THE ESSENTIAL HEALTHCARE TECHNOLOGY PACKAGE – A NEW WHO TOOL FOR PLANNING AND MANAGING RESOURCES FOR HEALTH INTERVENTIONS

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ABSTRACT

In the complex environment of the health care delivery system, a wide variety of health technologies interact with many other interventions and inputs, and as technology continues to evolve, so does its impact on health outcomes, health services operation, and financial resources. The scope of technologies for health extends from those that provide a direct benefit to patient’s health, i.e. pharmaceuticals and medical devices, to those that support health service delivery function, i.e. human resource development and resource management. Within this paradigm, health care technologies, and in particular, related healthcare technology management strategies, have repeatedly come under the spotlight as health care providers seek to identify cost-effective methods for providing equitable and quality health care with the limited resources available.

In response to this urgent need, the World Health Organization (WHO) and its Collaborating Centre for Essential Health Technologies at the South African Medical Research Council (MRC) embarked, in 1996, on a major research initiative, to develop a comprehensive tool for rational planning and management of healthcare technology and interventions. This work has resulted in the development of the Essential Healthcare Technology Package (EHTP), a tool made up of three components - the concept, methodology and a software tool.

Keywords: Essential Technologies, resources, planning, interventions, health systems.

INTRODUCTION

Global economic, political and social changes, as well as increased and changing disease burden have generated widespread efforts to reform and adapt health care systems to improve their efficiency, equity and effectiveness. Serious economic constraints have led health authorities, world-wide, to be increasingly concerned with defining policies and strategies to contain growing costs of care while preserve health system's social imperatives of equity and solidarity.

Technology plays a paradoxical role in health care systems. It is frequently cited as the most significant contributor to unacceptable cost increases while, at the same time, it equips health care providers with indispensable tools to perform their functions more effectively and efficiently. Within this paradigm, health care technology, and in particular related management strategies, have repeatedly come under the spotlight as health care providers seek to identify cost-effective methods for providing equitable and quality health care.[1]

In response to this urgent need of WHO Member States, WHO and its Collaborating Centre for Essential Health Technologies at the South African Medical Research Council in Cape Town embarked, in 1996, on a major research initiative, to develop a comprehensive tool for rational planning and management of health care technology resources. This work has resulted in the EHTP, a tool made up of three components - the concept, methodology and software.

The EHTP aims at ensuring that health care technology interventions are properly assessed and successfully implemented. It also helps to make informed decisions on acquisition, deployment and utilization of health care technologies thus contributing to cost-effective, quality and equitable health services delivery. The EHTP does this by defining those essential services that are affordable and sustainable, based on identification and quantification of all resources needed to perform procedures for the majority of diseases and health-related conditions.

METHOD

The Essential Healthcare Technology Package is a methodology and a tool aimed at strengthening and optimizing healthcare technology planning and management.

The EHTP methodology is based on the hypothesis that effective healthcare delivery can only be realised if all healthcare technologies (medical devices, drugs, human resources and physical infrastructure etc) are available, in the correct combination and are correctly managed. The ratio and magnitude of the combination of healthcare technologies will of course depend on the skills and clinical practice applicable for each technology used in each stage. The lack of either one or more of these healthcare technologies clearly may have an impact on the effectiveness and/or on the ability to implement the desired intervention. In many cases, the omission of critical and essential healthcare technology elements would impede the viability of the specific intervention. There are however, many interventions (in particular promotive healthcare interventions) that only require one or two healthcare
technology elements for them to be effectively implemented.

The objective of the EHTP therefore is to identify and quantify the above-mentioned nature and ratio of healthcare technologies for all medically recognized healthcare interventions. Figure 1 represents the relationship between healthcare interventions and their corresponding technologies. Healthcare interventions (promotive, preventive or rehabilitative) that are represented on the x-axis may be linked to a corresponding medical device, human resource and/or physical infrastructure, forming the EHTP matrix. The EHTP matrix is developed for all levels of healthcare delivery reflecting the different nature of services and clinical practice, technological complexity and sophistication of healthcare technologies that will be applicable and realistic for the different levels of healthcare.

A three-dimensional matrix is therefore developed reflecting the inter-relationship between healthcare technologies, health interventions (x and y-axes as in figure 1) and levels of healthcare delivery (z-axis). This relationship provides the basis for a very powerful management and planning tool since it enables health planners and decision-makers to quantify and qualify similarities and differences in healthcare interventions (with respect to healthcare technologies), thus providing an unique platform to integrate services and resource requirements into more efficient and effective healthcare packages.

Linking the healthcare technologies to their corresponding interventions is based on current clinical practice and therefore is time and knowledge dependent so the EHTP matrix is not universally applicable but needs to be adapted to become country specific, alternatively, it does not prescribe clinical practice but merely provides a basis for currently available methodology.

**LOGICAL FRAMEWORK**

The EHTP logical framework is based on linking existing and proprietary information sources such as the International Classification of Diseases (ICD) database, the Current Procedure Terminology (CPT) database with medical equipment, human resources, facility databases and drugs databases (figure 2). The change in extent and rate, at which the contents of database change, necessitates that proprietary databases are incorporated into the EHTP package to ensure that up-to-date information is always available.

As shown in figure 3 the ICD and CPT databases are cross-linked. In addition, three versions of the International Classification of Diseases database (ICD 10, ICD 9 and ICD CM) have been cross-referenced to expand the user base of the EHTP package. Currently there are more than 225'000 established links between the ICD and CPT databases.

The healthcare technology databases (medical equipment, drugs, human resources and facilities) are then linked to the procedures database. This process is guided by the expertise of medical societies, experts and individuals, using their respective fields of knowledge. The process described above is used in the development of the EHTP template database which will be described in detail in a later section.

Figure 3 represents the logical framework of the linked database of the EHTP package. Each rectangle represents a proprietary database. The International Classification of Diseases Databases, ICD 9 and 10 (shown in orange) are the copyright of the WHO and have been cross-referenced as described above. The link to ICD 9CM has been provided to ensure that countries using the Clinical Modification (CM) of the ICD 9 will also be able to use the EHTP software package.

The cross-referenced ICD databases have been linked to clinical procedures via a template. This template contains more and 225’000 links to the CPT procedure database.
which is the copyright of the American Medical Association. This link of the procedure databases to proprietary healthcare technology databases (shown in purple) forms the EHTP template.

A standard feature of the EHTP database is the essential equipment, human resources, drugs and facility lists as shown in figure 3. Limited querying and analysis tools are incorporated into the EHTP template software to provide limited functionality and analysis capabilities.

The EHTP logical framework. The disease classifications databases (ICD 9, 10 and 9CM) are linked to the clinical procedures database (CPT) which in turn is linked to its appropriate technologies through linking medical devices (UMDNS), human resources (HR), drugs (DRUGS) and facilities (FACILITIES) databases. This link provides the basis for the EHTP templates. The EHTP output includes Essential Lists for Human Resources, Drugs, Physical Infrastructure and Medical Equipment. In addition limited query and simulation capabilities ensure maximum benefit for healthcare planners.

The EHTP package contains two main components. The first is the generic template (figure 4) which has been described above and is used to develop the EHTP generic template database. In addition, the generic template forms the basis, which is modified by countries to reflect their specific conditions and realities.

The second component of the EHTP package is the development of simulation tools as shown in figure 4. This package incorporates the generic template database and allows access to the generic template. The simulation tool is the actual package which provides the front end to healthcare planners to simulate and plan healthcare technology interventions as part of healthcare delivery.

The simulation tool has four main components. The first incorporates the economic analysis of healthcare technology. Basic economic information such as medical equipment fixed and recurrent costs, human resource costs, drug costs and facility costs are stored in the generic EHTP template database and are accessed by the Simulation Package. Here, the stored costs are applied to the simulation tools and costing analysis becomes available.

The other elements of the simulation tools are structured in the same way. These elements include analysis tools for clinical, epidemiological and related medical equipment information such as maintenance requirements etc. Healthcare planners can thus, without much effort, simulate various possible healthcare delivery scenarios by varying cost, human resource and medical equipment availability, without changing the EHTP template database.

The template database information can be updated whenever new versions of the propriety database become available. This incorporation of the template database thus provides an up to date information base for planners and also provides a conduit for health planners to sample both the latest developments of medical equipment and classification of diseases and preventive, promotive and curative procedures.

Figure 4 further shows that the entire EHTP package is made up of two separate components which share a common core or template database. As will be discussed later, the separation of the two systems assists in the implementation of the EHTP as the generic template needs to be modified to produce the country specific core database before the implementation of the simulation tools.

Additional modifications have been undertaken on the generic EHTP template database. In figure 5, the incorporation of the EHTP classification database for the Integrated Management of Child Illness (IMCI), Integrated Management of Pregnancy and Childbirth (IMPAC) and Adult Lung Health Initiative (ALHI) is shown. These classifications of interventions as defined in these special health initiatives are directly linked to the CPT database.

This requirement was identified by the WHO since many health interventions are performed out identifying the underlying disease and this applies in particular at lower levels of healthcare delivery (clinic, health centre etc).

The incorporation of this modification of the EHTP methodology does not alter the development of the EHTP generic template database. Substantial more effort is however required in the development of the EHTP simulation tools. The link between the diagnostic codes (the ICD databases) and the CPT procedures database however needs further
The EHTP template system overview. The EHTP healthcare technology databases are shown by the black rectangles. These healthcare technology databases are linked to the CPT and International Classification of Primary Care (ICPC) procedures databases. The classification of diseases (ICD) and interventions of the special health initiatives are shown in blue and orange respectively. A procedure sequence capability has been added to ensure logical flow of procedures. The limited simulation and tools component is shown. An additional link between the simulation tools and the special health initiative database has been implemented to ensure that grouped interventions as defined in the special health initiatives packages by the WHO can be simulated.

The next element is an artificial step call Step which was included to differentiate between diagnostic and therapeutic Interventions. Many interventions performed at lower levels of healthcare delivery only address the diagnostic component of a disease classification, but, due to practical and other reasons involve a requirement to refer the patients to higher levels of care to address diagnostic and/or therapeutic components of clinical practice. In order to capture this difference therapeutic and diagnostic elements for healthcare delivery this artificial step has been included. No special codes are attached to this step.

The next element in the tree is the CPT and/or ICPC coding. As mentioned before a template of codes linking CTP to ICD is provided in the EHTP template database for guidance.

Both the CPT codes and nomenclature (62278, vaginal delivery only) are given as shown in figure 6. Multiple CPT procedures are again possible for a single Step and ICD Intervention. Again linked to each procedure is another artificial element of the tree called the Techniques. This step is incorporated to ensure that all possible techniques may be captured to perform a single Procedure. Linked to the Techniques are the healthcare technologies (medical equipment, facilities, human resources and drugs) as described previously.

Figure 6:
Linking of the International Classification of Diseases (blocks C, B, Bs and I) to procedure (P), and technologies (Tech). An example from pregnancy and childbirth is given below the tree structure. C represents the disease classification, B the disease block, Bs – the block subset, I the intervention, S the step, P the procedure, T the alternative techniques per procedure and Tech the technology (medical devices, drugs, human resources and health facility).

For each of the healthcare technology proprietary databases, collateral information is collected. For example for medical equipment, data on life expectancy, user training, complexity, criticality for the procedure and maintenance requirements are collected. For the purpose of this paper all details of this information will not be discussed.

IMPLEMENTATION

The nature of implementation is slightly different for the different levels of healthcare delivery. At national level the EHTP mainly will be used as a planning tool aimed at identifying the relationship between healthcare technologies and healthcare interventions. At lower levels of healthcare, the EHTP will focus on identifying resources with particular reference on simulation and comparing different healthcare delivery scenarios. Economic evaluation and cost analysis can identify hidden and recurrent costs, which typically include medical equipment costs such as installation, maintenance, user training, commissioning and decommissioning, consumables and spare parts and purchase costs.
ADAPTABILITY OF EHTP

The EHTP was developed specifically with the intention of being applied and implemented globally. The development of the EHTP template covering entire spectrum of the ICD 10 codes contributes towards the country specific implementation. Language adaptability has been provided and most of the proprietary databases are available in various languages. For example, the UMDNS is available in English, Spanish, French, German, and Russian while the ICD 10 is available in English, French and Spanish and the CPT in English and Spanish. A French version will be available within two years.

The EHTP database management system has been fully developed and tracks changes to the EHTP generic template ensuring proper management of the data capturing process.

IMPLEMENTATION PROCESS

Key activities for the EHTP implementation and information dissemination are given below and may be divided into three phases.

Phase 1

The first phase includes the training of trainers for EHTP implementation. Experts in the field of healthcare technology will be identified and will be invited to attend two workshops. These experts, once trained, will become the core group of trainers who will be responsible to support and guide the implementation, also monitoring and evaluation of the EHTP implementation, both nationally and regionally. The curriculum for the training workshops includes hands-on training of the EHTP software, its methodology and implementation strategies required, to ensure successful implementation at national level.

Part of the first phase will be the development of training material, guidelines and facilitator notes. This documentation will also act as the reference material for both the facilitators and trainers at national level.

Phase 2

The second phase includes the identification of national counterparts from Ministries of Health or national institutions who will ultimately manage and facilitate the implementation of the EHTP at national level. These individuals may be selected from within national Ministries of Health & Finance and/or appropriate national institutions and will be responsible for all local management associated with the EHTP implementation. These national counterparts will attend two training workshops to familiarise themselves and strengthen their understanding of the EHTP methodology and use of the EHTP software.

In each participating country infrastructure will be provided to support and manage the EHTP implementation. This will include the EHTP software, computer system and peripherals, modem and documentation.

Phase 3

The third phase includes modification of the EHTP generic template database.

The EHTP software is provided to each participating country with a generic EHTP template containing data on medical device costs, human resource and drug requirements etc. These templates have to be modified to reflect the requirements and realities of the specific country of implementation. The national counterparts will manage this process of modifying the EHTP templates as described in phase 2 above.

The national counterparts will organise numerous workshops during the first year of implementation. Each workshop will address a specific clinical speciality (for example anaesthesiology, paediatrics or mother and child healthcare) and local medical specialists and experts will be able to modify the EHTP generic template to reflect local conditions.

The modified EHTP template will then be incorporated into the country specific EHTP package at national level and will form the basis of the healthcare technology management-planning tool for decision-makers.

Information promotion and dissemination

This phase will be an ongoing activity for each participating partner country and their collaborating partners. Results and other outputs of the EHTP implementation will be disseminated at scientific meetings and meetings of regional stakeholders, and provided to regional governments for their consideration.

Implementation Status Quo

In collaboration with the WHO, a number of countries have been selected for EHTP implementation. These include Namibia, Mozambique, South Africa, Estonia, Russia and Nepal. Numerous presentations have been made to the appropriate authorities in the selected countries and both the benefits and implications of the EHTP have been presented and highlighted.

The identification and selection of the Trainers of Trainers has been completed and the first workshop a scheduled in Geneva during June 2000. A further Trainers of Trainer workshop is scheduled for April 2000 in South Africa with specific emphasis on the South African implementation.

The implementation schedule for the selected countries has been finalised and resource material (facilitators’ manuals, implementation notes and guidelines etc) is currently being developed and will be available by June 2001.
PAQUETE TECNOLOGICO ESENCIAL PARA EL CUIDADO
DE LA SALUD—UNA NUEVA HERRAMIENTA PARA
PLANIFICAR Y ADMINISTRAR LOS RECURSOS

RESUMEN

En el complejo ambiente del sistema hospitalario, una amplia variedad de tecnologías actúan recíprocamente con muchas intervenciones y entradas, y como la tecnología continúa evolucionando, esta hace su impacto en los resultados de los servicios de salud y los recursos financieros. El alcance de las tecnologías médicas se extiende desde aquéllos que proporcionan un beneficio directo a la salud del paciente, por ejemplo, fármacos y dispositivos médicos, a aquellos cuya función es de apoyo a los servicios de la salud, por ejemplo, el desarrollo y dirección de los recursos humanos. Dentro de este paradigma, las tecnologías médicas, y en particular, las estrategias de dirección y organización relacionadas con las mismas, han destacado como proveedores para el cuidado de la salud, buscando identificar métodos rentables para proporcionar una adecuada calidad con los limitados recursos disponibles. En respuesta a esta urgente necesidad, la Organización Mundial de Salud (OMS) y su Centro de Colaboración para las Tecnologías Esenciales de la Salud, del Consejo de Investigación Médica en Sudáfrica (MRC), inició en 1996 una iniciativa de investigación, para desarrollar una herramienta flexible para la planificación y dirección racional de los recursos y de las tecnologías médicas. Este trabajo ha producido el desarrollo del Paquete Tecnológico Esencial para el Cuidado de la Salud (EHTP), una herramienta compuesta de tres componentes: el concepto, la metodología y una herramienta de programación (software).