more than three billion bahts revenue from one product alone invested 120 million baht for advertisement, while the FDA only had a budget of 20 million bahts to promote appropriate drug information to the public.

There is evidence that physicians report practices in treating diarrhoea which differed from their actual practices. Reported practices conform to knowledge. However, actual practices agree with the social expectations and the caretakers' perception of the physicians' role (21-Igun94).

An example of non-medical influence of medical decision making is the diagnosis and treatment of chest pain. Given the same set of symptoms, younger patients were more likely to receive the diagnosis of psychogenic chest pain while older patients were more likely to receive cardiac diagnosis, particularly if they are insured. The HMOBASED physicians were more likely to recommend follow-up visits for chest pain (22-McKinlay et al 96).

Technology management can also occur in a situation where technology in question has been entrenched. In trying to address the problems of inappropriate use of anti-diarrhoea medication, the World Health Organization has developed a thorough review and gives recommendation for appropriate use of medicine for diarrhoea. Media coverage and the advocacy of dedicated groups and individuals are additional important factors leading to regulatory actions mostly within two years following the introduction of the WHO reviews and media attention; however, there were constraints for de-registration of the inappropriate drugs, such as anti-motility, absorbents, and anti-diarrhoea preparations containing anti-microbial. For drugs generating lucrative profits, massive de-registration is unlikely because of possible black marketing.

Additional concerted efforts might be needed to change patients and providers' attitudes towards the benefits and harmed from these drugs (23-Haak96).

With the increase in the development of many State run insurance schemes in developing countries, the State can assume a more prominent role as actors for rationalization of health care through health insurance plans. Through insurance, the State can modify the role of doctors as the health care providers, and can use it to modify the relationship between medicine and para-medicine. The state can interact with the professional organizations so that they may help play the intermediary role in resolving conflicts among the various providers (24-Coburn93, 25-Drummond94).

Many new roles of the providers might be investigated. For example, should a pharmacist take on a more patient oriented role in addition to the previous product oriented role? What about the role of pharmacists in utilization reviews for insurance patients? Should the nurses also have some new roles in promoting the rational use of medicines since they are the first-line patient contacts, and they are expected to do more home visits? Should the role of family members in promoting the use of medicines be increased? Research is currently being carried out in Thailand about the effectiveness of using family members in the DOTS therapy for tuberculosis. Do we need to define the roles for clinical psychologists, commercial health workers, folk healers, and fortune-tellers in treating psychoneurosis, quacks and other supernatural healers (26-Jones et al 94)?

For the facility policy, the concept of total quality management (TQM) and continuous quality improvement (CQI) is central to improve the quality and efficiency of care. The legitimacy of care is the emphasis on the teamwork of the health care team within a facility, rather than the role of individual provider. The team works to meet the patients' expectations and not only to win accreditation. When errors occur, efforts will be directed at the flaw within the health care system within the facility rather than trying to find a scapegoat. The attitude of the workers is one of proactive improvement rather than a defensive guard against lawsuit. TQM and CQI (27-f313).

The methodology for systematic reviews, the development of treatment guidelines, and the development of locally relevant clinical research can help guide the development of knowledge- and information-base for use at the facility and the practice level (28-ta386). Evidence-based medicine has been more strongly advocated in recent years as clinical experience is recognized to be of limited value, as evidenced from the common occurrences of large and systematic medical practice variations, with considerable implications for costs and outcome of care (29-Davis et al 94). The major causes of medical practice variations are the clinical uncertainties, the ignorance of relevant knowledge, and the individual preferences of providers and consumers of clinical care. Profound uncertainties and ambiguities in medicine have been masqueraded as facts. There are widespread conflicting ideas and values among the providers and patients and the complexity of the group processes to reach an agreement about appropriate possible actions. Therefore, the parties to be involved in technology adoption include the administrators of health facilities, the various categories of providers, the patients and the relevant academics (biomedical scientists, the third party payers, the clinical epidemiologists, ethicists, clinical economists and social scientists). The aim is to improve the technical efficiency and quality of services since patients have the right to assume that providers and health care facilities are competent and they will take great care to minimize risks and adverse outcomes.

THE EMPOWERMENT OF STAKEHOLDERS FOR SOCIAL ACCOUNTABILITY OF TECHNOLOGY ASSESSMENT AND DISPERSION

The main target groups for empowerment are the people, so that they may be well informed to make appropriate choices for services and to demand an accountability of the government and the providers of care. Research into information dissemination through the use of various media and intervention methods will be important. In addition to the public, other stakeholders who also require empowerment include the government, the providers, the insurers, and the investors in health facilities for financial gains. In the Asian context, an important aim is to capitalize on the local values and culture to promote information transfer and effective dialogue-based compromise and mutual respect in conflict resolution. A reliance on the legal system to settle conflicts as prevails in the West, cannot be the answer for Eastern society since it will make the cost of health care soar beyond the ability of the system to cope. Therefore, those who should be involved in technology management for social accountability include the government, the public, the providers, the insurers, the investors and the communication specialists such as the media.

Many governments maintain that their countries are moving towards a more civil society and sustainable democracy. Democracy in an ideal sense, requires that each person in the society pay as much attention to the society as to him or herself. In the real world, the society consists of many heterogeneous population groups, each trying to guard their own interests. Realistic democracy, in contrast to ideal democracy, has to be interpreted in a new light, (ie: it is the accepted method of conflict resolution). Therefore, in resolving conflicts for better health systems, the citizens must be encouraged to participate in the decisions that affect their health and well-being. Second, NGOs must be actively involved in advocacy. Third, the private sector must be involved in the process of promoting efficient quality care. Fourth, the executive branch must establish good mechanisms to ensure more accountability. Finally, it is the duty of the academics and the research community to make accurate information available and accessible by citizens because it is the citizen who should be encouraged to determine the fate and the direction of their society toward economic prosperity and social harmony.

Health technology policies, strategies and management are complex and can involve a broad range of technical and political issues. Implementation of Health technology policies, strategies and management requires more than research. It requires some skill to balance the evidence and values/benefits/agenda of the various stakeholders. With the help of the toolkit, the policy makers, strategists and managers of health technology have the responsibility to digest the results into a user-friendly form with an executive summary.

In the final analysis:

1. Due consideration of the demand of the people for health and health technology, we have the moral obligation to uncover the hidden needs and to make the voice of the under-privileged heard so that they can get access to health technologies which are possible and optimized within the economic and health system constraints of a society.
2. Partnership between researchers of different disciplines and sectors, and between the researchers and users, particularly the professionals and the public, is essential. Such a partnership requires sincere and true commitments and interactions on a regular basis. The partnership has to be dynamic.

3. Tools must be applied, evaluated and improved to enhance our capacity to balance cost and benefit of technology to reflect the reality of health needs and the health system infrastructure of a country.
4. The requirement for research on the influence of globalization on health and equity will be of paramount importance as we move towards the next century.

Our commitment is for the well being of mankind. The commitment may be fulfilled through unselfish and intelligent solidarity, a solidarity which will begin with a handshake and continue through well-organized exchanges of expertise and networking. We cherish the opportunity to be involved in the development and thinking of the toolkits for needs-based technology assessment. It is a learning exercise for us. We hope that a well-organized network will further strengthen our solidarity and efforts towards a healthier world.

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