From Nightingale to the 21st Century: Information as Illumination for Modern Nurses

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and

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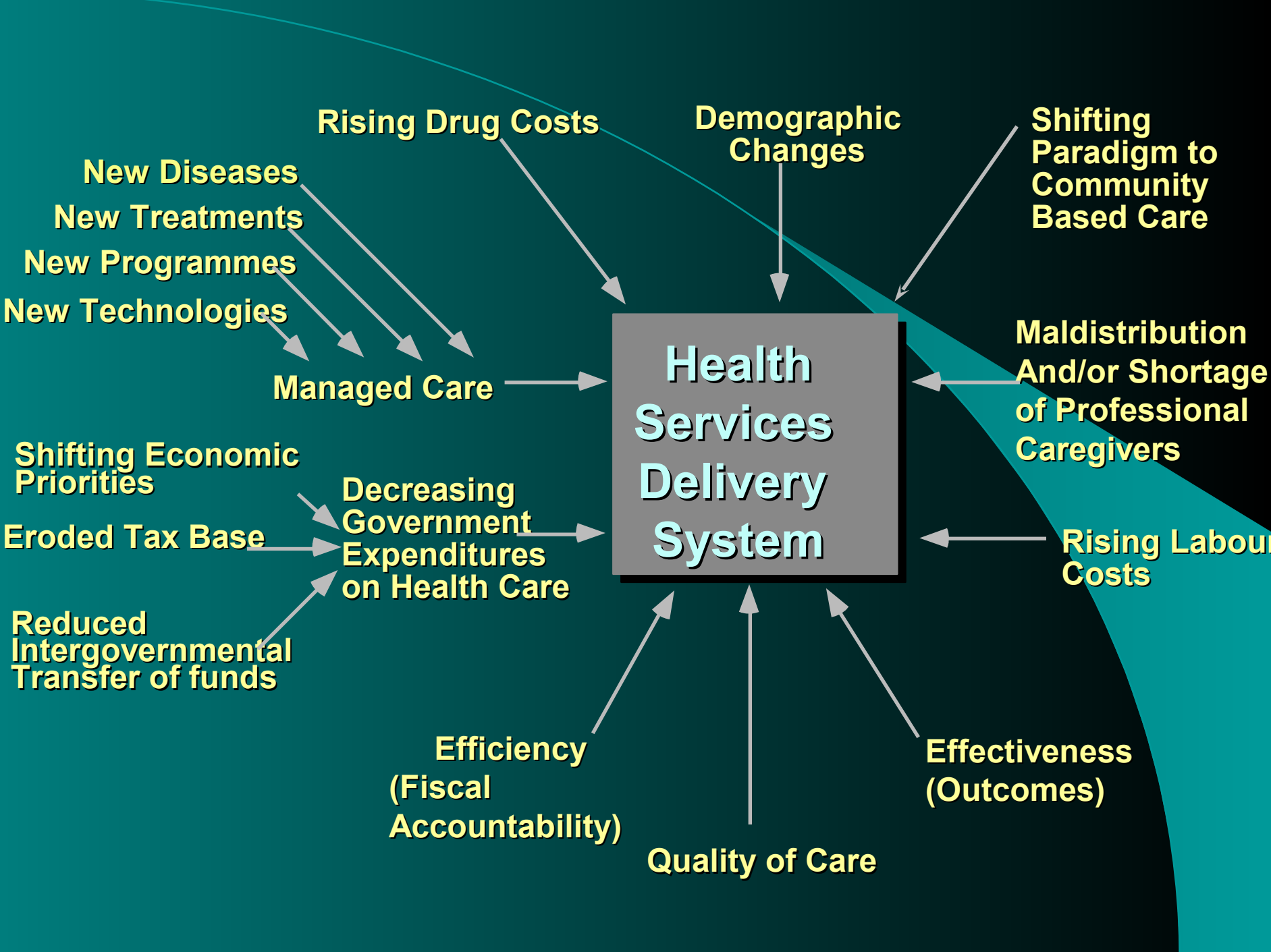Department of Community Health Science

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The University of Calgary

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Agenda

- **Health Care and Health Informatics**
- **Modern Nursing**
- **Nursing Informatics**
- **Trends**
- **Future**

SUPER ABUNDANCE OF DATA

DUE TO:

- increase in reporting requirements
- increased concern about risk of litigation
- increase in life expectancy
- increased incidence and prevalence of chronic disease
- increasing development and use of life long electronic health records

What We Know Now: Information Growth Trends

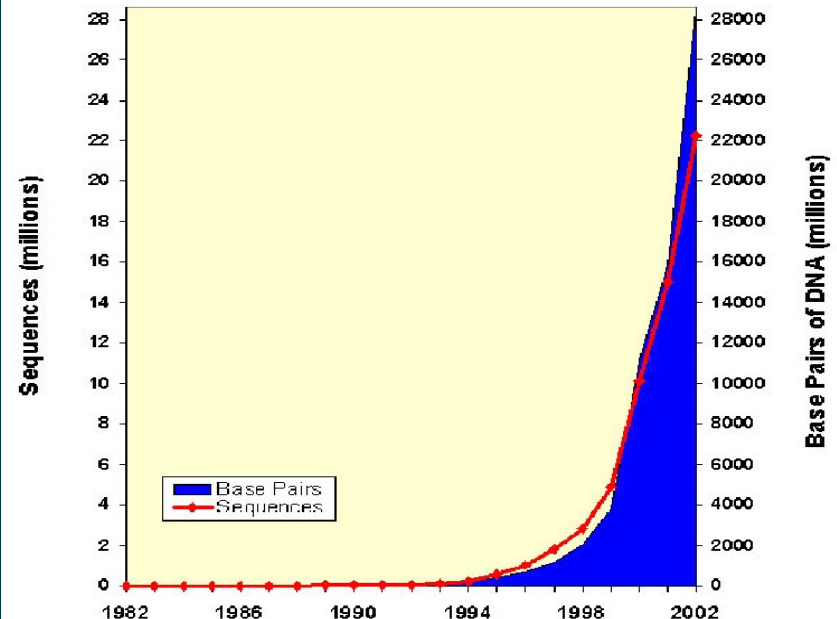## The Biomedical Literature

Molecular Life Sciences
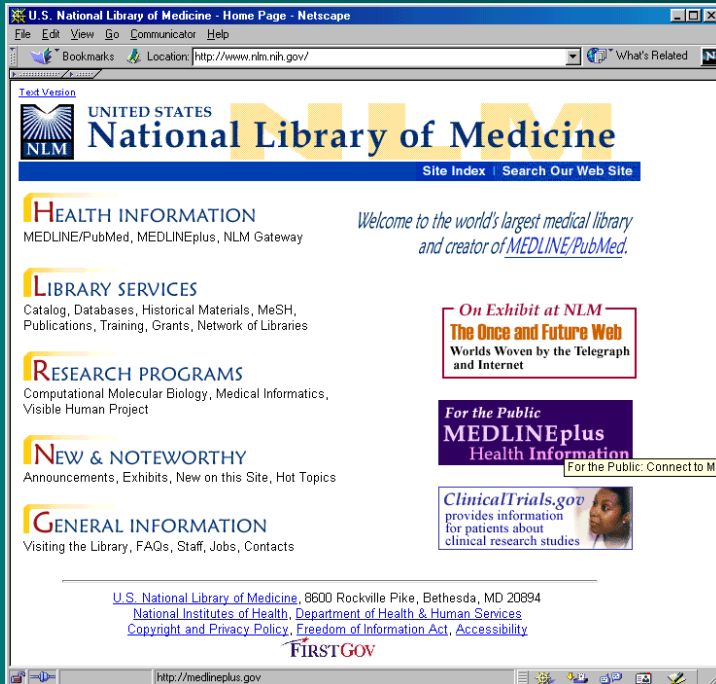
MEDLINE:

14 Million citations dating from 1953

Growing at 400,000 new articles per year

GENBANK*:
28.5 Billion Base Pairs
22,318,883 Sequences

*Revised February 07, 2003

RESEARCH FINDINGS

• **Data and information are essential to rational decision making and good management of the health services delivery system.**

• **Restructuring of health systems must be based on data and information**

• **Decisions about health care system are too important to be based on opinion, emotion, historical precedent or political expediency**

Federal And Provincial Reports Identify Information Requirements

| Author	Title	Date
National Forum on Health	Volume I -Canada Health Action: Building on the Legacy The Final Report of the National Forum on Health	February, 1997
Advisory Committee on Health Human Resources	The Nursing Strategy for Canada	October 2000
Michel Clair	Commission d'étude sur les services de santé et les services sociaux	December 2000
Kenneth J. Fyke	Caring For Medicare Sustaining A Quality System	April 2001
Don Mazankowski	A Framework for Reform Report of the Premier's Advisory Council on Health	January 8, 2002
The Standing Senate Committee on Social Affairs, Science and Technology *Chair: The Honourable Michael J.L. Kirby*	The Health of Canadians – The Federal Role. Final Report. Volume Six: Recommendations for Reform (The Kirby Report)	October, 2002
Roy J. Romanow	Building on Values: The Future of Health Care in Canada	November 28,2002

Health Informatics

The unique combination of:

- Knowledge of Health Services Delivery
- Technology
- Applications
- Information
- Methodologies and
- Data Management Processes

to meet the needs of the Health System for integrated information.

Health Informatics Conceptual Framework
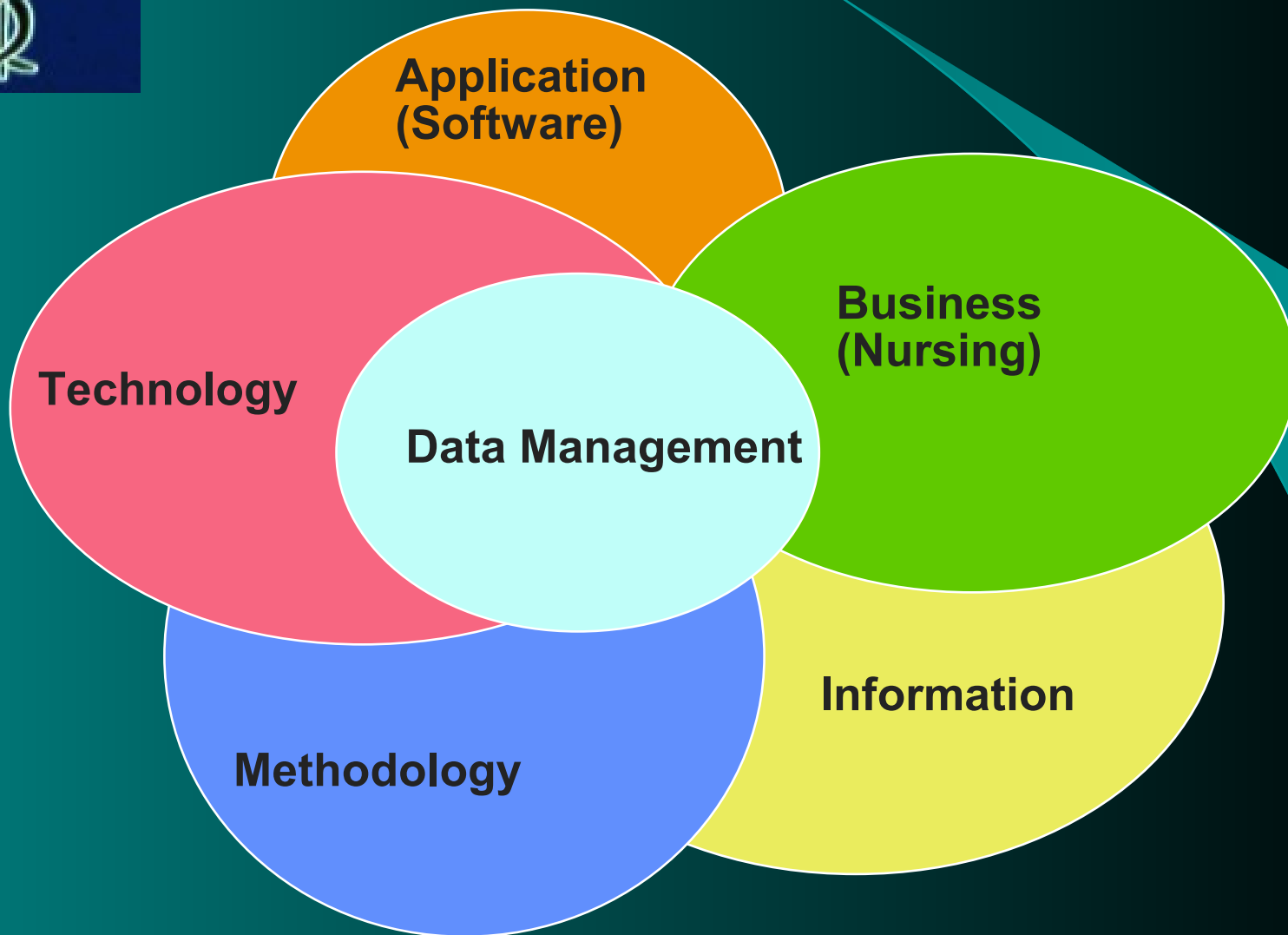
USE OF INFORMATICS TO SUPPORT MANAGEMENT OF HEALTH ORGANIZATIONS

- Policy formation and programme development
- Evaluation and reprogramming
- Monitoring and control of programme implementation
- Information management
- Budgeting and financial forecasting
- Financial management
- Facility and asset management
- Human resources management
- Materiel management
- Office automation

USE OF HEALTH INFORMATICS TO SUPPORT
HEALTH CARE DELIVERY

- Self care
- Population/Community Health
- Primary care
- Ambulatory care
- Knowledge Bases
- Expert Systems
- Decision Support for Caregivers
- Epidemiology and statistics
- Literature Retrieval
- Electronic Health Records
- Acute Care

Transforming Health Data into Information Based Action

Detailed Clinical Data (CPR, CMR, Electronic Chart)	Compiled Historical Detailed Data (EHR)	Comparable Aggregate Data	Comparison to Indicators and Accountability Measures	Plans, Policy, Issues

Data   *Information*   *Decision*

Action

Clinical Data Capture, Data Quality Assurance	Information Quality Assurance	Information Analysis, Information Interpretation, Decision Support

Clinical Information Requirements		Population Health and Program Management Information Requirements	Administrative and Management Information Requirements

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Fundamental Premise

NURSING CARE
IMPACTS
PATIENT OUTCOMES

Goals of Nursing

- Promotion of adaptation in health and illness

- Facilitation of the achievement of the highest possible state of wellness for individuals, groups, and populations

Changes in the Nature of Nursing

- Patients who have increasingly complex health problems
- Greater responsibility and accountability
- Increasing need for information
- Increasingly sophisticated level of knowledge
- Increased education requirements

Changes in Nursing Practice

FROM

Relying on Historical Precedent

Standardized Care

Departmental Focus

Micro Perspective
(detail oriented)

Authority (based on position
and budgets) and Results based
on process and performance

Risk avoidance

Judgmental

TO

Evidence based

Personalized Care

Team focus

Macro Perspective
(big picture oriented)

Outcomes focused

Risk Management

Learning

Information Needs for Clinical Nursing Practice

- **Information for Purposes of Patient Care**

- **Information to Manage Nursing Resources**

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Nursing Informatics Is

"….a combination of computer science, information science and nursing science designed to assist in the management and processing of nursing data, information and knowledge to support the practice of nursing and the delivery of nursing care"

Graves and Corcoran (1989)

Hannah, Ball, and Edwards Definition

"….any use of information technologies by nurses in relation to the care of their patients, the administration of health care facilities, or the educational preparation of individuals to practice the discipline is considered nursing informatics" **(1994, p.5)**

American Nurses Association Definition of Nursing Informatics

Nursing informatics is a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice. Nursing informatics facilitates the integration of data, information and knowledge to support patients, nurses and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology.

(ANA, 2001)

Staggers and Thompson

"a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information and knowledge to support patients, nurses and other providers in their decision making in all roles and settings. This support is accomplished through the use of information structures, information processes and information technology".

[Staggers, N. and Thompson, C.B. The evolution of definitions for nursing informatics: A critical analysis and revised definition. *Journal of the American Medical Informatics Association,* Philadelphia, 2002:9 (May/June):255-261.]

Goal of Nursing Informatics

- **"to improve the health of populations, communities, families and individuals by optimizing information management and communication.**

- **This includes the use of information and technology in the direct provision of care, in establishing effective administrative systems, in managing and delivering educational experiences , in supporting lifelong learning, and in supporting nursing research".**

[Staggers, N. and Thompson, C.B. The evolution of definitions for nursing informatics: A critical analysis and revised definition. *Journal of the American Medical Informatics Association,* Philadelphia, 2002:9 (May/June):255-261.]

Nursing Role in Managing Information

- management of information necessary to provide care to patients/clients using the nursing process

- management of information necessary to manage patient care in health services delivery settings

Nursing Information Needs Related to Patient Care

- Patient Demographics
- Client Status (Nursing Phenomena and Outcome)
- Documentation
  - Plan of Care (Nursing Interventions)
  - Record of Care given (Nursing Interventions)
- Primary nurse provider
- Decision Support Tools

Nursing Information Needs Related to Management of Nursing Resources

- **Human Resource Information (Primary Nurse Provider)**

- **Patient Classification and Workload Measurement (Workload intensity)**

- **Fiscal Resources**

- **Physical Resources**

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Trends

- **Nursing Terminology Standards**
- **Change Management**
- **Computer-based Patient Records and Electronic Health Records**
- **Information Networks to support Integrated Delivery**
- **Outcomes Orientation**
- **Evidence Based Practice**

The Trouble with Nursing !

"If we cannot name it, we cannot control it, finance it, teach it, search it or put it into public policy" (Clark and Lang, 1992, p. 109)

Clark, J., and Lang, N. Nursing's next advance: An international classification for nursing practice. *International Journal of Nursing* 1992;39(4):102-112, 128

ICNP®
ICN Programme on Development of an International Classification for Nursing Practice

ICNP®

- **a reference terminology for nursing phenomena, actions and outcome**

- **provides a terminology for nursing practice**

- **serves as a unifying framework into which existing nursing vocabularies and classifications can be cross-mapped**

- **enables comparison of nursing data**

ICNP Introduction
http://www.icn.ch/icnpupdate.htm#Intro

Classifications

- **useful to people as a means of communicating and understanding**

- **classifications are not sufficiently granular or specific for use in electronic information systems**

Formal Terminology

Electronic information systems require formal terminology that Ingenerf defines as being:

. . .based on concepts or units of thought, rather than on lexical expressions or terms. Formal terminologies also have explicit rules for combining simple concepts into sensible complex concepts. Finally, formal terminologies have a knowledge representation scheme, or formalism, for depicting the relationships among the concepts.

International Standards Organization (ISO)

Technical Committee on Health Informatics (TC 215) Working Group 3 (WG3)

International Standard (ISO 18104)- Integration of a Reference Terminology Model for Nursing

CLIMBING THE TERMINOLOGY LADDER

Formal Terminology (Electronic)

PATIENT OUTCOMES

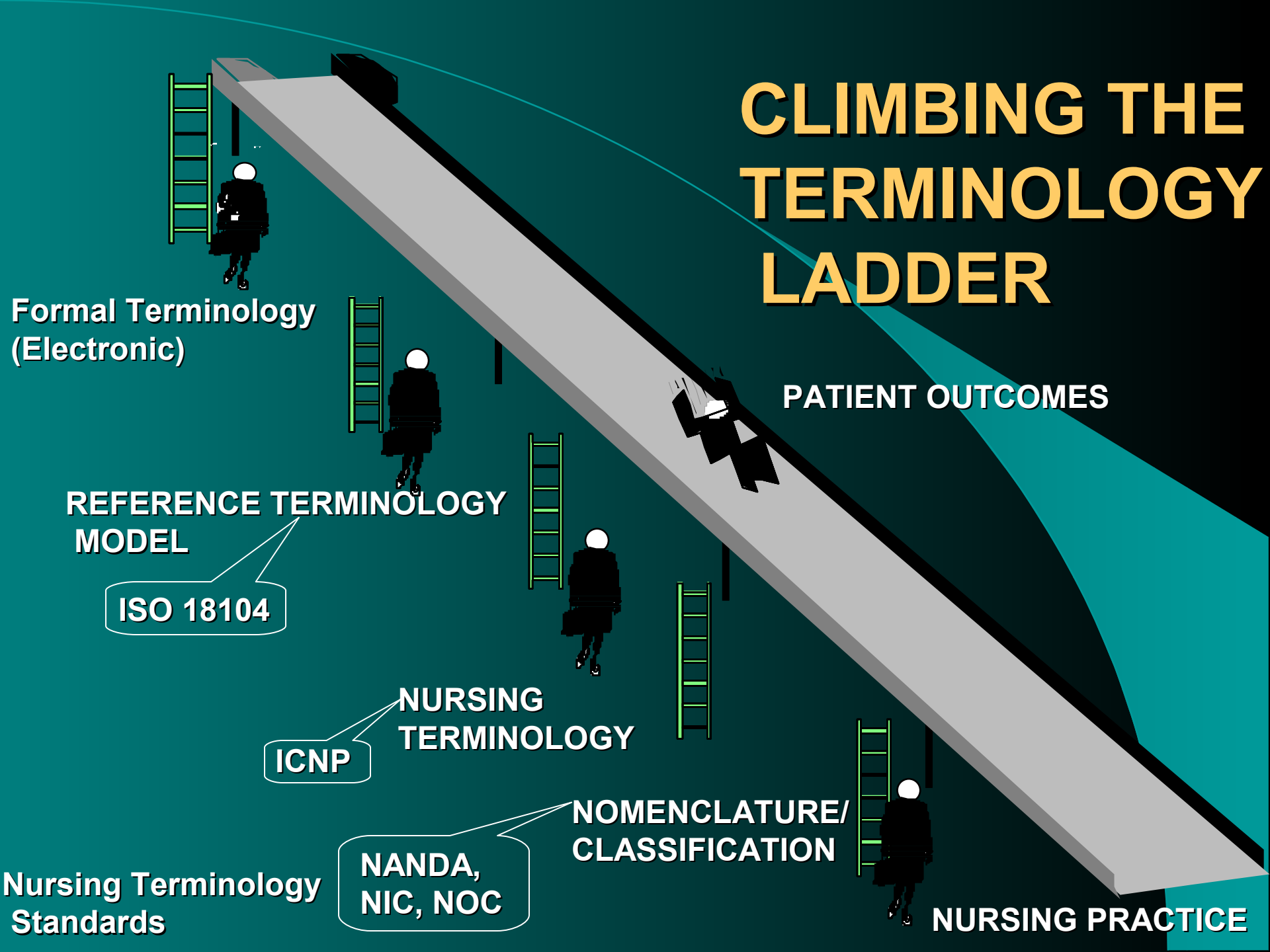**REFERENCE TERMINOLOGY MODEL**

ISO 18104

NURSING TERMINOLOGY

ICNP

NOMENCLATURE/ CLASSIFICATION

Nursing Terminology Standards

NANDA, NIC, NOC

NURSING PRACTICE

More Information

Lang, N.M., & Baernholdt, M. (2003). Why an ICNP? Links from quality, information and policy. *International Nursing Review, 50(2),* 73-78

http://www.icn.ch/bib-icnp-references.htm

Canadian
Health Information Context

Organization	Origin	Mandate
Canadian Institute for Health Information (CIHI) - Including HL7 Canada	1992	Information collection and aggregation
Canada Health Infoway Inc. (Infoway)	2001	Implement pan-Canadian EHR
Canadian Standards Association (Z295)	1950's (1999)	National Standards of Canada

Example of Collaboration to Establish National Standards of Canada (Current State) v6
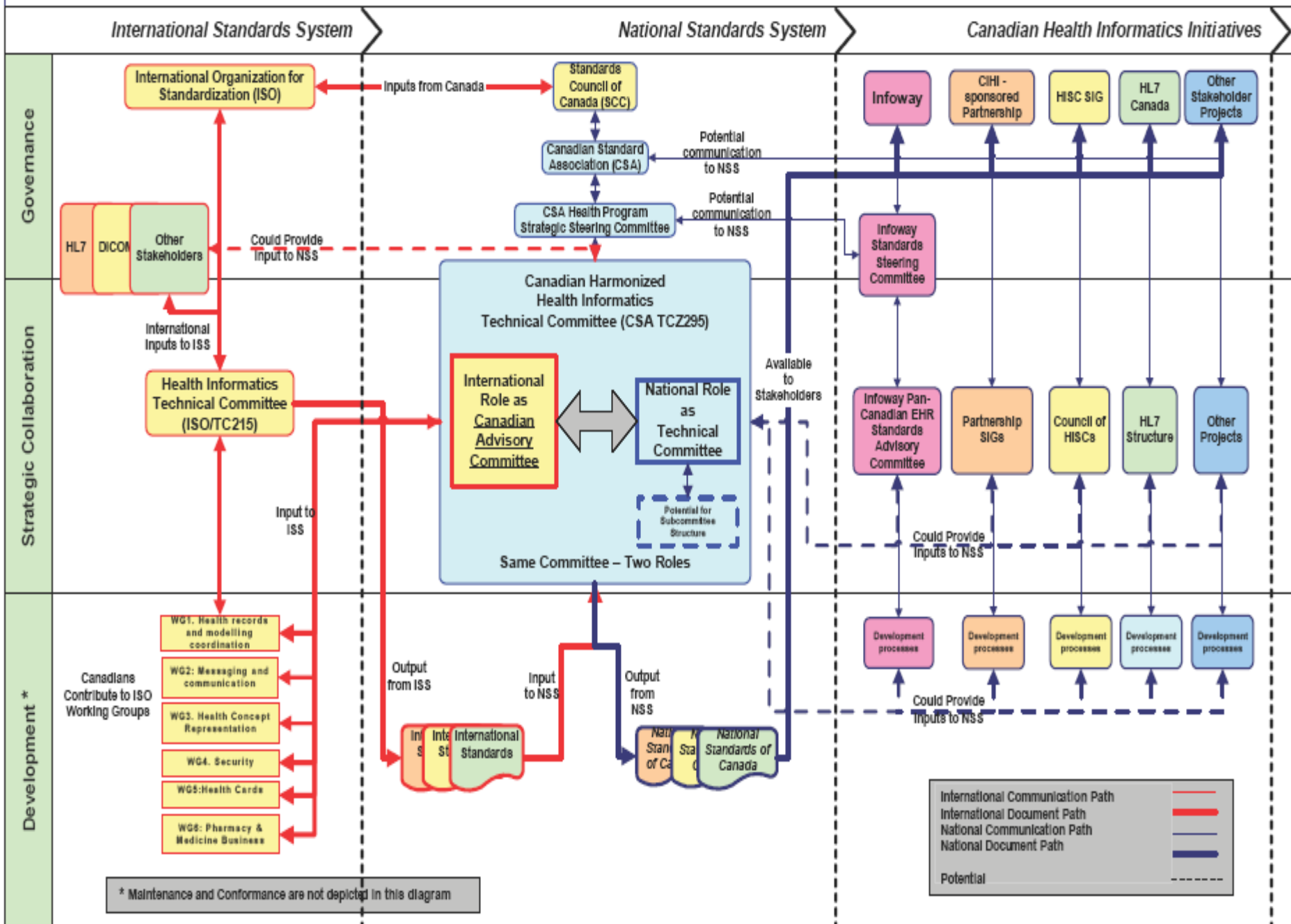
an EHR is

ISO definition

a repository of information regarding the health status of a subject of care in computer processable form, stored and transmitted securely, and accessible by multiple authorised users. It has a standardised or commonly agreed logical information model which is independent of EHR systems. Its primary purpose is the support of continuing, efficient and quality integrated health care and it contains information which is retrospective, concurrent and prospective

an EHR is

Infoway definition

An Electronic Health Record (EHR) provides each individual in Canada with a secure and private lifetime record of their key health history and care within the health system. The record is available electronically to authorized health care providers and the individual anywhere, anytime in support of high quality care.

converging EHR definitions

a repository of information regarding the health status of a subject of care in computer processable form, stored and transmitted securely, and accessible by multiple authorised users. It has a standardised or commonly agreed logical information model which is independent of EHR systems. Its primary purpose is the support of continuing, efficient and quality integrated health care and it contains information which is retrospective, concurrent and prospective

provides each individual in Canada with a secure and private lifetime record of their key health history and care within the health system. The record is available electronically to authorized health care providers and the individual anywhere, anytime in support of high quality care.

- Infoway to converge
- Above not normative

Information Technology

- **Convergence**
  - **Wireless**
  - **Progressive miniaturization**
- **Further integration and interoperability of systems to support integrated care delivery**

Information Networks

Self Care

- **Patients on line between home and health care centre**
  - biggest users of the health system are 50+
  - biggest users of the internet are 50+
  - most searched area of internet is health
- **On line communities of health interest**
- **Virtual assisted living**
  - monitored homes/classrooms
- **Supported by convergence of telephones, computers and T.V.'s**

Increasing Emphasis on Change Management

- **Organizational Development**
- **Cognitive Sciences**
- **Continuing Professional Education**
- **Skill Based Staffing**
- **Cross Cultural Issues**
- **Staff Development Through Training and Education**

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Informatics in Nursing Practice in the Future

- **Bioinformatics**
- **Genomics**
- **Individually Customized Care**
- **Electronic Health Records**
- **Robotics**

Clinical Informatics and Bioinformatics: Similarities

Both

➤ **deal with living systems (that lack straight edges and right angles).**

➤ **concentrate on systems that are:**

  – **inherently uncertain,**

  – **difficult to measure and**

  – **result from complicated interactions among multiple complex components**

Clinical Informatics and Bioinformatics: Differences

Clinical Informatics

- **Management of information related to the delivery of health care**
  - **Human physiology**
  - **Social systems**
  - **Cognitive process of clinical care**

Bioinformatics

- **Management of information related to the underlying basic biological sciences**
  - **Biological systems at the molecular and cellular level**

Initiatives influencing Explosion of Biological Information

- **Human Genome Project**
  - Facilitate the use of DNA sequences in the diagnosis and treatment of disease.
- **Genome Sequencing of other biological organisms**
  - Will facilitate analysis of mechanisms of pathogenicity
  - Analysis of animal models for human disease
- **New Research Methodologies and Technologies**

Implications for Clinical Informatics

- Sequence information for the patient record
- New diagnostic and prognostic information sources
- Ethical Considerations and Dilemmas

Sequence information for the clinical record

- Sequence of a human gene involved in disease may provide the critical information needed to select appropriate treatments or prodcue custom fabricated medications

- Sequence of infectious agents

New diagnostic and prognostic information sources

- Diagnostic tools based on gene sequences within a patient are likely to increase the number and variety of tests available to physicians and will require significant computational assistance to analyze and interpret.

- Genetic information in combination with outcome analysis, over time may provide more precise prognoses

Individualized Patient Care

- **Predictive and Preventive Care**
  - **Predisposition Profiling (genetics, functional genomics)**
- **Disease Monitoring (surrogates, home monitoring devices, portable devices)**
- **Remote Diagnostics; Remote Interventions**
- **Uniquely Customized Drug Selection (medication response profile)**
- **Customized Individual Therapeutic Intervention (Genetic Modification)**
- **Treatment Monitoring (therapeutic response, adherence, disease progression)**

Protocol Support
From
Electronic Health Records

◆ Standing orders sets ⎫ customized to the patient;
◆ Alerts   ⎬ shared; clinician controlled
◆ Information packaging / Presentation
◆ Decision support
   ◆ Guidelines
   ◆ Protocols
   ◆ Best Practices
   ◆ Links to the evidence base

Ethical Considerations and Dilemmas

- **Prediction of disease long before it develops**
  - **Who should have this information**
    - **Employers**
    - **Insurance companies**
    - **Patients**

CNA (2002). Code of Ethics for Registered Nurses
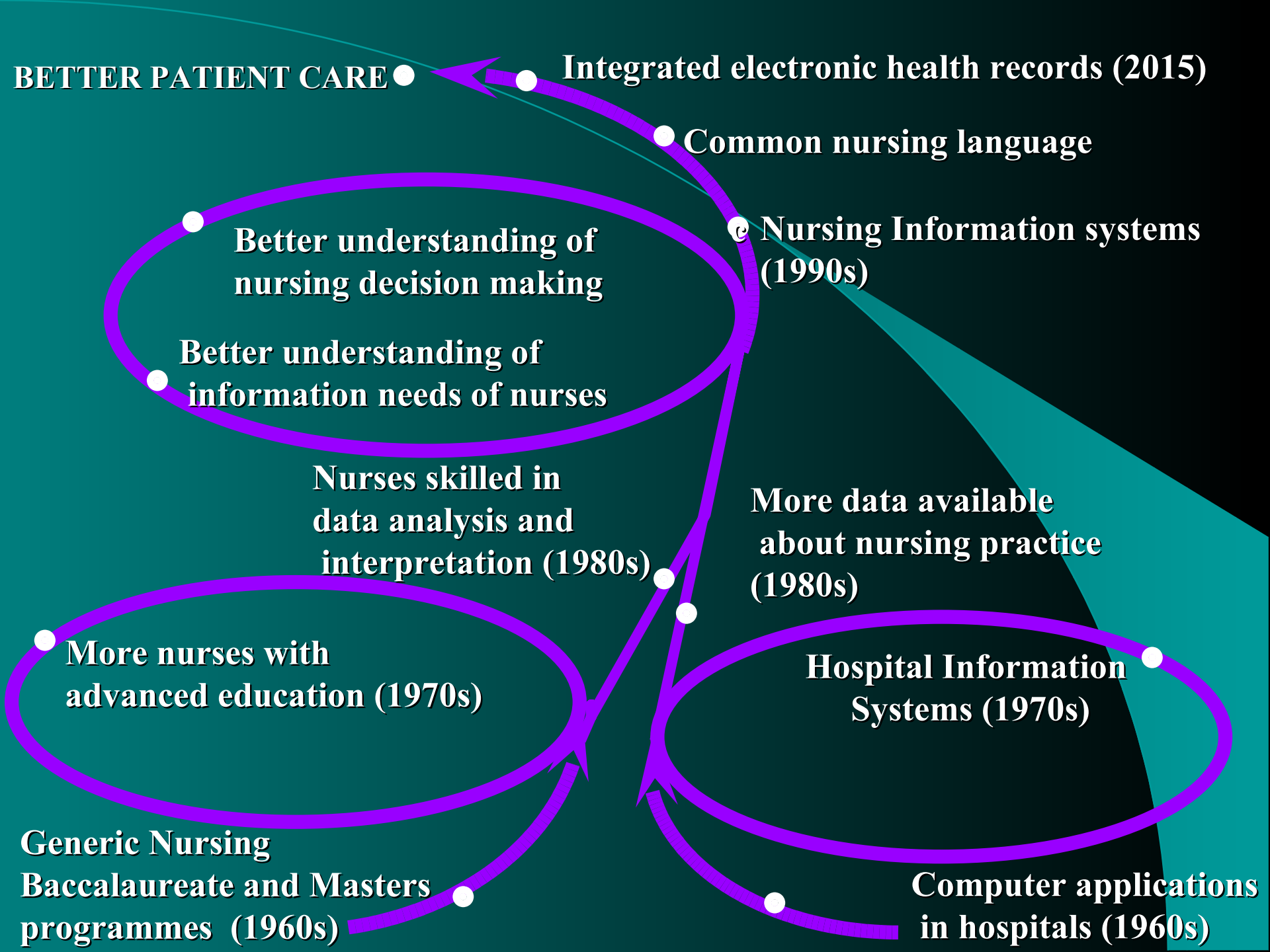
More Information

Hannah, K, Ball, M., Edwards, M. 2005. Introduction to Nursing Informatics 3rd Ed. New York: Springer.

CNA Position Statements:

Evidence-Based Decision-Making and Nursing Practice (2002)
Collecting Data to Reflect the Impact of Nursing Practice (2001)
The Role of the Nurse in Telepractice (2001)
Privacy of Personal Health Information (2001)

Nursing NOW:

Measuring Nurses' Workload (2003)
International Classification for Nursing Practice: Documenting Patient Care and Client Outcomes (2003)
Demystifying the Electronic Health Record (2002)
What is Nursing Informatics and Why is it so Important? (2001)
Telehealth: Great potential or risky terrain? (2000)