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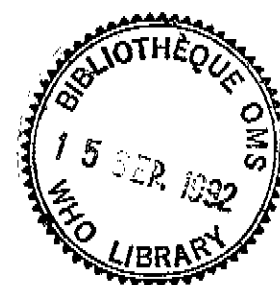
**WHO WORKSHOP ON**

**"NURSING INFORMATICS"**

held at the

**WHO Regional Office for the Americas/Pan American Sanitary Bureau**

**Washington, 28 October - 1 November 1991**



**WORLD HEALTH ORGANIZATION**  
1992

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## WHO Workshop on "Nursing Informatics"

Washington, 28 October - 1 November 1991

### EXECUTIVE SUMMARY:

Human resources absorb up to 70% of the health care resources of a country, and nurses and midwives represent the largest segment of health care workers worldwide. Efficient, effective training and use of nurses and midwives depend on the ready availability of knowledge regarding the needs and resources - human and otherwise - of any country. This gives rise to two major questions: "What do we need to know about nurses and midwives?" and "How can we make this knowledge available where needed?"

The World Health Organization (WHO) is aware that in some WHO-defined regions, data bases and information systems on nursing/midwifery are being developed to assist in policy making and resource allocation. WHO seeks to encourage the coordination of the design of these data bases and systems to maximize their usefulness and ensure the comparability of the resultant data and information over time and between countries and WHO regions.

WHO organized the workshop to help develop a framework for the organization and reporting of nursing/midwifery data and information. The aims of the workshop were to describe and review the current trends of nursing information systems, identify data elements and methods of data collection, explore system development and implementation, and plan future activities in these areas.

#### A) Expected Outcome

The anticipated outcomes of the meeting were:

- consensus on the boundaries of nursing informatics
- consensus on the minimum data elements essential to planning effective use of nursing/midwifery personnel in support of health-for-all (HFA) strategies and policy-making by Member States, regional offices, and WHO headquarters
- consensus on definitions for each of the essential data elements
- recommendations for future nursing informatics projects to be developed and/or coordinated by WHO headquarters.

The participants were to identify activities they thought should be undertaken to facilitate the development and implementation of a management information system for nursing/midwifery.

The workshop gave participants an opportunity to share experiences with information management systems. It also gave them a perspective on their own needs and on future steps that should be taken nationally, regionally and globally in order to provide necessary information for human resource management in countries.

**B) Proposals for future action**

The workshop stressed that the role of nursing in health care needed to be strengthened in all areas. This was particularly important as health care issues had become more politicized. The development of a global nursing minimum data set, and the quantity, quality and timeliness of the information that it would make available thus became extremely important for planning, decision-making and resource allocation. The workshop made proposals for the following action:

a) Should the project be continued?

- All working groups indicated a commitment to continue trying to define a framework for minimum data base development. Several groups called for special emphasis on developing country-level standards before global standards.

b) What actions are needed?

- The WHO nursing collaborating centres that have informatics expertise should play an important role in advancing the nursing minimum data base movement - its development, implementation and use.
- Countries should be encouraged to examine and strengthen their existing information system(s) with an eye towards compatibility with emerging global minimum data base standards.
- Nurses should use a systems analysis approach and involve systems analysts in the development of data base systems.
- Nurses should clarify the purpose of data collection activities in terms of components such as management/administration, research, educational planning, etc.
- Nurses should identify questions to be answered by the base before determining specific data items.

c) What are the priorities?

- Find out what data elements countries are currently collecting and using.
- Develop a nursing human resource planning model from which to generate data elements for the minimum data set.
- Begin to build common definitions of nursing personnel (probably around the International Council of Nurses guidelines).
- Begin to build a translation framework and mechanism for the purpose of making existing personnel data comparable to a "standard" definition.

d) Proposals by the working groups for future activities

- Bring together multi-level, multidisciplinary informatics experts and nurses from Member States to compare existing data base systems and, ultimately, develop a framework for comparability.
- Develop a global model for human resources planning that will guide and direct all future activities in information acquisition and management.

- Develop strategies to implement the planning model(s).
- Organize human resource planning workshop(s), at which informatics would be a part, but not the focus.
- Establish a task force to identify countries' existing information systems, develop a data translation framework and mechanisms.
- Plan activities for collaborating centres with informatics expertise.
- Begin dialogue on including nursing activities and nursing outcomes in emerging human resources data base models.
- Organize workshop(s) on the use of data bases for the advancement of nursing practice.

## 1. Background

The World Health Assembly resolution WHA42.27 on strengthening nursing and midwifery in support of strategies for health for all concluded that: "it was not possible to implement national strategies effectively without the participation of nursing/midwifery personnel; that there was an urgent need to strengthen nursing/midwifery education and practice in primary health care (and that) . . . . information and management systems need to be developed so that adequate and reliable information about nursing/midwifery is more readily available."

The resolution urges Member States to: "support . . . the reorientation to primary health care of all educational programmes (and) . . . . to provide the necessary supervision and support to personnel, especially those in peripheral areas, to enable them to contribute effectively to the promotion and protection of health, especially the health of the most vulnerable groups."

Further, the resolution urges the Director-General to: "promote and support the training of nursing/midwifery personnel in . . . the development of information systems."

In developed and developing countries alike, nurses provide primary health care to meet the basic health needs of the population. Monitoring and improving the quality of care offered are essential.

Nurses need data and well-designed management information tools to facilitate and improve decisions on the coverage and quality of care.

A primary health care management information system (MIS) must be designed and implemented to monitor<sup>1</sup> primary health care of individuals, families, and communities. In addition, well-thought-out indicators of quality of care must become an integral part of the system.

## 2. Objectives of the workshop

The objectives of the workshop were:

- (a) To describe the current status of nursing informatics at national, regional and global levels.
- (b) To identify, through consultation, a common core set of data elements essential to planning effective use of nursing/midwifery personnel in support of health-for-all strategies by countries, WHO regional offices, and WHO headquarters.
- (c) To define, through consultation, each of the essential data elements.
- (d) To explore how to incorporate the core data elements into a nursing/midwifery management information system that can integrate and communicate with a human resources for health (HRH) information system in countries, WHO regional offices, and WHO headquarters.
- (e) To help participants establish a local nursing management information system by enhancing understanding of principles and criteria related to:
  - system design
  - hardware selection
  - software selection

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<sup>1</sup>Definition of "monitor" for the purpose of this report: The observation and recording of selected activities within a system in order to determine significant departure from the norm, or to determine levels of use of particular functions or activities, etc.

- data base development
  - system implementation
  - system maintenance (system security, data integrity, data quality)
  - system evaluation (functionality, utility).
- (f) To help participants maximize the benefits of a management information system in the day-to-day operation of national, regional and global nursing/midwifery programmes.
- (g) To evaluate through consultation the feasibility of developing projects initiated by WHO headquarters and/or the regions to develop and promote further use of nursing management information systems.

### 3. Programme of work, workshop design, and participants

The workshop was organized as follows:

- (a) An orientation and overview to nursing informatics and management information systems was presented, and the kinds of data at present available through the WHO retrieval system were reviewed and discussed. Experiences in informatics at the national, regional and global levels were presented, as were experiences in health care data base development.
- (b) On the basis of the above presentations and discussions, the participants formed working groups to discuss current methods of managing information, basic concepts and skills, core data elements, definitions for data elements, and future activities.
- (c) Consensus building in relation to core data elements and their definitions constituted a large part of the plenary sessions on the third and fourth days.
- (d) An endeavour was made in the closing presentation to link the various components to the overall objectives and to point to future activities that would add to the knowledge of the group.

The agenda appears in Annex 1.

The list of participants is given in Annex 2.

### 4. Opening session

Opening the meeting, Dr R. Knouss, Deputy Director, Pan American Sanitary Bureau, highlighted the need for information on nursing and its importance to the functioning of the Organization and the achievement of HFA, and specifically referred to the importance of data for decision-making and in the allocation of resources. Dr M.J. Hirschfeld, Chief Scientist for Nursing at WHO, welcomed the group and expressed her hopes for a collaborative effort during the sessions. She introduced Dr O. Marie Henry, Deputy Surgeon General and Chief Nurse of the United States Public Health Service, who in her message also expressed the need for nurses to develop management information systems that will facilitate timely and appropriate decision-making by nurses for nursing.

### 5. Proceedings of the workshop

The workshop was organized in such a way that a presentation was given daily by experts and knowledgeable people in the field to provide the necessary background for the working sessions which followed the presentations. This report has, therefore, been organized with summaries of the presentations, the identification of the tasks given to the working groups, and the conclusions.

#### 5.1 Presentation: Overview of nursing informatics

Dr Kathryn Hannah, WHO temporary adviser, gave an overview of nursing informatics. Dr Hannah characterized nursing as information-intensive, and noted that the identification of nursing input to patient care forms

the foundation of nursing informatics. She put her presentation in the context of a number of current societal and technological issues including the following:

- The costs of providing health care have risen to the extent that many sectors of the population will not be able to receive adequate care.
- There is a global shortage of nursing personnel.
- Numerous new health care technologies have been developed.
- Budget restraints are pervasive.
- New programmes and treatments have been developed to meet the needs of growing segments of client populations, such as hepatitis and AIDS patients, as well as the growing geriatric population.

All of these issues put pressure on nursing and health care systems. Dr Hannah posited that the only way to relieve this pressure was to make nursing more efficient, through effective implementation of nursing informatics, which she formally defined as "any use of information technology in relation to any of the functions which are carried out by nurses in the performance of their duties."

Dr Hannah detailed the use of computers in clinical nursing settings with such examples as automated charting, care plans, patient monitoring and interdepartmental scheduling and communication. She indicated that there were, however, a number of prerequisites to use of computerized information systems by nurses. These included such components as refinement of hardware (e.g., portable bedside terminals), software development, appropriate system architecture, core patient data (essential data elements), and decision support systems. Dr Hannah went on to stress the importance of a concept she referred to as "source data capture,"<sup>2</sup> which would permit nurses at the bedside to collect information on individual patients that is essential in making decisions for their care.

With respect to definition of core data elements, Dr Hannah introduced the notion of the *nursing minimum data set*, which she defined as "those data which provide essential information for nursing decisions about patient care." One such element was defined as human resource information. She emphasized the importance of collecting information over time to improve its validity and reliability. Dr Hannah ended her presentation by discussing the elements of a nursing information management system, which she identified as: patient care management, resource management, personnel management, planning, and decision support.

During a discussion that followed Dr Hannah's presentation, one participant stressed that many developing countries were not in a position to employ costly high technology solutions to nursing problems. In fact, resources in these countries were typically expended on "keeping patients alive." Dr Hannah and Dr Hirschfeld both responded by noting that computers were not necessary for information system development, but stressed that it was nonetheless important to consider the increased efficiency and effectiveness that computerization brings.

Concern was also expressed regarding the care that must be taken to ensure that collected information was reported and used appropriately and in proper context. Dr Hannah affirmed the importance of this issue, but stressed that information was empowering to nursing when collected and presented properly.

## 5.2 Presentation: Information currently available through WHO data retrieval system

Mr Scott Becker, Association of Schools of Public Health, presented an overview of information now available through WHO's data retrieval system. He began by discussing an "interim data base project," developed during the summer of 1991 when he served as a WHO consultant. This data base was described as a limited set of information on health care personnel across all WHO regions. Due to the difficulties in collecting the data and the different sources used, Mr Becker characterized the data base as having data of questionable quality, but emphasized the valuable lessons learned in the process.

Mr Becker described other data bases available in WHO (e.g., World Bank, ILO, etc.), some of which include data that do not respond to nursing needs due to varied definitions of data elements and lack of comparability of information/data across various data base systems.

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<sup>2</sup>Definition of source data capture for the purpose of this report: The collection of data at the point of origin.

During a discussion following Mr Becker's presentation, it was noted that data collection "cannot be a one-way street". Because data collection is time- and resource-intensive, it should be done in a well-planned, unified effort, in a way that is simple and useful for a wide variety of audiences. Likewise, the analysed data must be returned to the person(s) who collected it in a form that is usable for decision-making, etc. Better communication and a coordinated effort by WHO regional units and other nursing professional organizations (e.g., ICN) was called for.

Dr Hirschfeld stressed that the purpose of the workshop was to identify the necessary data elements for further data collection efforts, and Ms Margaret Truax concluded by underlining the educational nature of the process.

### **5.3 Panel discussion: Perspectives on nursing/midwifery information management - nationally, regionally and globally**

Chief nursing officers (CNO) from Botswana, Hungary, Zimbabwe, and Trinidad and Tobago and a representative of the CNOs from Latin America participated in a panel discussion on the current status of information management related to nursing/midwifery from the perspective of the ministry of health.

Topics addressed in the discussions were:

- the current methods of managing nursing/midwifery information
- information needed
- information requested by others
- sources of information used in your country
- how an information system could assist in fulfilling responsibilities, now and in the future

The Regional Nursing Advisers participated by describing the current status of information management related to nursing/midwifery from the perspective of their regional offices.

Dr Miriam Hirschfeld, Chief Scientist for Nursing, WHO, Geneva, then spoke on the current status of information management related to nursing/midwifery from the global perspective. She stressed the need for comparability of data across countries and regions and across time, and the need for consistency of definitions, data quality, and data integrity.

A summary of the panel discussion can be found in Annex 3.

### **5.4 Presentation: Management information systems in health care**

Dr Marion Ball, Vice President, Information Services, University of Maryland, provided an introduction to nursing informatics, its historical roots, and a description of computer-based technologies currently in use in hospitals in the United States, including the information that can be generated with such technologies. Dr Ball suggested that computing and communications technologies could transform health care and the nursing profession. She also stressed that her interest was in promoting the integration of nursing and computing, or, as she stated, "Nursing informatics is where care and technology meet."

In response to Dr Ball's presentation, one participant voiced a plea to system developers that new health care software be designed and guaranteed to do what developers promise it will do. Several participants expressed concern that countries and territories/regions without material resources to purchase computers have not had their needs for information system development met thus far. Likewise, the lack of emphasis on rural primary health care information needs was noted, given that over 2/3 of the world's population receive health care outside of hospitals.

Over-reliance on technology, even to the point of "deification" of computers, was pointed out as potentially dangerous and unwarranted. Information systems depend on the individual recording the data and must be focused on the health care needs of the patient. It was requested that discussions focus on the kinds of information nurses need to carry out all their roles (e.g., patient care, policy making, resource allocation), why that information was needed, and how to design effective systems with and without major material resources.

Dr Ball's presentation can be found in Annex 4.

### 5.5 Panel discussion: Experiences in health care data base development

Presentations were given by panelists who have been working in the development of information systems in Mozambique, Israel, Denmark, and the Western Pacific Region. The presentations briefly described their experiences with information systems or data bases with an emphasis on the process of development.

The presentations addressed the following topics:

- who participated in the development
- how decisions were reached regarding the content, e.g., by vote, consensus, by edict, or mandate
- how the data definitions were derived
- how the stakeholders (people who had a vested interest) were identified and involved
- who did the coding
- what were the obstacles/hurdles to be overcome and what strategies were used to overcome these
- how were/are the data gathered
- what means are used to ensure data integrity and data quality
- how the systems were implemented, i.e., how the users were trained to enter and retrieve data.

Summaries of the panelists' presentations can be found in Annex 5.

### 5.6 Working groups

Throughout the workshop several small group working sessions were held. Each participant was assigned to a particular working group for the duration of the workshop, with a facilitator assigned to each group. Each group designated a recorder who documented the group process and the decisions of the group. Topics for discussion were assigned prior to each working group session. All working group sessions were followed by a plenary session in which each group report was discussed and consensus was sought.

Topics addressed in the working group sessions were:

*Current methods of managing information* - a description of the present status of information management in the participants' work environments.

*Basic concepts and skills* - exploration of the process to be used to develop the content for data bases of nursing/midwifery information at the national, regional, and global levels, with particular emphasis on information related to planning effective use of nursing personnel in support of health-for-all strategies.

*Core data elements* - discussion of the components of a core set of data elements (categories) essential to planning effective use of nursing personnel in support of health-for-all strategies by countries, regional offices, and WHO headquarters.

*Definitions for data elements* - discussion of the definition of each element comprising the suggested core data set.

*Future activities* - exploration of the feasibility of initiating projects to develop and promote future uses of nursing informatics.

Most of the working groups prefaced their reports with statements that can be summarized as follows: The role of nursing in health care needs to be strengthened in all arenas. This is particularly important as health care issues become more politicized. The development of a global nursing minimum data set, and the quantity, quality and timeliness of the information that it would bring, thus become extremely important for the planning, decision-making and resource allocation.

Summaries of the working group discussions appear below:

- (a) **Current Methods of Managing Information** - a base line description of the present status of information management in the participants' work environments

Reports from the six working groups are summarized under each of the questions considered.

1. What information do you use and how do you use it?

The group concluded that information was used for planning (financial, education, and programme), management (recruitment and development), monitoring/evaluation (health status of populations, quality of services, development of human resources), policy formulation (norms and standards, trends), and scholarly writings (bibliographies, indices to literature, and abstracts).

2. What reports must you prepare regularly?

The group concluded that reports on risk and evaluation of progress towards health goals reports for given population, area, were required: annual reports (for departments, vacancies, issues, training, and manuscripts and research); statistical (vital data) reports.

3. What are the sources of your data?

Sources of data consisted of monthly and yearly reports from departments (financial, patient information, personnel registries) and programme managers as well as aggregated data from local, community, district, country, and regional levels via meetings, surveys, informal information.

- (b) **Basic Concepts and Skills** - exploration of the process to be used to develop the content for data bases of nursing/midwifery information at the national, regional, and global levels with particular emphasis in information related to planning effective utilization of nursing personnel in support of health for all strategies

Once again, responses from the six working groups are summarized below according to the questions posed:

1. Who are the potential users?

The group concluded that potential users were managers and planners at local, district, national, regional, global level; (directors of nursing services, educational institutions, accreditation agencies, hospitals, health units, professional organizations, researchers). Additionally, information is requested by foundations, insurance companies, health care consumers, politicians, unions and nongovernmental organizations (NGOs).

2. Who are the potential beneficiaries?

The potential users were seen by the group as benefiting from the information they obtained.

3. Who are the potential contributors of data?

The contributors are health care providers, patients, secondary data sources professional organizations, educational institutions, vital statistics bureaux and licensing bodies.

4. Who are the stakeholders - those with vested interests?

The stakeholders are all governments and nongovernmental organizations involved in the provision of and reimbursement for health care services. Additionally, funding agencies and special interest groups have a need for such information.

5. How should data elements (categories) be decided?

Data elements should be decided by consensus involving categories 1-4 above.

6. How should data definitions be derived?

The group unanimously believed that you should start with existing definitions from WHO, ICN, and ICM and include those definitions that exist in countries and regions. These definitions could be broadened in context and use through ongoing evaluation and by addressing exceptions and special cases.

7. What resources will be required?

The resources required will consist of consultants, a project coordinator and clerical support, as well as project costs related to all developmental and demonstration projects. Ongoing maintenance will require equipment costs (hardware, software, maintenance services), expert consultations (systems analyst, programmer) and a centralized "owner".

8. What obstacles can be anticipated?

The obstacles that can be anticipated are similar to those for any global/interregional project/programmes. These include, but are not limited to: language, human resources, communication infrastructure, cultural conflicts, resistance to change, and lack of agreement of special interest groups. The most critical obstacle to be overcome is maintaining quality of data over time.

9. What strategies can be developed to overcome the anticipated obstacles?

The strategies begin with education and awareness of the need for the system, then they identify key people in the country who will be stakeholders in the system and listen to them. There must be a lobby for the support of the system, including funding, making sure you include those affected by data collection and use. Nurses must be involved in the lobbying process. Identify key people as contacts and communicators who can be trained in the art of negotiation and can assist in conflict-resolution strategies.

Design a system that is "user friendly", matches the education level of the work-force, provides rapid response (feedback) to problems identified in the field with frequent feedback, and positive response to data sent on time.

(c) **Core Data Elements** - discussion of the components of a core set of data elements (categories) essential to planning effective utilization of nursing personnel in support of health for all strategies by countries, regional offices, and WHO Headquarters

Reports from the six working groups are summarized under each of the questions considered.

1. Why do we need a core data set?

The core data set is needed as it provides a frame of reference across countries for multinational planning, determining effective use of resources, and evaluating programme impact. It also provides a common language within nursing and with other provider groups to evaluate work-force supply and demand.

2. What is a core data set?

The groups decided on the following definitions:

**Definition 1:** minimum common facts needed about nursing (on a global basis) related to human resources, professional practice, and community health status. This data set can be added to at regional, national and local level as determined by those entities.

**Definition 2:** includes a minimum shared subset of data across countries that is mutually agreed upon by all countries. It also includes additional essential data as defined by every country.

**Suggested elements:** type of nurse, level of preparation, highest level of education, identification number, sex, gender, hours worked per week, ratio of nurses per population base, focus of work, total years experience, quality of performance indicators, content of training programme.

**National level core data set:** demographics (ID, DOB, sex, marital status); training and qualifications including basic education level, category of nurse, type of qualification, continuing education activity, post-basic training, fellowship/scholarship type, special skills; work data including geographic location, type of facility, employer, start date, position title, type of job and employment status.

3. What is data quality?

Quality data are reliable, valid, representative, useful, understandable and current.

4. What is data comparability?

Data comparability is a shared (i.e., common) unit of analysis, definitions (including language, labeling, and interpretation), a defined time frame and frequency of collection. It also implies that data are available, accessible, have a defined level of measurement and allow for the linking of activity to output.

5. What is a minimal data set?

A minimal data set is a shared set of data across countries that is mutually agreed upon. The proposed minimum data set includes (but is not limited to):

- 1) description of categories of health personnel (using existing global definitions) by title, regulation, educational levels and demographics such as age, sex, special skills;
- 2) availability, including number and types of education facilities, health facilities, number of graduates per year, number of admissions per year, number of teachers; and
- 3) information on migration/citizenship of nursing personnel.

Use existing global definitions of nurse, midwives, auxiliary personnel - e.g., WHO, ICN, ICM

Although there is a technical distinction between "core data set" and "minimal data set," these may not be a useful distinction.

6. What is needed for maintenance?

Maintenance requires a defined process for collecting data, updating files (framework, guidelines), and procedures for data security (access/control). Also there must be a commitment of time, expertise and money.

7. How can these data be aggregated?

If data are collected at the lowest appropriate unit of analysis, and use a common (i.e., comparable) level of measurement, they can be aggregated at the community, district, country, health system, regional and global levels.

Information on the working group discussion of consensus building: core data set, appears in Annex 7.

- (d) **Definitions for Data Elements** - discussion of the meaning of the definitions to be used for each of the elements comprising the core data set

The reports from the six working groups are summarized under each of the questioned considered.

1. Who should be involved in defining the necessary data elements?

All persons involved, who include all potential users, beneficiaries, contributors, and stakeholders.

2. How should data elements (categories) be defined?

All data elements should be defined through the process of group consensus regarding agreed minimum data set which includes demographic, training and work data, as well as a functional definition of nursing personnel categories. The group suggested the following functional categorization of nursing:

Nurse A	PHC/community + Institution
Nurse B	PHC/community
Nurse C	Institutional
Nurse D	Nursing and Midwifery
Nurse E	Midwife
Nurse F	PHC + mental health
Nurse G	Institutional + mental

[The independent and dependent functions of a nurse plus the level of education (minimum of three years) would also determine whether one was a highly qualified nurse or a lower qualified nurse.] The group provided the following examples of definition of possible data elements:

Demographic

- I.D. number = Unique number assigned to individual at country level
- Date of birth = To be decided at country level
- Sex = Gender of individual e.g. male/female
- Marital status = Current status (need for countries to determine what is acceptable)

Training

- Basic education level = Education prior to start of professional training expressed in years.
- Category of Nursing personnel = based on national criteria, including non-nurses who are engaged in nursing activities at regional level only, trained/non trained

- Types of Nursing qualification = Basic entry professional training undertaken by nursing personnel expressed by type, date and country.
- Post basic training = Any extended accredited professional training beyond basic qualification undertaken by nursing personnel expressed by type, date, country and funding source.
- Continuing education = Any professional training, generally short term, but formal undertaken by nursing personnel expressed by calendar year and hours.
- Fellowship/scholarship = formal professional training funded fully or partially by organizations expressed by field of study, date, funding source and contract obligation. At regional level yes/no.
- Special skills = Non nursing skills which are relevant to nursing profession e.g. training skills, computer skills, research skills and other as defined at national level. (at regional level this might not be necessary).

#### Work data definition

- Organization = Employing agent
  - name of organization
  - organizational unit i.e. hospital, clinic, etc.
  - unit address/geographical location
  - funding source i.e. governmental, NGO.
- Position, title/grade = defined by national criteria
- Type of job = Primary function performed within position categorized by clinical, administration, research, teaching and non-nursing
- Employment status = Full-time or part-time as per national criteria
- Start date = Date, month, year of current position

### 3. What are the essential elements of the definition for data elements?

Data element definitions must have clear boundaries, be quantifiable, concrete, consistent and provide an accurate description.

Comments given by some groups for consideration were:

- i. The group defined elements which were specifically on the inventory of nursing personnel but the group's understanding of planning for human resources should have included production, utilization and management.
- ii. Type of educational level for regulated nurses, presupposes competency on certain skills.
- iii. The issue of working conditions for nurses needs to be reconsidered.

Information on working group discussions on consensus building: definition for data elements, appears in Annex 7.

(e) **Future Activities** - exploration of feasibility of projects to develop and promote future uses of Nursing Information Systems

The views of the working groups are summarized under each of the specific questions posed.

1. Where do we go from here?

- The WHO nursing collaborating centres that have informatics expertise should have an important role in advancing the nursing minimum data base movement - its development, implementation and utilization.
- Countries should be encouraged to examine and strengthen their existing information system(s) with an eye towards compatibility with emerging global minimum data base standards.
- Use systems analysis approach and involve systems analyst in development of data base system.
- Clarify and formalize a series of common questions to be answered with data from the data base before determining specific data items.
- Clarify the purpose of data collection activities in terms of components such as: management/administration; research; educational planning, etc.

2. Are we committed to continue?

- All groups reported a commitment to continue efforts to define a framework for minimum data base development. Several groups called for special emphasis on country-level support for this development effort prior to development of global standards.

3. Can we identify future steps?

- Bring multi-level, multidisciplinary informatics experts together with nurses from member countries in an effort to compare existing data base systems and, ultimately, develop a framework for comparability.
- Develop a global model of human resources planning which will guide and direct all future activities in information acquisition and management.
- Develop strategies to implement the above HRH planning model.

4. What are our priorities?

- Find out what data elements countries are currently collecting and using.
- Develop human resource planning model from which to generate data elements for the minimum data set.
- Begin to build common definitions of nursing practice (probably around ICN guidelines).
- Begin to build a translation framework and mechanism for the purpose of making existing data comparable to a "standard" definition.

5. Can we identify sources of funding?

- Foundations (Kellogg, Rockefeller, Ford, etc.).
- World Bank.

- National resources (important for sustainability of effort).
- Corporations (esp. computer and/or health care related).

6. Proposals for future activities :

- Organize human resource planning workshop - informatics would be a part, but not the focus
- Establish a task force to identify countries' existing information systems
- Develop a data translation framework and mechanisms
- Plan activities for collaborating centres - identify informatics expertise
- Begin dialogue about the inclusion of nursing activities and nursing outcomes in emerging human resources data base model
- Organize workshop(s) on the use of data base for the advancement of nursing practice and human resource planning.

**5.7 Presentation: Definition of the problem**

The discussion was focused on, but not limited to:

- (a) definition of a core data set and need for a core data set
- (b) discussion of data quality, data comparability, minimum data required, maintenance of data set, and aggregation of data

Dr K. Hannah began with a challenge to workshop participants, suggesting that they attempt to separate data base definitions from the technology needed to implement them. After two days of discussion of computer-based information systems, it was apparent that the definition of a core data set for nurses/midwives and nursing/midwifery might be more easily defined if not viewed as dependent on one type of technology or another. The focus of the working group was to define the core information that nurses really need on a global basis. Dr Hannah posed three questions:

- 1) Do nurses/midwives need a common set of data, and if so, why?
- 2) What are the things we must know about nurses and nursing?
- 3) What should be the quality of the data and how can that quality be assured?

Participants were encouraged to work on defining the common elements from a global perspective, remembering that there will be no prohibition on what can be added by individuals/communities, nations or regions. They discussed how extensive the information should be. Should the information include human resources only, or health status indicators and characteristics of nursing practice? While some participants suggested that the groups needed to include information on all three areas as each influenced the others, several suggested that the participants must keep in mind the focus or "bull's-eye" for nursing and begin with human resources information first.

There was a request for a core conceptual model to be used for guidance in defining the core data set for nursing/midwifery, but this was not addressed. Ms Truax noted the complexity of achieving consensus on nursing informatics, and encouraged the groups to work through the process. Dr Hirschfeld noted that WHO headquarters required nursing information addressing the allocation of resources in nursing, and expressed a need for consensus on a human resources data base as quickly as possible. She added that the information pyramid needed to be changed; that is, the community/countries, not WHO headquarters, needed to define their specific data sets, although WHO headquarters needed a common set of information. All of these concerns were addressed within the working groups.

## 6. Closing session

In closing the workshop, Dr Hannah applauded the tenacity of the group. She said she felt that both the formal and informal (networking) objectives of the workshop had been met. She recommended the International Medical Informatics Association (IMIA) as a resource for members of the group, and encouraged participants to attend IMIA's two forthcoming international conferences (Medinfo - Geneva, 1992 - and Nursing Informatics - San Antonio, Texas, USA, 1994).

## 7. Evaluation of the workshop

The group agreed that they had derived a lot from the workshop and this was expressed in their responses to the evaluation form they were requested to complete at the closing of the last session. Of 35 participants, 24 completed the forms. A summary of items related to the workshop in general and thought to be the most important is presented in the following brief overview:

The section of the evaluation on the daily sessions received 369 responses, of which 340, or 92%, were positive and 29, or 8%, were negative. "Negative" and "positive" were defined in relation to the position of responses on the scale comprising the evaluation form. Under the "Workshop in General" section there were 117 responses, of which 102, or 87%, were positive and 15, or 13%, were negative. The total number of responses was 486, of which 442, or 91%, were positive and 44, or 9%, were negative responses. In general, the accommodations, general environment and preparation for the workshop were found to be satisfactory. A copy of the evaluation form and the calculations can be obtained from: Nursing, World Health Organization, CH-1211 Geneva 27, Switzerland.

ANNEX 1

WHO Workshop on "Nursing Informatics"  
Washington, 28 October - 1 November 1991

AGENDA

DAY 1: 28 October 1991

- 09.00 hrs - 09.30 hrs: Welcome: Dr M. J. Hirschfeld, Chief Scientist for Nursing, WHO/Headquarters, Geneva  
Dr O. Marie Henry, Deputy Surgeon General and Chief Nurse, USPHS, USA,  
Dr R. Knouss, Deputy Director, Pan American Health Organization
- 09.30 hrs - 10.15 hrs: Overview and Orientation to Workshop: Ms R. Margaret Truax, Nurse Scientist, WHO/HQ
- 10.15 hrs - 10.45 hrs: TEA/COFFEE BREAK
- 10.45 hrs - 12.00 hrs: Presentation: Overview of Nursing Informatics: Dr K. Hannah
- 12.00 hrs - 13.30 hrs: LUNCH
- 13.30 hrs - 14.30 hrs: Presentation: Information Currently Available Through WHO Data Retrieval System:  
Mr S.J. Becker
- 14.30 hrs - 15.30 hrs: Panel Discussion: Perspectives on Nursing/Midwifery Information Management Nationally,  
Regionally, and Globally: chaired by Ms R. Margaret Truax, Nurse Scientist, WHO/HQ
- National Perspective: National Chief Nursing Officers:  
Mrs K. Gasennelwe, Botswana  
Mrs K. Sovenyi, Hungary  
Ms J. Kandandara, Zimbabwe  
Dr J. Grayson, Trinidad and Tobago  
Mrs I. Ringeling, Chile
- 15.30 hrs - 16.00 hrs: TEA/COFFEE BREAK
- 16.00 hrs - 17.00 hrs: Regional Perspective: WHO Regional Nursing Advisers:  
Mrs S. Missé, for African Region  
Ms M. Manfredi & Dr S. Land, American Region  
Ms J. Salvage, European Region  
Dr E. Abou Youssef, Eastern Mediterranean Region  
Dr S. Bisch, South-East Asia Region  
Ms T. Miller, Western Pacific Region
- 17.00 hrs - 17.30 hrs: Global Perspective: Dr Miriam J. Hirschfeld, Chief Scientist for Nursing, WHO/HQ
- 17.30 hrs - 18.00 hrs: Plenary - Closing
- 18.00 hrs - 19.30 hrs: Reception

DAY 2: 29 October 1991

- 09.00 hrs - 10.30 hrs: Presentation: Management Information Systems: Dr M. J. Ball
- 10.30 hrs - 11.00 hrs: TEA/COFFEE BREAK
- 11.00 hrs - 12.00 hrs: Working Group Sessions
- 12.00 hrs - 13.30 hrs: LUNCH
- 13.30 hrs - 14.30 hrs: Panel Discussion: Experiences in Health Care Data Base Development:  
Ms A. Brown, Mozambique  
Ms E. Levi, Israel  
Ms R. Mortensen, Denmark  
Ms C. Sakamoto, Australia
- 14.30 hrs - 16.00 hrs: Working Group Sessions
- 16.00 hrs - 16.30 hrs: TEA/COFFEE BREAK
- 16.30 hrs - 17.00 hrs: Plenary - Reporting Session from Working Groups
- 17.30 hrs - 19.30 hrs: Reception

DAY 3: 30 October 1991

- 09.00 hrs - 09.30 hrs: Presentation: Definition of the Problem: Dr K. Hannah
- 09.30 hrs - 12.00 hrs: Working Groups Session  
TEA/COFFEE BREAK at time appropriate for each working group
- 12.00 hrs - 13.30 hrs: LUNCH
- 13.30 hrs - 15.00 hrs: Plenary - Reporting Session from Working Groups
- 15.00 hrs - 15.30 hrs: TEA/COFFEE BREAK
- 15.30 hrs - 17.00 hrs: Consensus Building: chaired by Dr K. Hannah

DAY 4: 31 October 1991

- 09.00 hrs - 12.00 hrs: Presentation: Charge to the Working Groups: by Dr K. Hannah  
TEA/COFFEE BREAK at time appropriate for each working group
- 12.00 hrs - 13.30 hrs: LUNCH
- 13.30 hrs - 15.00 hrs: Plenary - Reporting Session from Working Groups
- 15.00 hrs - 15.30 hrs: TEA/COFFEE BREAK
- 15.30 hrs - 16.00 hrs: Plenary - Reporting Session from Working Groups (continued)
- 16.00 hrs - 17.00 hrs: Consensus Building: chaired by Dr K. Hannah

DAY 5: 1 November 1991

- 09.00 hrs - 09.30 hrs: Presentation: Charge to the Working Groups: Dr K. Hannah
- 09.30 hrs - 10.30 hrs: Working Group Session
- 10.30 hrs - 11.00 hrs: TEA/COFFEE BREAK
- 11.00 hrs - 13.00 hrs: Plenary - Reporting Session from Working Groups
- Closing Presentation - Summary and Recommendations for Future Activities.
- 13.00 hrs: Closure of the meeting

**WHO Workshop on "Nursing Informatics"**

**28 October - 1 November 1991**

**LIST OF PARTICIPANTS**

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Dr E. ABOU YOUSSEF, Regional Nursing Adviser, WHO Regional Office for the Eastern Mediterranean, Alexandria

Ms Jane SALVAGE, Regional Nursing Adviser, WHO Regional Office for Europe, Copenhagen

Dr Sally BISCH, Regional Nursing Adviser, WHO Regional Office for South-East Asia, New Delhi

Ms Theresa MILLER, Regional Nursing Adviser, WHO Regional Office for the Western Pacific, Manila

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Dr Miriam J. HIRSCHFELD, Chief Scientist for Nursing, Division of Development of Human Resources for Health, WHO/HQ Geneva

Ms R. Margaret TRUAX, Nurse Scientist, Division of Development of Human Resources for Health, WHO/HQ Geneva

Ms Maricel MANFREDI, HSM, WHO Regional Office for the Americas, Washington, D.C.

Dr Sandra LAND, HSM, WHO Regional Office for the Americas, Washington, D.C.

Ms Carol COLLADO (Consultant HSM), WHO Regional Office for the Americas, Washington, D.C.

Dr Kathryn HANNAH, Faculty of Nursing, University of Calgary, 17th floor, 10025 Jasper Avenue, Edmonton, Alberta, Canada, T5J 2P4 (Temporary Adviser)

## **Panel discussion: Perspectives on nursing/midwifery information management - nationally, regionally, and globally**

### **(a) National perspective**

1. Current methods of managing information
2. Needs and requirements for information
  - a. Nursing/Midwifery
  - b. Other organizations
  - c. Sources of information about nursing/midwifery in various countries.

Chief Nursing Officers (CNO) reported on the state and nature of information management strategies in their countries:

Mrs K. Gassenelwe, Undersecretary, Botswana, reported that information on all health personnel had been collected for the purpose of human resources management. She indicated that the impetus for this data collection effort was to provide information for making projections to plan educational efforts needed to counter a serious shortage of health care workers. Mrs Gassenelwe also discussed an interest in tracking the incidence of post-basic training in an effort to examine and document the careers of nurses.

Mrs K. Sovenyi, CNO, Hungary, reported on the unique, current and somewhat tumultuous socio-political climate in her country. She presented a chronological perspective of sporadic attempts to introduce computing and technology into the health care setting, and indicated that 1982 marked a turning point when technology was democratized and distributed. She pointed out, however, that because technology is expensive relative to human resources, technological advancements have been slow. Mrs Sovenyi reported that data had been collected in the areas of human resources and educational level, but not in the area of clinical practice.

Mrs J. Kadandara, CNO, Zimbabwe, reported on information issues in her country. Identification of nursing personnel (e.g., their names/addresses, specialties, goals, etc.) forms the primary focus of data collection efforts. Most information is kept in personnel files and Kardex systems, although there are a few computers. Mrs Kadandara indicated that requests for information usually focus on staffing levels, turnover, areas of shortage, and promotion/advancement. Sources of this information include personnel files, health institutions, councils, and missions. The purposes of collecting and reporting this information typically centre on identification of training needs and staffing estimates.

Dr J. Grayson, CNO, Trinidad and Tobago, reported on information issues in her region which has had an increased level of mobility of nurses over the past 3-4 years. Because of this migration, and the ensuing shortage of nurses, Trinidad and Tobago are currently in a resource planning process. It is for this reason that emphasis on information systems is particularly timely. Nurses are currently planning the development of an information system, including a patient classification system. Because nurses typically have little access to computers, nursing personnel must manually file and index information. Like most of the other National Chief Nursing Officers, Dr Grayson indicated the need for information for planning purposes.

Mrs L. Perez, representing the Chief Nursing Officers of Latin America, reported on information issues in her region. Large external debt, poverty, nutritional problems, growing geriatric and young client sectors and a declining educational system underlie the socio-political context of nursing informatics issues in many Latin American countries. Mrs Perez reported that countries like Brazil, Mexico, and Colombia tend to have more developed information systems. Nurses in most Latin American countries are not politically empowered, but information could help them adapt to new roles leading to greater empowerment.

Following the presentations of the CNOs, a discussion ensued on what was being done to meet nursing information needs. By and large nurses in undergraduate and graduate school are easier to reach with respect to informatics education. Practising nurses, however, are more difficult to reach largely because of the cost of continuing education, time constraints and/or lack of interest. Several participants stressed that the collection of data could be separated from "computers" in those countries with economies that cannot yet provide high technology information systems.

### **(b) WHO regional perspective**

1. Current methods of managing information
2. Needs for information within the Regional Office, for whom requested, for what purpose
3. What information is requested from the Regional Office by:

- a. WHO
  - i. Other Divisions in the Regional Office
  - ii. Other Regions
  - iii. Headquarters
- b. Countries in the Region
- c. Other organizations or individuals in the Region.

WHO Regional Nursing Advisers (RNA) reported on the state and nature of information management strategies in their regional offices:

Dr S. Land, AMRO, detailed a number of comprehensive data bases used to manage information (PAHO-INFO (literature), UNIDADO (work-force), TIS (health status and health service), PC Globe (health statistics and country comparisons), PROD (planning, financial and personnel)). Methods used to access information include: personal computers; local area networks (LANs); electronic mail/BITNET; meetings/reports; and person-to-person communications. Information needs include: nursing/midwifery work-force (number and category); nursing education; literature "to support research in education"; nursing resources (to support health care provider functions) and others. The purpose of these information systems is to support nursing development in terms of health resource planning.

Ms J. Salvage, EURO, reported that nursing information is not well managed in her unit. It consists mostly of paper files. Although she has access to some data bases in EURO (referred to earlier in Mr. Becker's presentation), they are not nursing-oriented. Requests for information are typically for names of experts/consultants, and advice on a variety of nursing issues. Ms Salvage expressed frustration that the type of information requested is not readily available in EURO. Possible development areas for the Nurse Midwifery Services (NMS) unit's intercountry programme are identified as an information exchange on "good practice" projects; a resource centre (with advice/information on registry, publications, experts, etc.); project brokering (matching country needs with resources for projects); work-force data; and country information. Ms Salvage raised a number of issues including the necessary identification of whose needs are being met by the collection of information, the quality of information, the use of information, the role of WHO, and the development of partnerships/networks to reduce the duplication of effort.

Prof. E. Abou Youssef, EMRO, began her discussion of nursing information issues by detailing the socio-political turmoil surrounding her region. The distribution of information through registries, health and biomedical information divisions, technical units and administrative units. The information is usually managed by reporting (mostly manual), filing, and a few automated information systems. Information sources are typically governmental. Requests for information come from a wide variety of audiences, and encompass a number of different needs. Professor Abdou Youssef summarized by reporting that there is a great deal of information that needs to be systematized and the notion that education/training in informatics is very important for her region.

Ms T. Miller, WPRO, reported the development of a nursing data base used by advisors, consultants and researchers. A useful characteristic of the data base is that countries could be compared on a number of useful indices. She indicated that nurses in her region are currently working on the identification of quality indicators. Ms Miller also discussed the change process as it related to nursing information management by showing the relationship between the initiation of ideas and integration into policy or practice, mediated by various change mechanisms.

Mrs S. Missé, AFRO, began her discussion of nursing information issues by stating that nurses/midwives are the largest group of health care providers in her region. Like many of the other Regional Nursing Advisers, Mrs Missé identified the major areas of information needs as related to health policy, training, human resources, and continuing education. The main sources of this information are Ministries of Health, training/education institutions and the health care setting. The major purposes of the information are grounded in identification of resources and human resources and assessment of quality of care and programmes. Mrs Missé felt that an information system could assist her region in the areas of personnel management, identification of training sites, identification of problems and improved cooperation among countries.

The discussion which followed the presentations of the RNAs centred around the idea that WHO regional offices/units and Member States need to cooperate and encourage nursing input into HRH management information systems. It was stated that this is necessary to enhance communication and to assess nursing and midwifery service needs and to ensure that they are reflected in health care policies and in the political arena. A clear outcome of the discussion was the belief that nursing/midwifery personnel need more (and better quality) information to justify resource demands.

(c) Global perspective

1. Current methods of managing information
2. Needs of the information within the regional offices, for whom requested, for what purpose

Dr Miriam Hirschfeld, Chief Scientist for Nursing, WHO, Geneva, briefly presented the global perspective on needs for information about nurses and nursing. She began by reviewing the World Health Assembly resolution WHA42.27 on strengthening nursing and midwifery in support of strategies for health for all (primary health care). A report is required to the Executive Board of the WHO in January 1992 with information on nursing and midwifery and the extent to which they contribute to primary health care. Dr Hirschfeld intended to use the results of the workshop as an illustration to define the need for a nursing information management system and the importance of information about nursing/midwifery.

Dr Hirschfeld went on to emphasize the need for not only focusing on the unit of analysis in designing a nursing information system, but also on the needs of the community derived from demographic and epidemiological data as well as health care needs.

**Presentation: Management information systems in health care  
by Marion J. Ball, Ed.D.**

Good morning to you all! I am delighted to be here to speak with you today. Much of what I wish to say echoes the earlier speakers, especially Dr. Kathryn Hannah, with whom I have had the privilege of collaborating over the past decade and more, helping to bring information technology to bear upon health care in general and nursing in particular.

The questions nursing informatics addresses take on added urgency as we approach the year 2000. The vision of informatics for global health eludes us still. How much longer before health care realizes this promise? When will information technology work to improve patient care? When will healthcare professionals have access to information when, where, and how they need it?

### **Information Systems**

Computing and communications technologies are the enablers which will transform health care. Together they can provide the infrastructure upon which information systems can run.

**What are management information systems (MIS)?** Information systems are described by a number of terms. To begin, what are MIS?

The concept of management information systems was developed in the business and industrial sectors. It has been studied, analyzed, and evaluated in detail by management scientists for a considerable period of time.... definitions vary, from emphasizing the physical elements and design of the system to focusing on the function of an MIS within an organization. For our purposes..., an MIS will be used to refer to a method of collecting, storing, retrieving, and processing information that is used or desired by one or more managers in the performance of their duties.... (Ball and Hannah)

**How are they developed?** To understand how MIS are developed and used, it helps to move into health care and to define them within the healthcare setting, that is to say, as HIS. Management information systems (MIS) is the broadest concept and is not exclusive to health, which more often uses the term hospital information systems (HIS). HIS can be defined in many ways, but for our purposes here we shall define it simply as

a term used to describe overall hospital use of computers. Examples would be nurse staffing, medical records, patient admittance and discharge, patient bed control, and so on. (Ball and Hannah)

More recently, as pressures have increased to make information systems more complete, the H in HIS is sometimes meant to stand for the H in healthcare rather than in hospital. The most recent acronym is CPRS, for the computer-based patient record system recommended by the United States' Institute of Medicine (IOM). I'll have more to say about the CPR later, but first let's flesh out the concept of management information systems.

In 1988, a working conference sponsored by the International Medical Informatics Association (IMIA) explored the future of HIS. Ninety-six participants from 17 countries reviewed opportunities offered by new technology and evolving user requirements. They concluded that HIS should

- Encompass all information processing aspects of the hospital, including images (picture archiving and communications systems or PACS) and information for both medical and administrative management
- Have clearly defined interfaces to the world outside the hospital to allow for information flow across the borders of the hospital
- Emphasize patient care, which has been underserved (Bakker)

HIS are in a state of continued development. As the IMIA participants noted, major revolutionary change cannot occur, because HIS are part of the existing infrastructure for healthcare and thus cannot easily be changed or abandoned. Changes must be incremental and evolutionary. We must move beyond the stage where technology is the driver. Instead we must see technology as the *enabler* which makes it possible for us to change the nature of healthcare.

**How are they used?** Morris Collen, who chaired the Technology Subcommittee of the Institute of Medicine's Committee to Improve the Patient Record, set forth in 1988 seven functional requirements for HIS. These, which were endorsed by the IMIA working conference, included the following:

- Establish a database capable of providing an integrated continuing, computer-stored medical record for all patient care data and make it directly accessible to all authorized health care providers 100% of the time
- Communicate patient data to and from all hospital clinical and administrative services, within all affiliated medical facilities

- Support all health care provider functions, including order entry and result reporting, patient history and examination findings, consultation and procedure reports; and communicate individual patient data to and from all authorized health care professionals by user friendly terminals
- Provide clinical and administrative decision support
- Establish and maintain files for hospital administrative and business functions, including patient eligibility, registration, scheduling, personnel and resources
- Assist with quality assurance, accreditation, and regulatory requirements
- Support research and education requirements (Bakker)

According to Collen, these basic objectives, sought in the 1970s, remained relatively unchanged in the 1980s. Today the typical HIS does not realize the capabilities that technology provides and is much less sophisticated than true "state of the art" systems.

### **Principles and Criteria**

According to the IMIA working group in 1988, it is no longer a strategic issue whether an HIS is "implemented on one computer configuration or on a number of interlinked configurations"; indeed, they judged it no more than a technical detail. When this working group reconvened earlier this year, they reaffirmed their stance and underscored the call for a computer-based patient record which follows the patient "from womb to tomb." The findings of this conference will be published shortly; you will find them an excellent status report on healthcare information systems internationally. What I want to make perfectly clear is this: the technologies we need to support patient care exist now. The challenge is to use those technologies purposefully. Only then will they truly transform health care.

How can healthcare professionals gain the understanding they need to use these technologies? Increasingly, the informatics world is drawing nurses and other health professionals into making sure that "caring and technology meet." Almost a decade ago, I worked with Kathy Hannah to write *Using Computers in Nursing* (Appleton-Century-Crofts 1984), which I quoted above. This book has become a primer for nursing informatics. (See Figure 1.) It offers all the basic definitions, from computer hardware components to database development and on to systems implementation and evaluation. Its prime message, and that of the more recent book, *Nursing Informatics* (Springer-Verlag 1988), is this: Nurses can and must be vitally involved in deciding how to use technology. (See Figure 2.) They must be active participants in each and every step of decision making, from needs assessment to vendor selection and on into implementation.

Let me examine with you, briefly, several technical areas identified by Rose Margaret Truax, who so ably organized this workshop and share with you the wisdom I have gathered from informaticians from around the world. I will try to give you some rules of thumb. For more information, let me refer you to the many publications in the area. For ease of understanding and for a strong nursing orientation, I would suggest that you consult the many contributors represented in the two books Kathy Hannah and I have collaborated on. Both bring together a network of nurses and other professionals who write in a manner which you as nurses and healthcare providers are pre-eminently qualified to understand. Moreover, these dedicated professionals offer advice based on their own experience as healthcare practitioners and as technology interpreters.

### The Future

The future of information management in healthcare lies in increasing capabilities of computing and communications. At long last we are seeing a movement toward international standards in technical architecture and software communications is making it possible for different systems to "talk" to each other. This move toward standards will make distributed computing possible. In the distributed model, *the network becomes the computer*. Linkages between different hardware and software platforms become "transparent" to the user, whose workstation gives access to multiple machines, databases, and applications.

In closing, let me share with you a helpful chart which reviews some of the key functional needs in healthcare and the tools now available for addressing them. Again, these tools are already developed and in the marketplace. Some of them, like SMART cards, have been disappointing to date. Few of them have been used to the full extent of their potential.

Any or all can be used within integrated and networked systems to support patient care. From handheld, portable devices which support caregivers in remote rural areas to highly sophisticated applications like imaging and "visualization," technology offers us new tools.

How will we choose to use these tools? In the United States, the Institute of Medicine's Committee to Improve the Patient Record is recommending replacing the traditional hospital-based medical record by what they call the computer-based patient record (CPR). What may be among their greatest achievements is recognizing the record as patient centered, rather than as belonging to the healthcare institution or care provider. Only when the record becomes patient centered can it serve as a base for ongoing care, from birth to death.

As we move into the future, we can look to organizations like the International Medical Informatics Association (IMIA) and the World Health Organization (WHO). They offer us guidance and the opportunity to share information and expertise. I am delighted to report that IMIA is cooperating with the University of Maryland at Baltimore to develop a

database of informatics programs worldwide—and this is just one of the many promising new ventures IMIA is undertaking. Global health through informatics by the year 2000—an ambitious goal towards which we should all strive.

A last word: let me invite you all to attend the second Nursing Informatics Summer Institute at the University of Maryland at Baltimore. Over fifty nurses attended the first institute last July, and we expect international participants in the summer of 1991!

#### REFERENCES

Bakker AR, MJ Ball, JR Scherrer, and JL Willems, eds. **Towards New Hospital Information Systems**. Amsterdam The Netherlands: Elsevier Science Publishers B.V., 1988.

Ball MJ and KJ Hannah. **Using Computers in Nursing**. New York: Appleton-Century-Crofts, 1984.

Ball MJ, KJ Hannah, U Gerdin Jelger, and H Peterson, eds. **Nursing Informatics: Where Caring and Technology Meet**. New York: Springer-Verlag, 1988.

Table 1. Some Rules of Thumb

Start at the right place! Hardware selection would seem to come first, since the hardware provides the infrastructure. But don't be fooled. Begin by focusing on what you know about healthcare and what you need to support the nursing functions. Only after you have a clear understanding of those needs should you begin the selection process. I would advise that you get the best consulting support you can find to help you through the process. And then you should start by looking at software selection, not hardware. The software choice should drive the hardware selection, not the other way around (unless you already have the hardware).

This is the best time to identify system maintenance issues such as system security, data integrity, and data quality. Well made systems should address these issues. This clearly is an area you should investigate during the selection process and ask the vendors to address to your satisfaction. Poorly designed systems can never provide high quality, and security features need to be designed into the system. The same holds true for data integrity. I should add that I consider security and confidentiality to be at the very heart of healthcare information systems. If they are not protected, physicians will be unable to make the leap of faith required to create the totally electronic patient record.

You are best advised to avoid the old trap of designing your own unique system from the bottom up or the top down. System design is best left to information scientists and other professionals who can afford to run repeated tests and discard what does not work. Stick with the commercially available software applications. There are plenty of them. And before you select one, visit other users and find out how the system functions in the real world of healthcare.

The same holds true for database development. Don't reinvent the wheel! There are thousands of databases already developed. Before you invest time, effort, and money, be sure to investigate and find what is out there.

Whatever you do, remember this: The best system can fail if system implementation is carelessly planned or incompletely carried out. Implementation should claim even more energy than selection. And a critical part of any implementation plan has to be education and training for all those involved in using the system. If my experience has taught me anything, it is that this phase is "make or break", "do or die".

The upfront needs assessment you do should involve evaluation of the existing system, whether it is automated or not. Only then can you determine what functionalities are required. Subsequently, you need to include system evaluation for functionality and utility for the systems you consider in the selection process. Evaluation should be ongoing; during throughout the implementation phase, you need to maintain a formal evaluation process to ensure that the system selected lives up to its potential. Again, the decision to purchase is only the beginning of the job at hand! Implementation is key.

Figure 1. Topics addressed Using Computers in Nursing (Appleton-Century-Crofts 1984)

Nurses and Computing	Nurses as health care computer users; impact of computers on nursing
History of Health Care Computing	Historical development of computers; nurse contributors to health care informatics
Anatomy and Physiology of Computers	Computers: hardware/software components; integration; networking
Software Development	Algorithm; flowcharting; programming
Computers in Nursing Education	Impact on education; computer-assisted learning in nursing education
Computers and Continuing Nursing Education	Computer assisted/managed in continuing and inservice education
Implementing Nursing Computer Applications	Selection process and role of nursing; selecting a consultant; computer contracts; linking nursing and computing; preparing nurses to use computers
Administrative Applications	Management information systems; office automation
Computers in Health Care Institutions	Computer support for nursing practice
Computer Support for Nurses in Community Health Settings	Gathering statistics; patient appointment/identification systems; patient assessment and data gathering; home care management plans; automated remote patient monitoring; documentation
Computers in Nursing Research	Models for data systems; generating data bases (data gathering); microcomputers in data gathering; data analysis; reporting research findings
Issues in Nursing Informatics	Sources of resistance to computers in health care; change management; philosophy; privacy, confidentiality and security; using computers in hospitals; ergonomics
Role of the Nurse in Health Care Computing	Role of professional associations; new roles for nurses in medical informatics

Figure 2. Topics addressed in *Nursing Informatics: Where Caring and Technology Meet* (Springer-Verlag 1988)

<i>Nursing Informatics:</i> Mastering Change	Impact of informatics on nursing; integrating nursing and informatics; organizational change; selecting informatics consultants
<i>Nursing Informatics:</i> Integrating Computing and Nursing	Neural view of computing for nurses; human-machine interface; informatics and integration; evaluation
<i>Nursing Informatics:</i> New Roles for Nurses	Informatics and nursing; new roles for nurses; careers for nurses in healthcare information systems; nurses as systems analysts; nursing informatics and the future
<i>Where Caring and Technology Meet:</i> Clinical Practice	Nursing information systems in the clinical setting; case study of nursing information systems; bedside information systems; operating room software; nursing minimum data set; unified nursing language system
<i>Where Caring and Technology Meet:</i> Administrative Systems	Hospital information systems; nursing management information systems; nurses in computer system selection; nursing input to HIS selection; nurses in system implementation; nursing function in system design; integrating HIS into nursing practice
<i>Where Caring and Technology Meet:</i> Research Frontiers	Support for research in computer applications in nursing; classification of decision support systems; modeling for decision support; knowledge based systems for supporting nursing decisions
<i>Where Caring and Technology Meet:</i> Educational Innovations	Using computers to educate nurses; educational software; videodisk technology in nursing education; computers and staff development; need for educational programs in nursing informatics; computers and continuing education

Figure 3. Healthcare in the Year 2000 and Beyond  
Summary of Healthcare Information Systems Trends

<i>Type of Functional Needs</i>	<i>Available Tools to Accomplish</i>	<i>Today's Level of Accomplishment*</i>	<i>Time Needed to "4-Star" Status</i>
Quicker and uniform access to clinical information	Database organization SMART cards	●	3-5 years
Better clinical data collection for patient	Bedside/Point of care Critical care system	●●	1-3 years
Digitize clinical data	Voice data entry Knowledge bases	●●	Over 5 years
Mass data storage	Optical disk	●●●	1-3 years
Mass data retrieval	Optical disk/OCR	●	3-5 years
Patient tracking	Outpatient/Physician links HIS	● ●●	1-3 years
Networking/interfacing	HL7/Open architecture	●	3-5 years
User friendly database manipulation	Executive Information System Decision Support/SQL	●●	3-5 years
Improved instrumentation data collection/treatment/diagnostic	Offshoots of cardiology and patient monitoring systems	●	Over 5 years
Match resources to patients needs	Nursing management	●●●	1-3 years
Improved use of current functionality	Retraining on current system	●	1-3 years

\*Poor (●) to Excellent (●●●●)

Source: T.K. Zinn, "Confronting 2000 and Beyond: Tomorrow's Healthcare Information System," *Computers in Health Care*, October 1990, p. 15. Figure copyrighted 1990. Zinn Enterprises, Ltd., Chicago, Illinois.

## Reliability, Security, and Confidentiality Defined

**System reliability** relates to the availability of the hardware and software for useful work in the clinical setting, secured through the appropriate system design and use of physical security measures that are directed toward protection of environment and equipment. CPR [computer-based patient record] systems mandate the complete availability of the patient's record 24 hours a day for reading or updating, and system reliability is an absolute requirement.

**System security** relates to the appropriate measures taken to keep the computer-based information systems safe from unauthorized access or from harm. **Data security** involves the protection of data from accidental or intentional disclosure to unauthorized persons and from unauthorized alteration. Techniques for security include software and hardware features, physical measures such as locks and badges, identification numbers or codes, passwords, and an informed, security conscious staff. **Data protection** includes data integrity and data confidentiality. **Data integrity** means the consistency and accuracy of the data stored in the CPR. Data integrity is of paramount importance to the CPR, and care must be taken to ensure that the CPR is 100% restorable upon recovering from any system failures. Four ways to maintain data integrity are (1) by implementing security measures, (2) by implementing procedural controls, (3) by assigning responsibility, and (4) by establishing audit trails.

**Data confidentiality** is the status accorded to data or information indicating that it is sensitive for some reason, and therefore it needs to be protected against theft or improper use, and must be disseminated only to individuals or organizations authorized to have it. One of the most important methods for ensuring confidentiality, and also data integrity, is to restrict access to the CPR system to only those with a "need to know" and to then positively certify their identity before permitting access. The CPR system must be capable of providing different levels of data confidentiality as required for its various users. Legal, professional and accrediting standards will need to be revised to specify uniform computer system roles and responsibilities. The nature of data collection and retrieval may change, but principles of professional documentation will not.

Source: MF Collen and MJ Ball  
"Technologies for Computer-Based Patient Records"

### Panel discussion: Experiences in health care data base development

The discussion was focused on, but not limited to:

- (a) Identification of the principle participants in the development of data bases
- (b) How decisions were reached regarding content, how data definitions were derived, how the stakeholders (people with a vested interest) were identified and involved
- (c) Identification of those responsible for coding, data gathering, data integrity and data quality
- (d) How systems were implemented and how users were trained to enter and retrieve data.

Four presentations were made on health care data base development.

Ms A. Brown reported on efforts since 1988 to revise the health information system (HIS) in Mozambique, East Africa. She reviewed the devastation resulting from 12 years of war in that country. This had resulted in the destruction of 25% of hospitals and health posts, and the isolation and total collapse of the community health worker. At present, 40% of health posts are staffed by untrained health workers who represent the primary data collector in the newly designed HIS.

The Mozambican HIS introduced in 1982 was based on the primary health care tenets (e.g., Maternal and Child health, epidemiology, water, sanitation, etc.). The revision of this system began with analysis of the existing data system at the primary and secondary levels, training of data collectors in epidemiology and statistics, followed by a pilot testing of the forms in two districts. National level activities paralleled the provincial ones and resulted in revision of the HIS, simplification of the data forms, promotion of data analysis, interpretation and utilization of data at district level as well as attempts to link resource availability to workload. This was a HIS based on paper/pencil and human resources. The major problems that had to be overcome in the design of the new HIS were a lack of planning, no control over the quality of data, and the loss of standardization within the health care system.

Mrs E. Levy reported on the development of the Nursing Manpower Information System (NMIS) within the Kupat Holim health service in Israel. Nearly 3/4 of Israel's population receive their health care within this system. She noted that although computerized information systems that include data on all aspects of health had existed for a long time within Kupat Holim, it was recognized that the information systems needed to be improved in order to meet current needs.

Mrs Levy described one experience of improvement that was made by the Nursing Department. They developed the Nursing Manpower Information system. This system is operated on personal computers with updating from the main frame. This new development in the Nursing Department enabled them to manage nursing personnel (10,000 strong) in a more efficient way. Mrs Levy demonstrated some of the capability in nursing manpower information now available in the personal computer base, including up-to-date information on post-basic continuing education efforts.

Ms R. Mortensen reported on the role of the Danish Institute for Health and Nursing Research in defining and developing ID-ENTITY: Informatics and Diagnoses - European Nursing Terminology as a basis for Information Technology. Eleven clinical centres in three countries, and six industrial partners in four countries are participating in this effort, having defined nursing objectives and interventions using the conceptual framework of the nursing process. The goals of ID-ENTITY are to: 1) initiate the classification of nursing practice; and 2) initiate the development of care planning information and decision support systems based on classification/diagnoses. Ms Mortensen stressed the importance of information systems that link nursing diagnoses, nursing interventions, outcomes and resource use. The current efforts in information system development involve the use of clinical partners representing many areas of nursing practice, the role of the informatics industry, and the role of the Danish Institute in nursing research support.

Ms C. Sakamoto reported on the project initiated by Dr K.S. Lee, PHC Unit, WPRO. This is a Primary Health Care information system developed and used at the WHO regional level to assist the countries in the region to develop their PHC programmes. WPRO in Manila is the primary user of this system. The system is designed to receive information on PHC from collaborating centres in Nursing, to add work-force data and country profiles at regional level, and then allow WPRO to generate reports on work-force profiles, educational programmes to assist planning/resource allocation for development of PHC in the countries. Phase one in 1989 included the development of the PHC data base model. During Phase two, in 1990, four collaborating centres (Australia, Philippines, Republic of Korea, and Japan) were chosen to pilot the PHC information data base, and in phase three of the project, other countries may be included.

Ms Sakamoto noted that dBase 3 was the data base package used for the development of the data base. She also noted that an important part of this project is education - teaching people how to read and use the reports generated from the data base at the country level. Since this project covers many countries, there are problems with the implementation of the data base and the definition of terms. Lessons learned were shared with the workshop participants. They included the need to identify all users, to clarify the purposes of the proposed system and define boundaries of the system early and clearly, to justify the information selected (range from that information that is "nice to know" to that information that "must be known"), to identify primary and secondary sources of data, and to use existing data when possible (preferable to collecting new data).

**WHO Workshop on "Nursing Informatics"  
28 October - 1 November 1991**

**WORKING GROUPS**

Note: Each group designated a Facilitator and a Rapporteur who reported in Plenary.

Working Group 1

Ms R. CHOMPRE  
Mrs K. GASENNELWE  
Ms M. MANFREDI  
Dr B. McELMURRY  
Dr R. SLAUGHTER

Working Group 4

Dr S. BISCH  
Ms A. BROWN  
Dr J. GRAYSON  
Dr M. MARSHALL  
Ms R. MORTENSEN

Working Group 2

Ms J. KADANDARA  
Mr R. MAYES  
Mrs S. MISSE  
Mrs L.P. PELAEZ  
Ms C. SAKAMOTO

Working Group 5

Ms E. LEVY  
Mrs Y. M. LUHAHI  
Ms T. MILLER  
Dr D. MORRIS  
Dr C. G. SILVAN SCOCHI

Working Group 3

Dr E. ABOU YOUSSEF  
Ms C. COLLADO  
Dr N. LANG  
Dr R. NDLOVU  
Mrs I. RINGELING  
Mrs K. SOVENYI  
Dr J. THOMPSON

Working Group 6

Dr S. KUPE  
Dr S. LAND  
Ms G. MEERT  
Dr K. MILHOLLAND  
Ms C. ROMANO  
Ms J. SALVAGE

## Working groups - summaries of discussions on:

### a) Consensus building: core data set

In discussion leading towards consensus on the core data set for nursing/midwifery, Dr K. Hannah noted that it was apparent that more work was needed on the distinction between "nurse work-force" and "nursing work-force" before consensus building could be started. The following represents a summary of the main points of concern and issues raised.

A considerable amount of time was spent on deciding what level of health care worker should be included in the definition of "nursing personnel." Those who spoke to inclusion of professional nurses only were among the minority and gave their rationale as supporting country's efforts to move toward standardized professional nursing, as well as an unwillingness to give "status" to lower level personnel. One member suggested that inclusion of non-nurses in the definition of "nursing personnel" could be viewed as retrogressive and undermine the current struggle for survival of the professional nurses. The concern that including non-nurses in a nursing data set globally might give "status" to those health workers similar to nurses was not supported within the group. After much discussion and clarification, it was suggested that "nursing personnel" definitions should include a variety of "nursing" assistants, aides or auxiliaries, but that the title (definition) "nurse" should be reserved for those with formal nursing education.

Several participants requested recognition for those who are not nurses but who perform nursing activities in many countries. Latin America was one example where assistant nursing personnel and community midwives provide much of the nursing care in the countries, and therefore must be acknowledged in a core data set. Others noted that the implementation of primary health care in the developing world has necessitated a community based PHC worker with a variety of levels of training. Although there was no consensus on whether nurses should direct, supervise or take responsibility for educating all these "nursing assistants", all acknowledged that these community workers were important human resources in the PHC efforts.

Another discussion point centred around the decision to focus primarily on human resources information, or in the interest of planning, to include health status information and nursing practice data as well. This reinforced the concept that planning requires knowledge of who is giving what health/nursing care now in order to plan for needed changes in the future. Thus the inclusion of non-nurses (community health workers, TBAs, etc.) in the human resources data base was reinforced. After much discussion, it was suggested that the group begin with nurses first, then go on to define and collect data on other nursing personnel.

Within all these discussions, the need for clear definitions and agreement on these definitions (nurse, midwife, TBA, community health worker, nursing assistant) was reinforced. Likewise, several reminders were noted that in agreeing on definitions, one also needed to pay attention to whether the data could really be collected. Agreement on a core data set would mean little if several countries could not obtain the basic data. Within the same context, clarity in statement of purpose - why we were planning for a nursing information system - was requested. Although participants were referred to the statement of objectives at the beginning of the workshop, some thought there was not enough specificity in these to offer the needed direction for the workshop.

Several participants spoke to the efficiency of using existing definitions of nurse/midwife, etc., such as those from ICN, ICM or WHO. Likewise, it was noted that the definition of nursing/midwifery information did not imply that nurses/midwives had to collect and collate the data. It was noted that several sources of health personpower data could be used, such as vital statistics records, PHC unit data, etc. that includes nurses/midwives and nursing information. The goal suggested was to avoid duplication of efforts while guaranteeing the data about nursing/midwifery will be available for use.

Dr Hirschfeld noted that the philosophical and political arguments about definitions, core data set and who to include in nursing/midwifery information were very important to building consensus. One of the primary points to remember is that local level needs for information will always be greater than regional level needs, and regional level needs for information will be greater than global needs. This creates a pyramid with global needs most narrowly defined on top of the ever increasing base of regional, national, district and local information needs.

A final discussion point centred on the fact that no information system stands alone. It must be interrelated with other disciplines, etc., as well as used by other disciplines.

Though consensus on a core data set for nursing/midwifery was not reached, some beginning agreements were. It was acknowledged that while some aspects of nursing and caring were provided by families, neither family caregiving nor self care should be included in "nursing personnel data. It was agreed that "nursing" would be used as an adjective instead of "nurse" when

describing non-nurse categories of assistants or aides. There was no agreement on where the community health worker or TBA fit in the pyramid of nursing personnel.

Ms Sakamoto indicated that the purpose of the core data was to get a global picture using existing data-set boundaries in order to agree on definitions. It was also pointed out that data was needed to indicate what nurses do in order to render better quality care for the population. A data base should be started or strengthened in the countries themselves.

Ms A. Brown expressed concern in that, if the focus is on human resources alone, this is too far from quality of care. It was also pointed out that many countries do have some type of system for collecting data in their countries and these related to the various categories of nursing personnel and nursing activities.

Dr M. Hirschfeld emphasized that the purpose of the Nursing Information System (N.I.S.) was to determine the kinds of nursing resources available at global level in order to determine kinds of initiatives needed to foster better health care. Dr Hannah indicated the need to focus and target on one piece of what is a very large area. A start should be made with a small piece that is manageable.

b) Consensus building: definition of data elements

Dr Hannah indicated that there were more similarities than differences amongst the group members.

A diagrammatic representation of what the discussion had tried to address regarding core-data was given. The areas indicated were:

- health needs
- health interventions
- health care workers (nurses)
- health status
- health policy and planning

Steps needed were:

- Identify elements
- Define the data elements through a process of analysis and interpretation

This will assist in reaching a conclusion. Dr Hannah's view was that the group could not have a consensus on national issues.

The deliberations posed a lot of questions and concerns, it was felt by many that this workshop was only a beginning. Many others with additional technical experts would have to follow if the objectives of the workshop were to be met.

Dr Hannah reviewed the nature of the task of building a minimum and core data base in relation to the "triangular" model she had presented earlier in the week, in which data elements could be aggregated at different levels, beginning with countries, and working up through regional, then global aggregations.

Ms C. Sakamoto asked the group for the opportunity to present her own summary of the workshop proceedings. She subsequently contributed an excellent and useful visual representation of the purposes to which the "local -> regional -> global" data base model could be put. She discussed the importance of "drawing boundaries" (e.g., the group's discussion about "what is a nurse?") and how that process inevitably leads to the development of the actual structure and definition of the data base elements.