NSC 508
FUNDAMENTALS OF NURSING INFORMATICS

COURSE TEAM

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NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE GUIDE

GENERAL INTRODUCTION
Nursing Informatics has evolved over the years to become a very important part of nursing practice. This course is designed for you to recognise your pivotal role as a nurse in the widespread implementation and adoption of digital health technologies throughout the healthcare sector for the primary purpose of improving safety and quality of patient care. The successful planning, implementation, management and sustainability of such technologies cannot be achieved without the unique contribution of nurses. So, I welcome you to this unique course which will help to equip and enhance your knowledge level in the delivery of healthcare service to your patients.

WHAT YOU WILL LEARN IN THIS COURSE
Nurses are expected to provide safe, competent, and compassionate care in an increasingly technical and digital environment. Nursing Informatics combines knowledge and skills from nursing science, computer science, information science, and cognitive science to design and implement automated systems that support the nursing process in the delivery of health care services. This course builds on your previous knowledge on the use of computer, information science in decision making for efficient clinical practice. You will explore the concept and use of informatics in nursing practice and its role in enhancing client care in day-to-day practice as a nurse. You will acquire improved competencies in efficient use of information technology especially as it relates to the use of electronic health records. Students will also examine issues related to the protection of the privacy, confidentiality, and security of information in health care environments and the potential utility of a wide array of social networking tools in communicating health-related information.

COURSE AIM
The aim of this course is to provide you with an overview and basic understanding of how informatics and information technology can be used to improve the delivery of quality patient care.

COURSE OBJECTIVES
At the completion of this course, you will be able to:
Define and describe nursing informatics, information science, and information system.
Explain the need for nursing informatics in the care of patients.
discuss the historical antecedents of nursing informatics.
Discuss theoretical models and framework used in nursing informatics.
explain the relationship between data, information and knowledge.
describe nursing informatics roles, competencies and skills.
identify and describe the specific competencies in nursing informatics; basic computer skills, information literacy and information management.
Explain the available informatics tools and how they apply.
Develop and utilise standardised nursing terminologies.
Apply ethical principles to nursing informatics.
Apply nursing informatics to nursing administration, research, practice and education.

COURSE IMPLEMENTATION
DOING THE COURSE
The course will be delivered adopting the blended learning mode, 70% of online but interactive sessions and 30% of face-to-face during laboratory sessions. You are expected to

register for this course online before you can have access to all the materials and have access to the class session online. You will have hard and soft copies of course materials, you will also have online interactive sessions, face-to-face session with instructors during practical sessions in the laboratory. The interactive online activities will be available to you on the course link on the website of NOUN. There are activities and assignments online for every unit every week. It is important that you visit the course site weekly and do all assignments to meet deadlines and to contribute to the topical issues that would be raised for everyone's contributions.

You will be expected to read every module along with all assigned readings to prepare you to have meaningful contributions to all sessions and to complete all activities. It is important that you contribute to all the online discussion as it will help you to understand the course. You will also be expected to keep a portfolio where you keep all your completed   assignments.

COURSE REQUIREMENTS AND EXPECTATIONS FROM YOU
Attendance of 75%   of all interactive session, prompt submission of all TMA to meet deadlines and attendance of the final course examination
You are expected to:
Be versatile in basic computer skills
Participate in all group discussion/assignments and attend all teaching and practice sessions up to 90%

Submit assignment and group work on schedule
Log in to the class online discussion board at least twice a week and contribute to ongoing discussions up to 80% of times
Contribute actively to group seminar   presentations.

EQUIPMENT AND SOFTWARE NEEDED TO ASSESS THE COURSE
Students will be expected to have the following tools:
A personal computer (laptop or desktop)
Internet access, preferably broadband rather than dial-up access
Personal and functioning e-mail account
MS Office software – Word PROCESSOR, PowerPoint, Spreadsheet
Browser – Preferably Internet Explorer, Mozilla Firefox and Goggle Chrome
Adobe Acrobat Reader 8

COURSE EVALUATION
Students evaluation: The students will be assessed and evaluated based on the following criteria
In-Course Examination:

In line with the university's regulation, in-course examination will come up in the middle of the semester These would come in form of three compulsory Tutor Marked Assignment (TMA's) and three (3). Group Assignments, projects and case studies will constitute 10% of the total mark for the course

Final Examination: The final written examination will come up at the end of the semester comprising essay questions covering all the contents covered in the course. The final examination will amount to 60% of the total grade for the course.

Course Evaluation: This will be done through group review, written assessment of learning on the field; teacher-learner joint review of experiences, community members assessment of contribution/benefit from being part of the course.

GRADE POLICY:
A= 70% and above
B= 60-69
C= 50-59

MODULE 1   INTRODUCTION TO NURSING INFORMATICS

We are in the digital age. What does this mean to us as nurses? The convergence of the telecommunications and computer industry has seen a pervasive increase in how we communicate and process information. Integrated systems support evidence-based nursing practice, facilitate nurses' participation in the health care team, and document nurses' contribution to patient care outcomes. Nurses are major stakeholders in health care and based on their knowledge, they translate data to information, information to knowledge and knowledge to wisdom. For greater achievement in nursing practice, nurses need to desire and adopt innovative means to make their contribution to the patient care process and patient outcome visible. Hence, Nursing Informatics (NI) will brings nursing contributions to health outcomes visible

Module Objective

By the end of this module, you will be able to:

- define and describe nursing informatics, information science, and information system
- discuss the historical antecedents of nursing informatics.

UNIT 1   INTRODUCTION TO INFORMATION SYSTEMS

CONTENTS
1.0   Introduction
2.0   Objectives
3.0   Main content
          3.1   Concept in Nursing Informatics
4.0   Conclusion
5.0   Summary
6.0   Online Discussion and Assignment
7.0   References/Further Reading

1.0   INTRODUCTION
Nursing informatics is a distinct specialty within nursing. With a history dating back 25 years, nursing informatics is defined as "the specialty that integrates nursing science with multiple information and analytical sciences to identify, define, manage, and communicate data, information, knowledge, and wisdom in nursing practice. Nursing informatics supports nurses, consumers, patients, the inter-professional healthcare team, and other stakeholders in their decision making in all roles and settings to achieve desired outcomes.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
   • define the key concepts in nursing informatics
   • describe information science
   • discuss the purpose of nursing informatics.

3.0   MAIN CONTENT

3.1   Information Science
Information science is the science and practice dealing with the effective collection, storage, retrieval, and use of information. It is concerned with recordable information and knowledge, and the technologies and related services that facilitate their management and use. Information Science is a multidisciplinary science that involves aspect from computer science, cognitive science, social science, communication science, and library science to deal with obtaining, gathering, organising, manipulating, managing, storing, retrieving, recapturing, disposing of, distributing, or broadcasting information. Information Science studies everything that deals with information and can be defined as the study of information systems. This science originated as a sub-discipline of computer science, in an attempt to understand and rationalise the management of technology within organisations. It has matured into a major field of management that is increasingly being emphasised as an important area of research in management studies and has expanded to examine the human-computer interaction, interfacing, and interaction of people, information systems, and corporation. It is taught at all major universities and business schools around the world. Organisations have become intensely aware of the fact that information and knowledge are potent resources that must be cultivated and honed to meet their   needs.

In the mid-1980's Blum (1986) introduced the concepts of data, information and knowledge as a framework for understanding clinical information systems and their impact on health care. He did this by classifying the then-current clinical information systems by the three types of objects that these systems processed. These were data, information and   knowledge.

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Source: nursingschoolhub.com
Source: slideshare.net

Thus, information science is the study of information systems, the application and usage of knowledge focuses on why and how technology can be put to best use to serve the information flow within the organisation.

3.2   Nursing Informatics

The term "nursing informatics" was initially seen in literature in the 1980s, including a definition of combining nursing, information, and computer sciences for managing and processing data into knowledge for using in nursing practice (Murphy, 2010). In 1994, The American Nurses Association (ANA) began developing a statement to describe and define the scope of nursing informatics (Baker, 2012). The meaning of nursing informatics has evolved and been refined, with the American Nurses Association (2008) definition stated as "a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice" (p. 65). Another definition of nursing informatics comes from the American Medical Informatics Association (AMIA), which states "Nursing Informatics science and practice integrates nursing, its information and knowledge and their management, with information and communication technologies to promote the health of people, families and communities worldwide" (2009, para. 1).

Nursing Informatics (NI) has also been defined as a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice. NI supports consumers, patients, nurses, and other providers in their decision making in all roles and settings. This support is accomplished using information structures, information processes, and information technology.

Sources: css.edu

Staggers and Thompson (2002) believed that there were too many definitions for NI, which was causing the specialty to grow without a solid foundation. They believed that without this foundation it was difficult to build a solid informatics practice or the needed educational base for this specialty practice. Staggers and Thompson performed a critical analysis of the definitions, which resulted in a new definition. The new definition is as follows:

The goal of NI is to improve the health of populations, communities, families, and individuals by optimizing information management and communication. These activities include the design and use of informatics solutions and/or technology to support all areas of nursing, including, but not limited to, the direct provision of care, establishing effective administrative systems, designing useful decision support systems, managing and delivering educational experiences, enhancing supporting life-long learning, and supporting nursing research. The term individuals refer to patients, healthcare consumers and any other recipient of nursing care or informatics solutions. The term patient refers to consumers in both a wellness and illness model.

Source: healthinformatics.uic.edu

The definition and goal of NI is based upon work by Staggers and Thompson (2002) and evolved in this version to include the concept of wisdom. Otherwise, the NI definition is essentially synonymous with the 2001 Scope and Standards document.

NI is one example of a discipline-specific informatics practice within the broader category of health informatics. NI has become well established within nursing since its recognition as a

specialty for registered nurses by the American Nurses Association (ANA) in 1992. It focuses on the representation of nursing data, information, knowledge (Graves and Corcoran, 1989) and wisdom (Nelson, 1989; Nelson, 2002) as well as the management and communication of nursing information within the broader context of health informatics.

3.3   Why nursing informatics?
(1) provides a nursing perspective
(2) illuminates nursing values and beliefs
(3) denotes a practice base for nurses in health informatics
(4) produces unique knowledge
(5) distinguishes groups of practitioners,
(6) focuses on the phenomena of interest for nursing, and
(7) provides needed nursing language and word context (Brennan, 2003) to health informatics.

4.0 CONCLUSION

The convergence of the telecommunications and computer industry has seen a pervasive increase in how we communicate and process information. Integrated systems support evidence-based nursing practice, facilitate nurses' participation in the health care team, and document nurses' contribution to patient care outcomes. Nurses are major stakeholders in health care and based on their knowledge, they translate data to information, information to knowledge and knowledge to wisdom. For greater achievement in nursing practice, nurses need to desire and adopt innovative means to make their contribution to the patient care process and patient outcome visible.

5.0 SUMMARY
In this unit, you have learnt about the following:
Information science and nursing informatics

6.0 TUTOR-MARKED ASIGNMENT
Discuss the three concepts of clinical information system as espoused by Blum?

7.0 REFERENCES/FURTHER READING
American Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.

Baker, J. (2012). Nursing informatics. Perioperative Nursing Clinics, 7, 151-160.

Kaminski, J. (Fall, 2010). Theory applied to informatics – Novice to Expert. *CJNI: Canadian Journal of Nursing Informatics, 5* (4), Editorial. http://cjni.net/journal/?p=967

McGonigle D., & Mastrian K (2009). Nursing Informatics and the foundation of knowledge USA: Delma Publishers.

UNIT 2: HISTORICAL ANTECEDENTS OF NURSING INFORMATICS

CONTENTS
1.0   Introduction
2.0   Objectives
3.0   Main content
        3.1   History of Nursing Informatics
4.0   Conclusion
5.0   Summary
6.0   Online discussion and assignment
7.0   References/Further Reading

1.0   INTRODUCTION
Consider the following scenario. You have just been hired by a large healthcare facility. You enter the personnel office and are told you will have to learn a new language in order to work on the unit where you have been assigned. This language is just used on this unit. If you had been assigned to a different unit, you would have to learn another language that is specific to that unit, and so on. Therefore, interdepartmental sharing and information exchange (known as interoperability) is severely hindered.

Information and information technology have become major resources for organisations, and health care is no exception. Information technology help to shape the healthcare organisation, in conjunction with the personnel or people, money, materials, and equipment. Many healthcare facilities have hired Chief Information Officers (CIOs) or Chief Technical Officers (CTOs), also, known as Chief Technology Officers (CTOs). The CIO is involved with the information technology infrastructure and this role is sometimes expanded to chief knowledge officer. The CTO if focused on organisationally based scientific and technical issues and is responsible for technological research and development as part of the organisation's products and services. The CTO and CIO must be visionary leaders for the organisation since so much of the business of health care relies on solid infrastructures that generate potent and timely information and knowledge. The CTO and CIO are sometimes interchangeable positions. However, in some organisation, the CTO reports to the CIO. These positions will become paramount as companies continues to shift from being product-oriented to knowledge-oriented and as they begin emphasising the production process itself rather than the product. In healthcare, information system must be able to handle the volume of data and information necessary to generate the needed information and knowledge for best practice, the basis of our actions, since our goal is to provide the highest quality of patient care.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
   • describe the history of nursing informatics
   • explain the different definitional concepts of nursing informatics.

3.0   MAIN CONTENT
3.1   History of Nursing Informatics
In order to understand NI, one must understand its history, health care began to use computers in the 1950s. Computers in this era were typically used in the business office (Saba & McCormick, 2006). In the 1970s, nursing began to realise the importance of computers to the nursing profession and became involved in the design, purchase, and purchase of information systems (Saba & McCormick). In the 1980s, medical and nursing informatics specialties

emerged. The personal computer was introduced, which allowed for flexibility in how these clinical systems were used. It also brought to everyone's attention that not just NI specialist, but all healthcare personnel, would need to know about these systems. The first certification for NI was taken in 1995. The post-2000 era saw an unprecedented explosion in the number and sophistication of both computer hardware and software. Electronic patient recorded became an integral part of clinical information systems. Telemedicine became possible and was recognised as a specialty in the late 1990s. NI has experienced rapid growth in the last b40 years, and it does not appear to be slowing. It will be interesting to see what will happen over the next 40 years.

Nursing informatics as a field emerged from the overarching discipline of health informatics and alongside the expanding field of medical informatics. At present, it is a field of study which is still developing and is based on the concept that health care data and information can be effectively managed and communicated using computer systems, networks, modems and telecommunications.

Informatics is modelled after the French word *informatique* and was first used as medical informatics in the late 1970s, followed by use in nursing in the 1980s. The ANA designated nursing informatics as a specialty practice in 1992, although nurses had earlier incorporated informatics concepts. Subsequently, volunteer ANA members have developed a scope and standards for practice, which serves as guides for the practice, which serve as guides for the practice.

3.2   Evolution of Nursing Informatics

A review of definitions of nursing informatics by Staggers and Bagley-Thompson (2002) categorised the definition into three themes: Information technology-oriented, conceptually oriented and role oriented definitions. An early definition by Scholes and Barber (1980) stated that nursing informatics was "the application of computer technology to all fields of nursing— nursing service, nurse education, and nursing research." Ball and Hannah (1985) modified an early definition of medical informatics, acknowledging that all health care professionals are part of medical informatics. The use of information technologies in relation to those functions within the purview of nursing, and that are carried out by nurses when performing their duties. Therefore, 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.

The emphasis on technology is not limited to early definitions. More recently, Hannah et al. and Saba and McCormick continue to stress the role of technology in nursing informatics as it supports the functions of nursing. Hannah et al. continued with their original definition for nursing informatics, and Saba and McCormick provided this new definition:

The use of technology and/or a computer system to collect, store, process, display, retrieve, and communicate timely data and information in and across health care facilities that administer nursing services and resources, manage the delivery of patient and nursing care, link research resources and findings to nursing practice, and apply educational resources to nursing education.

The information technology-oriented view of nursing informatics may be critiqued for overstating the role of technology and underemphasising the need for the informatics nurse specialist to support the cognitive interaction between the nurse, the nursing process, nursing

data, patients and the technology. This do not easily suggest the informatics functions a nurse might assume in a health care organisation apart from the nurse's role in patient care. Specifically, informatics theories, principles, methods, and tools are not evident. These activities include, in part, needs analysis, requirements determination, structured system analysis, design, selection, implementation, and evaluation.

3.3   Conceptually Oriented Definitions
A shift from technology-focused definitions to more conceptually oriented definitions began during the mid-1980s. Schwirian moved away from technology and stressed the need for a "solid foundation of nursing informatics knowledge [that] should have focus, direction, and cumulative properties." She emphasised the need for informatics research to be "proactive and model-driven rather than reactive and problem-driven. "Her research model outlined a pyramid of users, nursing-related information, goals, and computers (hardware and software) interconnected with bidirectional arrows.

Graves and Corcoran provided the first widely cited definition downplaying the role of technology and incorporating a more conceptually oriented viewpoint:
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.

This definition broadened the horizon from technology and placed nursing informatics firmly within the practice of nursing. It also provided the first acknowledgement in nursing of an information-knowledge link, using concepts borrowed from Blois, and provided the foundation for Graves' work in knowledge building in the Sigma Theta Tau library.

Graves and Corcoran discussed the need to understand "how clinical nurses structure clinical problems and how they ask questions of the information system." These views drew researchers involved in the study of decision making under the rubric of nursing informatics. In addition, these views accented the need to consider the clinical decision-making process in the design of information systems. With an understanding of how captured data are used in decision making, designers can create systems that better meet the needs of nurses during their clinical decision-making processes. Graves and Corcoran's definition allowed a concentration on the purpose of technology rather than on the technology itself. Their transformation of the definition of nursing informatics changed the focus from technology to information concepts by expressly incorporating information science.

Graves and Corcoran's emphasis on nursing data, information, and knowledge was a novel change in direction in the late 1980s, and others immediately adopted the definition. One reason for the extensive acceptance of this new approach may have been that managing information (i.e., data, information, and knowledge processing) is at the core of nursing practice with or without technology. Therefore, the heart of the Graves and Corcoran definition[4] resonated with practitioners, and an immediate connection was established between nursing practice and nursing informatics. The centrality of nursing practice in the Graves and Corcoran definition also supported the need for nursing informatics as a distinct specialty within health informatics. Although informatics nurse specialists use many of the same tools and processes as practitioners in other areas of informatics, the data, information, and knowledge have elements unique to nursing.

Turley analyzed previous nursing informatics definitions and then proposed a new nursing informatics model. Although he did not propose a new definition[1] in this paper, by focusing on model development, he continued a conceptual approach to the definition of nursing informatics.

Turley's major "contribution was the addition of cognitive science to a model comprising the original three sciences proposed by Graves and Corcoran. Cognitive science includes such topics as memory, problem-solving, mental models, skill acquisition, language processing, and visual attention. These concepts can help informatics nurse specialists understand the decision-making and information processing done by nurses and, subsequently, assist in the creation of appropriate tools to support nursing processes. Therefore, cognitive science is most helpful to informatics nurse specialists concentrating on informatics issues related to users, such as decision making and the construction of computer interfaces   for nurses.

3.4   Role-oriented Definitions
As nursing informatics gained recognition as a nursing specialty, the Council of Computer Applications in Nursing, of the American Nurses Association (ANA), provided a new definition for the field. The ANA expanded the previous definitions by incorporating the role of the informatics nurse specialist into the earlier Graves and Corcoran definition:
A specialty that integrates nursing science, computer science, and information science in identifying, collecting, processing, and managing data and information to support nursing practice, administration, education, and research and to expand nursing knowledge. The purpose of nursing informatics is to analyze information requirements; design, implement and evaluate information systems and data structures that support nursing; and identify and apply computer technologies for nursing.

In 1994, the ANA modified their definition in an effort to legitimize the specialty and guide efforts to create a certification examination:
Nursing informatics is the specialty that integrates nursing science, computer science, and information science in identifying, collecting, processing, and managing data and information to support nursing practice, administration, education, research, and expansion of nursing knowledge. It supports the practice of all nursing specialties, in all sites and settings, whether at the basic or advanced level. The practice includes the development of applications, tools, processes, and structures that assist nurses with the management of data in taking care of patients or in supporting their practice of nursing.

Although the 1994 ANA definition continued to provide information on the role of the informatics nurse specialist, the concepts from the systems life cycle were replaced with a more generic discussion of the role of the informatics   nurse specialist.

4.0   CONCLUSION
Nursing informatics attempts to manage the explosion of ever increasing medical information by managing and communicating information in order to promote knowledge in nursing practice for quality care. The ultimate goal of nursing informatics is to use technology to bring critical information to the point of care to increase efficiency and make healthcare safer and more effective.

5.0   SUMMARY
In this unit, you should have learned:
History and evolution of nursing informatics.

Conceptually and role definition of nursing informatics.

6.0   ONLINE DISCUSSION AND ASSIGNMENT
What is the historical evolution of nursing informatics?
Briefly explain the different definitions of Nursing Informatics.

7.0 REFERENCES/FURTHER READING
American   Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.

American Nurses Association (ANA). (2010). Recognition of a nursing specialty, approval of a specialty nursing scope of practice statement, and acknowledgement of specialty nursing standards   of   practice.   Retrieved   December   20,   2019,   from http://www.nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/NursingStandards/3-SBooklet.aspx

American Medical Informatics Association. (2009). Nursing informatics. Retrieved December 20, 2019, from http://www.amia.org/programs/working-groups/nursing-informatics

Ball MJ, Hannah KJ. Using computers in nursing. Reston, Va.: Reston Publishing, 1984.

Baker, J. (2012). Nursing informatics. Perioperative Nursing Clinics, 7, 151-160.

MODULE 2: PERSPECTIVES ON NURSING INFORMATICS
The healthcare delivery environment is dramatically changing, and nursing has found itself in the midst of these revolutionary changes. Health care providers are expected to be able to provide safe, competent care in a highly technical and digital environment. Today's nursing requires nurses to be constantly aware of new developments. Nursing is increasingly becoming as "high tech" as it is a "high touch" profession. Today's nurses have more technology at their disposal than any nurses ever before, and as one might expect, it's considerably improving patient care.

One area where nurses are putting technology to use is in informatics. Officially known as the study of information, in the world of health care, health informatics is the management of health information. Nursing information includes data collected by nurses; data used by nurses; data about nursing activity; and data about the nursing resource.

Module Objectives
By the end of this module, you will be able to:
    i.   describe the theoretical models in nursing informatics
    ii.   explain the relationship between data, information and knowledge.

UNIT 1:   CONCEPTS, THEORETICAL MODELS AND FRAMEWORKS IN NURSING INFORMATICS

CONTENTS

1.0   INTRODUCTION
Nursing in acute-care settings has grown so complex that it is no longer possible to standardise, routinize, and delegate much of what the nurse does. Increased acuity levels of patients decreased length of hospitalization, and the proliferation of health care technology and specialization have increased the need for highly experienced nurses. The complexity and responsibility of nursing practice today requires long-term and ongoing career development. This, in turn, requires an understanding of the differences between the experienced nurse and the novice.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
- describe the theoretical models in nursing informatics
- explain the distinguishing features
- describe the levels of Novice to Expert theory.

3.0   MAIN CONTENT
3.1   Theoretical model
The Novice   to Expert Theory, a construct theory first proposed by Hubert and Stuart Dreyfus (1980) as the Dreyfus Model of Skill Acquisition, and later applied and modified to nursing by Patricia Benner (1984) provides a very useful and important theory that clearly applies to nursing informatics.

Source: cjni.net

Within   the field of nursing informatics, this theory can be applied to:
the development of nursing informatics skills, competencies, knowledge and expertise in nursing informatics specialists;
the development of technological system competencies in practising nurses working in an institution;
the education of nursing students, from first year to graduation and;
the transition from graduate nurse to expert nurse.

The currently accepted five levels of development within the Novice to Expert theoretical model are illustrated in the image above, as presented by Benner (1984). They start from the bottom rung at the Novice level and move upward through Advanced Beginner, Competent, Proficient, and Expert levels. Dreyfus and Dreyfus (1980) initially proposed the stages of Novice, Competent, Proficient, Expertise and Mastery. In both configurations, each level builds on the level before it as the learner advances from a neophyte level then gains knowledge, skills, perceptions, intuition, wisdom and most important of all, experience in their given field   of practice.

3.2   Distinguishing features
Both Dreyfus   and Dreyfus and Benner estimated that it takes approximately five years to move through the five stages from novice to expert but also elaborated that not all novices become experts. Some people get 'stuck' at the competent or proficient stages. Two personal characteristics that distinguish the successful evolution to the expert level seem to be deliberate practice and the willingness to take risks, to go beyond the 'norm'.

Deliberate practice is a trait shown by people who use a personal, goal-oriented approach to skill and knowledge development – they devote themselves to engage in progressively higher, and ultimately expert performance. This requires years of sustained effort to continually improve the quality of their practice and performance within the skill – in this case, in nursing informatics skills. They feel personal satisfaction in confronting challenges to achieve a high standard of excellence within their field. They are not content to acquire merely functional and rudimentary skill levels – they want to shine and join the ranks of the experts in the field.

Taking Risks – This continuous climb to the expert level is not without perceived 'risks' – it requires people to move beyond the status quo of mere competence through the levels of Proficiency, then Expertise. This is a quality often seen in Super Users and Champions within the nursing informatics arena. To move to this level, many different perspectives must be digested, and the zone of comfort can become threatening. Many people do not like to stand out from the rest, so do not risk the possibility of being perceived as different or peculiar – nor do they want to be regarded as thinking that they excel above their peers. Yet, the true expert must take this risk and continue to move up the ladder of skill and knowledge acquisition despite potential conflict within the nursing workplace.

Some common themes are evident as a person successfully progresses through the novice to expert levels:

As progression occurs, the person tends to move away from relying on rules and explicit knowledge to learning to trust and follow their intuition and pattern matching.
Better cognitive filtering occurs, where problems are no longer a huge confusing collection of data but instead become a complete and unique whole where some bits are much more relevant than others.
The person also moves from being a detached observer of a problem to an involved part of the system itself, accepting responsibility for results, not just for carrying out   tasks.

3.3   Novice to Expert level
The level of skill acquired have some distinguishing behaviour and features peculiar to each of the levels in Novice to Expert theory (Frisoli, 2007). These are enumerated below:

Novice
A novice   does not know anything about the subject he/she is approaching and has to memorize its context-free features. The novice is then given rules for determining an action on the basis of these features. To improve, the novice needs monitoring, either by self-observation or instructional feedback. For example, a nurse learning to use a new hospital information system needs explicit instruction and 'rules' to learn to use the computer interface and manipulate the software.

Advanced Beginner
An advanced   beginner is still dependent on rules, but as s/he gains more experience with real-life situations, s/he begins to notice additional aspects that can be applied to related conditions.

Competent
At this stage, the competent person grasps all the relevant rules and facts of the field and is, for the first time, able to bring his/her own judgment to each case. This is the stage of learning that is often characterized by the term "problem-solving." A competent level nurse would be able to use a hospital information system with ease and know-how to solve technical difficulties or interpret conflicting data.

Proficient
The   fourth stage is called fluency and is characterized by the progress of the learner from the step-by-step analysis and solving of the situation to the holistic perception of the entirety of the situation. The proficient hospital information system learner would know how to interpret data

from all departmental information and provide guidance to other disciplinary members as needed.

Expert
An expert's repertoire of experienced situations is so vast that normally each specific situation immediately dictates an intuitively appropriate action. After a great deal of experience actually using a system in everyday situations, the expert nurse discovers that without his consciously using any rules, situations simply elicit from him or her appropriate responses. The proficient performer, immersed in the world of his skilful activity, sees what needs to be done, and decides how to do it. The expert not only knows what needs to be achieved, thanks to the well-refined ability to exercise situational discrimination, s/he knows how to achieve his or her goal.

4.0   CONCLUSION
The novice to expert theory can be used as a predetermined clinical guideline for conducting all practices associated with nursing career. The model/theory is highly important to the practice of nursing for better service and care giving to patients.

5.0   SUMMARY
In this unit, you have learnt:
1.   Novice to Expert theory and areas where it can be applied.
2.   The distinguishing features of novice to expert theory.
3.   The five level of the Novice to Expert theory.

6.0   ONLINE DISCUSSION AND ASSIGNMENT
Describe the Novice to Expert theory and their distinguishing features?
Enumerate the Novice to Expert levels?

7.0   REFERENCES/FURTHER READING
American Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.
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UNIT 2: RELATIONSHIP BETWEEN DATA, INFORMATION AND KNOWLEDGE

CONTENTS

1.0   INTRODUCTION
Data, information and knowledge are key components of nursing informatics and helps in understanding clinical information systems and their impact on health care. Patient safety is a primary concern of any health care provider, and nurses are often on the front lines of ensuring that their patients are kept safe and preventing medication errors, misdiagnoses, falls, and other problems. Nursing informatics provides important data that can prevent these errors; for example, an electronic record can provide information about a possible dangerous medication interaction or allergy that might not otherwise be immediately apparent. Armed with data, which translate into information and knowledge for nurses can make quick decisions that would keep patients   safe.

2.0   Learning Objective
By the end of this unit, you will be able to:
- discuss what data, information and knowledge is in relation to nursing care
- describe the relationship between data, information and knowledge.

3.0   MAIN CONTENT
3.1   Data, Information and Knowledge
In 1986 Blum introduced the concepts of data, information and knowledge as a framework for understanding clinical information systems and their impact on health care. He did this by classifying the then current clinical information systems by the three types of objects that these systems processed. These were data, information and knowledge.

In 1989, Graves and Corcoran built on this work when they published their seminal work that described the study of nursing informatics using the concepts of data, information and knowledge. The article contributed two broad principles to NI that will be acknowledged here. The first contribution was a definition of nursing informatics (NI) that has been widely accepted in the field.

The second contribution of Graves and Corcoran (1989) was an information model that identified data, information, and knowledge as key components of NI practice. The Graves model is presented in figure below.

Grave's Model: source: Electronic Health Technologies – WordPress.com
Graves and Corcoran (1989) and the American Nurses Association (ANA) have similar definition of the concept of data, information and knowledge and believed that they are key components of NI practice.

Figure below   builds on the work of Graves and Corcoran by providing a depiction of the relationship of data, information, and knowledge. As data are transformed into information and information into knowledge, each level increases in complexity and requires greater application of human   intellect.
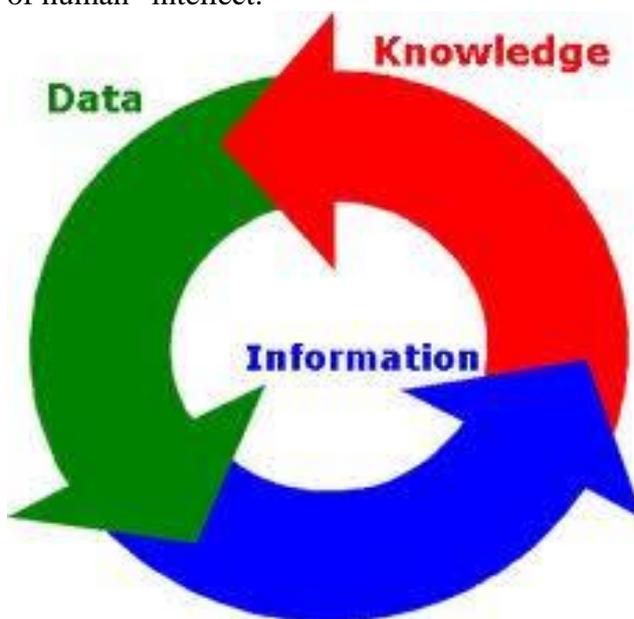
Data are   discrete entities that are described objectively without interpretation,
Information is data that are interpreted, organised, or structured, and knowledge is information that is synthesized so that relationships are identified and formalized.

Data, which are   processed to information and then knowledge, may be obtained from individuals, families, communities, and populations. Data, information, and knowledge are of concern to nurses in all areas of practice. For example, data derived from direct care of an individual may then be compiled across persons and aggregated for decision-making by nurses, nurse administrators, or other health professionals. Further aggregation may address communities and populations. Nurse-educators may create case studies using these data, and nurse-researchers may access aggregated data for systematic study.

As an example, an instance of vital signs for an individual—heart rate, respiration, temperature, and blood pressure—can be considered (a set of) data. A serial set of vital signs taken over time, placed into a context, and used for longitudinal comparisons is considered information. That is, a dropping blood pressure, increased heart rate, respiratory rate, and fever in an elderly, catheterized person are recognised as being abnormal for this person. The recognition that the person may be septic and, therefore may need certain nursing interventions reflects information synthesis (knowledge) based on nursing knowledge and   experience.

4.0   CONCLUSION
Data – uninterpreted   items, often referred to as data elements. An example might be a person's weight. Without additional data elements such as height, age, overall well-being it would be impossible to interpret the significance of an individual number.

Information – a group of data elements that have been organised and processed so that one can interpret the significance of the data elements. For example, height, weight, age, and gender are data elements that can be used to calculate the BMI. The BMI can be used to determine if the individual is underweight, overweight, normal weight or obese.

Knowledge is built on a formalization of the relationships and interrelationships between data and information. A knowledge base makes it possible to understand that an individual may have a calculated BMI that is over 30 and not be obese. At this time, several automated decision support systems included a knowledge base and a set of rules for applying the knowledge base in a specific situation. For example, the knowledge base may include the following information. A fever or elevated temperature often begins with a chill. At the beginning of the chill the patient's temperature may be normal or even sub-normal but in 30 minutes it is likely the patient will have spiked a temp. A rule might read: if a patient complains of chills, then take the patient's temperature and repeat   in 30 minutes.

5.0   SUMMARY
In this unit, you have learnt about the following:
What data, information and knowledge is in relation to nursing informatics
The relationship between data, information, and knowledge in nursing informatics

6.0   ONLINE DISCUSSION AND ASSIGNMENT
Explain each of the following in relation to Nursing Informatics:
Data
Information
Knowledge.

7.0   REFERENCES/FURTHER READING
Beauchamp, T. L., & Childress, J. F. (1994). Principles of biomedical ethics (4th ed.). New York, NY: Oxford University Press.
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Dreyfus, H. & Dreyfus, S. (1986). *Mind over machine: the power of human intuition and expertise in the age of the computer.* Oxford: Basil and Blackwell.

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MODULE 3: USES AND COMPETENCIES IN NURSING INFORMATICS
The nursing informatics competencies means that nurses have adequate computer literacy and information management skills (McGonigle & Mastrian, 2012). For example, knowing how to use e-mail, manage Windows applications, search databases, and the ability to operate institution specific nursing software used for charting and medication administration are all part of informatics competencies (Barton, 2005). However, not all nurses possess adequate skills. Patients' health outcomes are at risk when health care providers do not possess the technologic skills required for work environment (Dufault et al., 2010). Therefore, it is extremely important to identify the nurses' informatics skills toward the technologies that facilitate information processing, communication and its exchange.

Module objectives
By the end of this module, you will be able to:
i.　　　Identify and describe various competencies of nursing informatics
ii.　　Explain the available informatics tools and how they apply
iii.　Discuss nursing aspects of health information systems.

UNIT 1:　　NURSING INFORMATION COMPETENCIES

CONTENTS
1.0　　Introduction
2.0　　Intended Learning Outcomes
3.0　　Main Content
　　　　3.1　　Nursing informatics competencies
　　　　3.2　　Beginner, entry or user level competencies
　　　　3.3　　Intermediate or modifier level of competencies
　　　　3.4　　Advanced or innovator level of competencies
4.0　　Conclusion
5.0　　Summary
6.0　　Online discussion and assignment
7.0　　References/further reading materials

1.0　　INTRODUCTION
Nurses are expected to provide safe, competent, and compassionate care in an increasingly technical and digital environment. A major theme in this new healthcare environment is the use of information systems and technologies to improve the quality and safety of patient care. Nurses are directly engaged with information systems and technologies as the foundation for evidence-based practice, clinical-decision support tools, and the electronic health record (EHR).

2.0　　INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
- identify and describe various competencies of nursing informatics
- explain the meaning of nursing informatics competencies.

3.0　　MAIN CONTENT
3.1　　Nursing informatics competencies
Several emerging taxonomies for describing nursing informatics competencies have been discussed in the literature. Most focus on a three tiered system which equate to:
- Beginner, entry or user level
- Intermediate or modifier level and
- Advanced or innovator level of competency.

Source: flickr.com

With the advent of computer technology use in nursing, the need for data to be analysed and interpreted to become usable information in practice escalates with each passing year. In order to work with data, process information and derive knowledge, nurses must be able to apply nursing informatics to their practice. Therefore, informatics competencies need to be developed in all three level of expertise through basic and continuing nursing education programs. Each of the three level competency level includes both knowledge and skill required to:
Use information and communication technologies to enter, retrieve and manipulate data;
Interpret and organise data into information to affect nursing practice; and
Combine information to contribute to knowledge development in nursing.

3.2 Beginners, entry or user level competencies
A "User" level of competency indicates nurses who demonstrate core nursing informatics competencies. This level includes practicing nurses, nurse administration, nurse researchers, and educators.in most taxonomy, this is the basic level that all nurses should minimally demonstrate, no matter what area of practice he or she works in. even user level competencies include technical, utility and leadership related skills and knowledge. The competencies required by nurses in the workplace are categorised in a number of ways in the literature. Although different language is used to describe these competencies, the key concepts and categorises are quite similar across taxonomies. All proposed frameworks include competencies that describe:
The use of information and communication technology (Technical competencies)'
The use of automated information in a professional context (utility competencies)'
Decision-making with respect to planning for and using both the technology and information (leadership competencies)

Source: nursing-informatics.com

Technical Competencies
Kaminski (2011) described the User level technical competencies to include the ability of the nurse to:
Use word processing applications
Demonstrate keyboard skills
Use spread sheet applications
Use telecommunication devices to communicate with other systems
Uses e-mail systems to communicate with other health care professionals
Use presentation application to create slides, displays, over heads (PowerPoint, Corel Presentations, etc.).
Use multimedia presentations
Use internet resources to locate client support group, online resources
Use sources of data that relates to nursing practice and care
Access, enter and retrieve data related to client care via available hospital or nursing information systems

Uses database management programs to develop and access database and tables
Uses database applications to enter and retrieve data and information
Conduct online and database literature searches
Use decision support systems, expert systems and other aids for clinical decision making and care planning
Use computer applications to document client care
Use computer applications to plan client care, including discharge planning
Utility Competencies

The User level utility competencies were further explained by Kaminski to include the ability of the nurse to:
Recognise the relevance of nursing data for improving practice
Recognise the limitation of computer applications

Recognise need for continual learning in informatics skills, applications and knowledge
Recognise the nature of computer – human interfaces and assesses impact on client care
Understand the basic process of using networks for electronic communication
Recognise the basic components of computer systems.

Leadership Competencies
User level leadership competencies include the ability of the nurse to;
Use computerized management systems to record administrative data (billing data, quality assurance data, workload data, etc.).
Use applications for structure data entry (classification systems, acuity level, etc).
Understand client rights related to computerized information
Recognise the utility of nurse involvement in the planning, design, choice and implementation of information systems in the practice environment.
Incorporate a Code of Ethics in regard to client privacy and confidentiality.

3.2   Intermediate or modifier level competencies
A "Modifier" level of competency indicates nurses who demonstrate intermediate nursing informatics competencies. This level includes practicing nurses, nursing administration, nurse researchers and educators who have mastered basic skills and use technology in inventive ways in their practice.

Technical Competencies
Modifier level technical competencies involve the ability of the nurse to:
applies technology support to provide evidenced based practice synthesizes data from more than one source and applies to practice demonstrates awareness of and ability to access data and information from multiple sources uses decision support systems in practice accesses pertinent literature resources and incorporates into practice and professional development creates and accesses research and other documents electronically.

Utility Competencies
Modifier level utility competencies involve the ability of the nurse to:
understands basic and complex concepts and processes of various computer systems and how they relate to practice synthesizes data from more than one source and applies to practice accesses and utilises multiple information sources for gathering evidence for clinical decision making upholds ethical standards related to data security, confidentiality and clients' right to privacy evaluates internet based nursing and health materials for quality, accountability, reliability and validity coordinates information flow with multidisciplinary team using information systems analyzes client information needs, accesses technology resources to meet needs and evaluate effectiveness

Source: ohoud-alosais.blogspot.com

Leadership Competencies
Modifier level leadership competencies involve the ability of the nurse to:
awareness   of role of nursing informatics in the context of health informatics and information systems participates in policy and procedural development related to nursing informatics participates in system change processes and utility analysis participates in evaluation of information systems in practice settings analyzes ergonomic integrity of workstation, bedside and portable technology apparatus in practice participates in design of data collection tools for practice decision making and record keeping participates in quality management initiatives related to patient and nursing data in practice awareness of the impact of implementing technology to facilitate nursing practice evaluates security effectiveness and parameters of system for protecting client information and ensuring confidentiality participates in change to improve the use of informatics within nursing practice encourages other nurses to develop comfort and competency in technology use in   practice.

3.4   Advanced or Innovator level competencies
An "Innovator" level of competency indicates nurses who demonstrate advanced and specialized nursing informatics competencies. This level includes practicing nurses, nursing administration, nurse researchers and educators who have mastered expert skills and use technology in design, plan and coordinate the use of technologies and informatics theory in nursing.

Technical Competencies
Advanced level technical competencies involve the ability of the nurse to:
* participates in the design and development of information systems for nursing practice
* develops inventive ways to access data and interact with information systems
* participates in the design and develop design and development of new applications for nursing practice
* participates in developing new methods for data and information organisation
* collaborates with information technology consultants and other members of information system development team
* collaborates, negotiates with and directs information technology vendors
* proficiency in diverse computer application programs

- manipulates and enhances nursing data sets
- organises and directs applications of shared data sets
- develops data gathering tools and processes for literature search access for nurses
- develop charting and documentation templates for use in nursing practice
- design and development of evidenced based practice documentation and processing within practice area
- designs applications (apps) for mobile   devices

Utility Competencies
Advanced level utility competencies involve the ability of the nurse to:
- participates in   needs assessment, system selection, implementation and maintenance of information systems for practice.
- recognises factors and issues related to human-computer interface interactions
- ensures inclusion of nursing data and information in the design of planned information systems
- independently seeks learning initiatives to stay abreast of technological developments
- synthesizes data and information for knowledge generation within practice
- understands and helps to determine data structures used to organise patient information.

Leadership Competencies
Advanced level leadership competencies involve the ability of the nurse to:
- develops and   participates in quality assurance programs using information systems
- participates in patient instructional program development
- participates in ergonomic design of work stations, bed side access stations and portable apparatus equipment
- awareness of societal and technological trends, issues and new developments and applies these to nursing
- demonstrates proficient awareness of legal and ethical issues related to client data, information, confidentiality
- design and implement project management initiatives related to information technology   for practice.

4.0   CONCLUSION
Nursing informatics competencies has become essential for nursing practice globally (Lin, Hsu, & Yang, 2014; Schleyer, Burch, & Schoessler, 2011). Due to rapid innovation in healthcare, there is the need to measure and enhance nurses' informatics skills and knowledge. Measuring and enhancing informatics competencies may help nurse managers to advance nurses' contributions to healthcare technological innovations (Schleyer et al, 2011).

5.0   SUMMARY
In this unit, you have learnt about the following:
Informatic competencies which is in three levels as:
Beginner, entry or user level
Intermediate or modifier level and
Advanced or innovator level of competency.

6.0   ONLINE DISCUSSION AND ASSIGNMENT
Briefly describe nursing informatics competencies?

List with examples the different types of nursing informatic competencies?

7.0   REFERENCES/FURTHER READING

American Nurses   Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.

Baker, J. (2012). Nursing informatics. Perioperative Nursing Clinics, 7, 151-160.

Kaminski, J. (Fall, 2010). Theory applied to informatics – Novice to Expert. *CJNI: Canadian Journal of Nursing Informatics, 5* (4), Editorial. http://cjni.net/journal/?p=967

McGonigle D., & Mastrian K (2009). Nursing Informatics and the foundation of knowledge USA: Delma   Publishers.

UNIT 2:   INFORMATIC TOOLS

CONTENTS

1.0   INTRODUCTION
According to Ackoff, nursing informatics can be examined in terms of theory surrounding data, information, knowledge, and wisdom (1989). Nursing practice begins with the use of data. In our society, more often than not, we are using technology to capture the   data.

Source: southuniversity.edu
familiar with data collection as daily agents of patient care documentation, patient monitoring and interview data. In this way, formal nursing data sets are actually made up of gathered information such as healthcare definition, classification, and nursing information.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
  • explain the available informatics tools and how to apply informatics tools.

3.0   MAIN CONTENT
3.1   Nursing informatic tools
Good nursing practice requires detailed record-keeping that is comprehensive, timely and accurate. Without complete recording there is no evidence to prove that care was provided to the patient, and in nursing practice there is a saying that 'what is not recorded has not been done' (Marinic 2015; Taiye 2015). Furthermore, poor record-keeping not only undermines patient care but makes the nurses more vulnerable to legal claims which arise from breakdown in communication that results from incomplete or inadequate records (Marinic 2015).

Nurses may generate and record data from their own observations or with the assistance of various devices. In this way free text-informational data such as drug dosages administered,

resources used, problems diagnoses, etc – is recorded manually. Free text is then interpreted and organised by some standardising principle, either manually or by computer. In this way, data (often qualitative data that cannot be traditionally measured) can be organised and processed. Data actually becomes information when these separate components are interpreted, organised, combined and structured within a specific context to convey particular meanings.

System applications are designed to collect, sort, organise, store, retrieve, select, and aggregate data. Nursing and health data may be classified into four basic types:
1.   resource data (e.g. financial information)
2.   patient or client demographics
3.   activity data (clinical data) and
4.   health service provider data

These primary data are recorded manually or collected electronically, with manual collection providing a greater opportunity for error. Data that has been electronically recorded follows a programmed set of instructions built into the software, thus cutting down substantially on collection error. One paramount important in the collection process are the data collection form and computer interface used for inputting the data; these will affect completeness, consistency and accuracy.

Quantitative data collection tools or instruments includes:
Questionnaires
Interviews
Surveys
Quizzes
Assessments
E-mail interviews, and
Web-based surveys

A questionnaire is a data collection instrument consistent of a series of questions and other prompts for the purpose of gathering information from respondents. The questionnaire was invented by Sir Francis Galton. Questionnaires, one of the most popular form of data collection, and can be administered in hard copy, on paper, or programmed into a web site where individuals may answer the questions electronically. Other electronic data collection tools include Personal Digital Assistants (PDAs) and on-site laptops. A benefit of using electronic data collection is the ability to transmit data to another computer directly for compilation and analysis, thereby cutting down on error.

Questionnaire design is a multi-step process. Questionnaires allow collection of both subjective and objective data in a large sample of the study population in order to obtain results that are statistically significant, especially when resources are limited. It is a good tool for the protection of the privacy of the participants. The validity of data and information depends on the honesty of the respondent. The questionnaires can measure both qualitative and quantitative data, but is it more appropriate for quantitative   data collection.

An excellent example of innovative electronic data collection is the system used by the participants in the Nightingale Tacker System pilot study, in which nursing students travelling to rural clinical sites submitted inf017mation into handled devices while miles away from their preceptors – supervisors. Result suggest that, despite some technical challenges associated with the hardware, using the handheld technology enhanced students' learning (especially in the

area of physical assessment), increased their confidence in practicing in community-based settings, and provided efficient data input capabilities.

Source: registerednursing.org

Hardware to measure, numerical qualitative data can be collected electronically, as well, in the form of a narrative or diary-like entry. Much in the way free text is analysed and sorted, this narrative dialogue is assessed and then sorted according to the data collection's organising principle.

4.0   CONCLUSION
Informatics tools and methods from computer and information sciences are considered fundamental elements of NI. Information technology includes computer hardware, software, communication, and network technologies, derived primarily from computer science Information structures organise data, information, and knowledge for processing by computers. Information management is an elemental process within informatics in which one is able to file, store, and manipulate data for various uses. The use of information technology distinguishes informatics from more traditional methods of information management in nursing practice.

5.0   SUMMARY
From this unit, you must have learnt and identified the various tools used in nursing informatics and how such tools have aid and supported the service delivery of nurses to their patients.

6.0   Online Discussions and Assignments
Describe the four basic types of nursing data?
Explain the quantitative data collection tools or instruments?

7.0   REFERENCES/FURTHER READING
American Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.
Baker, J. (2012). Nursing informatics. Perioperative Nursing Clinics, 7, 151-160.

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McGonigle D., & Mastrian K (2009). Nursing Informatics and the foundation of knowledge USA: Delma   Publishers.

UNIT 3:   NURSING ASPECTS OF HEALTH INFORMATIC SYSTEMS

CONTENTS

1.0   INTRODUCTION
Nursing is increasingly becoming as "high tech" as it is a "high touch" profession. Today's nurses have   more technology at their disposal than any nurses ever before, and as one might expect, it's considerably improving" patient care.

One area where   nurses are putting technology to use is in informatics. Officially known as the study of information, in the world of health care, health informatics is the management of health information. Using electronic medical records, devices that collect health information electronically, and other electronic information standards, health informatics nurses are responsible for managing, interpreting, and communicating the data that comes in and out of health care facilities, all with one primary purpose: Improving the quality   of patient care.

2.0   INTENDED LEARNING OUTCOMES
At the end of this unit, you will be able to:
- discuss Nursing Information System
- explain sources of data capture
- list types of point of care devices.

3.0   MAIN CONTENT
3.1   Nursing Informatic System

Source: authorstream.com

Nursing Information System (NIS) is a part of a health care information system that deals with nursing aspects, particularly the maintenance of the nursing record. The several objectives that a Nursing Information system should meet in order to succeed its aims, cover the users' needs and operate properly are described. The functions of such systems, which combine with the basic tasks of the nursing care process, are examined. As Nursing Information System is part of the health care and hospital information system, the different strategies and approaches for designing and developing Hospital Information Systems followed from the decade of 1970 until the recent decade of 1990, are presented.

Motivation for the development and implementation of computerized hospital information systems has been financial and administrative, i.e. driven by the need to capture charges and document patient care for legal reasons. The majority of systems marketed today have been motivated by those two factors. Historically, such systems have required a major investment in hardware (typically mainframe, desktop and laptops), and, even though they have demonstrated significant improvement in hospital communication (with a corresponding reduction in paper flow), they have been characteristically weak in supporting the professional nursing practice. These factors have prevented the level of acceptance by nurses that was originally foreseen.

If one considers the original principle that CampBell (1978) identified when looking at the activities nurses perform when caring for patients, nursing roles falls into three global categories.

The first is managerial roles or coordinating activities, for example, order entry, result reporting, requisition generation and telephone booking of appointments. Current hospital information systems can help nurses with those activities.

The second is the Physician-delegated task. Current systems can capture these from the physicians' order entry set and then incorporate them into the patient care plan.

The third category is the autonomous nursing function, characteristics of nursing professional nursing activities, when knowledge unite to nursing is applied to patient care. Current system are beginning to support nurses in fulfilling their responsibilities in this categories.

All three categories – managerial/coordinating, physician-delegated, and autonomous nursing function – must fit together to create a fully operational system. Present system, while they

release nurse to focus on professional nursing practice. The future will require decision-making support for professional nursing practice and the capture of information from the patient care plan for nursing administration decision making related to nursing resources   allocation.

Source: lippincottsolution.lww.com

In health care organisations, as in other fields, the first computer-based management information systems implemented were typically limited to financial applications. Quantitative financial data are easily automated, and the benefits are readily observable and measurable. However, the role of management information systems in today's nursing departments continues to expand as nursing managers recognise the value of information as an essential resource. The increasing complexity of patient care problems, combined with the pressures for efficiency and effectiveness in patient care, have prompted nursing managers to require quick access to useful, reliable information. With these kinds of demands, manual data processing has become increasingly ineffective in supporting management decision making. The advantages of automation extend far beyond the ability of a computer to crunch numbers. While it is true that more data can be processed at a greater speed, automated management information systems provide for enhanced accuracy, increased detail, and flexibility in reporting, as well as standardisation of the information reported.

As the number of hospital information systems (HISs) have rapidly increased, systems for nursing also have increased. Since nursing care is a major operating cost within a hospital budget, nursing management is important for cost saving, and it contributes to the financial stability of hospitals. Moreover, nursing management also affects clinical practice; it is responsible for managing nursing units, personnel (recruitment, selection of staff, development, working environment), budgets (budgeting, cost control, and financial results), nursing practice (introducing and maintaining standards), and the development of services. For these activities, effective nursing management relies on the effective use of up-to-date information about patient flow and acuity, staffing, and costs. Thus, evaluation of these systems should be conducted to manage costs, activity planning, resource al-location, and quality assurance.

Increasingly, the nurse administrator's role is being facilitated by the use of management information systems to assist in the management of nursing resources. In the past, the nursing

manager's involvement with MIS was limited to receiving various budget reports produced by the accounting department's financial system. Until recently, very little information appeared in the literature regarding MIS applications for nursing managers with the exception of articles relating to the area of nurse scheduling. With advances in computer software, nursing management applications have been expanded to the extent that they are now beginning to support decision making and strategies planning.

For information to influence management in an optimal way, it has to be used by decision-makers at each point of the   management spiral.

Source: nursingfile.com

Examples   of these decision points include undertaking situational analysis, setting priorities, or implementing a programmed activity. Information is crucial at all management levels of the health services, from the periphery to the centre. It is crucial for patient/client management, for health unit management, as well as for health system planning and management. This means that not only policymakers and managers need to make use of information in decision making but also care providers, including doctors, health technicians, and community health workers. Unless this occurs, the considerable opportunity costs involved in set-up and maintenance of health information systems can be difficult to   justify.

3.2   How can Technology help Nurses care for patients?
The use   of computer and information technology to support an electronic health record (EHR) is quickly becoming a standard practice in health care. For nurses and other health-care team members, the use of computer technology provides quick access to important information about your health or illness. For you, it means no longer having to repeat your health information multiple times as you receive care and the assurance that members of your health-care team have ready access to current health information. This fact sheet answers questions you may have about the use of computers and other computer technology by nurses.

How nurses use computers in their daily work are:
 • Record on the electronic health record your personal health-care story, the treatments they carry out for you, and your response and progress toward your health care goal for monitoring and for ready access by other team members.
• Obtain information about your past and ongoing treatments and medications and the results to ensure the best care is provided.
• Review data about your current and past health situation and plan of care on the electronic health record, which helps them monitor your recovery process over time.

• Access clinical knowledge such as drug information, nursing assessments, articles and nursing best practice guidelines and resources to better understand your health situation and plan of care.

To provide information management assistance to nurses, the three of source data capture, nursing data standards, and decision support system must be addressed. These three areas are crucial to providing computer support for nurses in the delivery of patient care.

3.3   Source Data Capture

Source data capture in here means gathering data and information about patients where it originates, that is, with the patient. The concept of "terminal by the bedside" was introduced in the mid-1980s. most experts agree that bringing the computer access closer to the patient, i.e. locating it at the "point of care", is a valid premise, and clinicians appears to favour the bedside terminal as a means to reduce much of the clerical workload and improve access to   clerical data.

Source: nursekey.com

Point of care systems are very much in widespread use now, their potentials has been fully utilised. As more facilities and organisations implement source data capture systems, including bedside terminals, the concept will gain acceptance in the industry and become the standard for nursing systems.

Criteria for Source Data Capture
The technology must meet specific criteria which are:
It must permit nurses at the patients' bedside to interact with the main patient database and the main care planning system or hospital information system.
It must have the capacity to interact with existing hospital information system so that effort already expended in developing hospital information system is not wasted

Such technology must be small and compact so as to occupy the minimum amount of space at the patient's bedside and therefore, not interfere with the use of other important equipment necessary to the care of the patient.

The technology must be rugged and durable
It must be easy and uncomplicated to use and have high-resolution screens with graphics capability that can be read in the dared.
Provision must be made for a variety of means of data entry, (e.g. bar code reader, physiological probe, digital camera, natural language, or keyboard).
A volume control is necessary to mute any keyboard sounds.

This type of technology must allow nurses the maximum degree of mobility to enter data wherever the patient is, because patients do not always stay in their beds.
Two-way radio transmission of data should provide an acceptable level of security and confidentiality for patient information, perhaps by such means as encrypted data or irregular short burst transmissions.
Much work remains to be done before a satisfactory system form sources data capture is fully developed.

3.4   Types of "Point of Care" Devices

These types of "Point of Care" devices are presently available.
The first is the standard stationary terminal. The expedient approach to the concept of source data capture was to simply place a standard keyboard and monitor at the bedside.

The second type for terminal is specially designed for the purpose of source data capture. One variety of special-purpose terminals is a small footprint terminal, fixed at the bedside, and having special function keys for data input. A second variety of special designed "Point of Care" devices is a hybrid solution that attaches to the wall in the patient's room when not in use but is portable and interactive within the patient's room.

The third type of device is a handheld portable terminal, not restricted to a particular care field, with "point of care" or source data capture devices to allow consensus as to whether to a fixed beside terminal or a portable handheld terminal is best suited for both patient care and optimum system utilization. Portable devices are favoured for a number of reasons, including better access by professionals, better control over access by patients, lower cost, and ease of service and maintenance.

Uses of Source Data Capture in Health Care

Nurses document their work and outcomes for a number of reasons: the most important is for communicating within the health care team and providing information for other professionals, primarily for individuals and groups involved with accreditation, credentialing, legal, regulatory and legislative, reimbursement, research, and quality activities. A number of factors, such as the increasing prevalence of infectious diseases in developing countries, the rising incidences of lifestyle diseases such as cardiac diseases and diabetes, the rising usage of home based POC devices, and technological advancements with regard to development of advanced, faster, and easy to use devices are stimulating the demand for POCT
The capacity for source data capture could be more greatly exploited by nurses if assessment guidelines and interview instruments were developed to be downloaded to the point of care device. Data input of responses in an interactive manner at the patient's bedside would permit source data capture. More accurate documentation of patient care would be the first outcome.

Ultimately, it should be possible to develop and deliver decision support systems for use at the patient's bedside. Clearly, the initial uses of such technology will be within acute care facilities. Eventually, extended-care facilities, long-term care facilities, occupational health, outpatient clinics, community health, and home care are prime areas for development of software for use with this technology. These areas have been solely underserved by the health care computing industry primarily because until now the technology was unable to serve the highly mobile and geographically dispersed nature of practice in these fields of health care. With this technology, there is almost unlimited opportunity. It is also conceivable that this technology could be used in for hospital bookings and preadmission data gathering.

3.5   Nursing Data Standards

Standards are critical in the development and implementation of electronic health records (HERs). The effectiveness of health delivery is dependent on the nurses to access critical health information where and when is needed. Nurses continually use mental processes, often unconsciously, to organise information systematically by grouping data according to common features. We do this to make sense of the massive amounts of information with which we are daily bombarded. The problem arises because nurse do not have a common system or language to communicate precisely, even with each other. "If we cannot name it, we cannot control it, finance it, teach it, search it or put it into public policy", because nursing has not universally accepted methods for defining and collecting nursing data. For example, the patient discharge abstracts prepared by medical records departments in hospital contain no nursing care delivery information. The abstracts, therefore, fail to acknowledge the contribution of nursing during the patient's stay in the hospital. The abstracts are used by many agencies for a variety of statistical and funding purposes. Patient discharge summarises need to include nursing workload data that recognise the personnel providing the care in addition to the substance of that care, i.e. the nursing component of patient care, the type of nursing care provided, and the impact of that care on patient outcome. Presently, much valuable information is being lost. This information is essential for nurses to be able to develop evidence-based practice. Data to support evidence-based practice is required not only for clinical practice, but also to inform evidence-based decision making by nurse managers. Therefore, as the development of nationwide health database increases, it is vital that it minimum number of essential nursing elements be included in the database.

The practicing nurse finds word (labels) for the elements of her/his practice. When these words are standardised among nurses, they can be called a nursing nomenclature. These word-labels can then be combined within a defined structure and systematic management to form a language system for nursing. From the point onward, the data that are labelled according to a nursing nomenclature, structured into a nursing language, and classified by mean of common features, can be collated for inclusion in a nursing minimum data set which in turn can be fed back into nursing practice at the centre of spiral; and the continuous process of development, refinement and modification in response to external change begins again.

3.6   Decision Support Systems

Decision Support System (DSS) are a computer-based form of decision tool, integrating information (ideally from high quality research studies) with the characteristics of individual patients, to provide advice to clinicians (Dowding D et al., 2007). Clinical Decision Support (CDS) used interchangeably with DSS has been shown to lead to significant quality and safety improvements in patient care and improve workflow among clinicians.

Nurses have a unique dual role regarding information. They are both generators and consumers of an enormous amount of data in any given patient encounter (Byrne, 2010). CDSS as ''computer software applications that match patient characteristics with a knowledge base to generate specific recommendations. Decision support can take many forms and is often integrated subtly into many aspects of an EHR. It is not intended to replace the provider's knowledge or experience, but rather to facilitate the best decision possible with the best information available. CDSS represent the intersection of clinical decision-making, cognitive sciences, evidence-based practice, and computer science all contextualised by the practice setting, patient population, provider needs, and information technology infrastructure (Anderson and Willson, 2008, Bakken et al., 2008). With all of this said, electronic health records are the way of the future for healthcare industry. It is a way to capture and utilise real-time data to provide high-quality patient care, ensuring efficiency and effective use of time and resources. By incorporating EHR and CDSS it has the potential to change the way medicine has been taught and practiced. Since "clinical decision support systems (CDSS) are computer systems designed to impact clinician decision making about individual patients at the point in time that these decisions are made", the reasons can be seen why it would be beneficial to have a fully integrated CDSS and HER (Berner and La Lande, 2007, Brian et al., 2012). CDSS have the potential to deliver improved quality of care, increased clinician evidence, improved documentation and patient satisfaction.

Clinical decision support systems are computer programs designed to help health care professionals make clinical decisions and can be characterized according to one of three functions provided: information management, focusing attention, and patient-specific consultation (Musen et al., 2006, Bakken *et al.*, 2007a).

Decision support systems offers great potential to assist nurses to handle the volume of data and information required. Six major uses of decision support have been identified;
Alerting: Alerting systems are those which notify the clinicians of an immediate problem that calls for a prompt action or decision. These alerts are commonly clinician alerts that appears on the screen at time of entry of orders, assessments, or laboratory values. These systems may also provide management alerts based on problem with an individual patient or an individual clinician.

Interpretations: This type of CDS systems is one that works to interpret particular data such as electrocardiogram or blood gases. A system such as this works by assimilating the data and transforming it into a conceptual understanding or interpretation. The interpretation is then presented to the clinician for use in decision making.

Assisting: A system that is used to simplify clinician interaction with the computer is classified as an assisting system. These systems usually assist in the ordering or charting process by offering the clinician such things as standing order list, patient specific drug dosing, or appropriate parameter for charting based on earlier identified patient problems.

Critiquing: Systems that do this are primarily in the research stage and not yet available for implementation. This type of system is designed to critique a set of orders for particular problem. For example, a clinician might enter orders for a change in respirator settings which the system will then critique in light of the most recently entered blood gases. The clinician would be presented with an alternate set of orders and the rationale for change made. The clinician would have the option of accepting or rejecting the changes suggested by the computer.

Diagnosing: This type of decision support systems uses general assessment data to generate suggested diagnoses. These systems may then ask for additional data so as to rule out, rule in, or otherwise refine the list of diagnostic possibilities. Other system that can be considered in this category are those that provide predictive scoring of mortality, estimation of treatment benefits based on effects of competing risks, or prediction of specific risks (pressure ulcer, falls).

Managing: The computer automatically generates the treatment or plan of care from assessment data and/or diagnostic categories and the nurse or physician then critiques the computer and its logic. While those systems with fixed protocols are easy to program and to implement, the lack of individualization leaves the clinician with the job of extensive critiquing. This type of system can be used in a developmental manner, however, so that clinicians give a rationale for changing the plan or the protocol and this is used to determine further data needs and decision rules so that the protocols are further refined. The variation in the intervention and the rationale offered can be combined with data of outcomes of care, to determine which interventions are most effective in producing the desired outcome, so the refine protocols result in a progressively higher quality   of care.

4.0   CONCLUSION
Modern nursing care is driven by individual patient needs and history — information that is collected and organised in electronic patient records. By documenting a patient's condition, and sharing that information electronically, nurses are able to more effectively manage care, and by extension, improve the quality of that care.

A great deal of documentation takes place automatically thanks to connected devices, which collect specific information in real time and transmit it to patient records. By looking at the documentation of a patient's condition over time, nurses can make better decisions about how to provide care and when changes or adjustments   need to be made.

5.0   SUMMARY
In this unit, you have learnt;
Nursing Information System
How technology can help nurses care for patients
Source data capture
Critique for source data capture
Types of "Point of Care" Devices
Uses of source data capture in Health care
Nursing Data Standards
Decision Support Systems.

6.0   ONLINE DISCUSSIONS AND ASSIGNMENTS
How can Technology help Nurses care for patients?
What are the Criteria for Source Data Capture?
Explain the concept of Nursing Data Standards?
What are the six major uses of decision support system?

7.0   REFERENCES/FURTHER READING
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UNIT 4:   STANDARDISED NURSING TERMINOLOGIES

CONTENTS
1.0   Introduction
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        3.1   Standardised Nursing Terminologies
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1.0   INTRODUCTION
Nursing has its own language, including unique terminology and classifications that facilitate the efficient delivery of high-quality health care. It's important that advanced practice nurses have an acute understanding of the standardised nursing terminology lists and classification systems, as this knowledge can potentially establish the line that separates an efficient health care organisation from an inefficient one.

A term of simplest level use a word or phrase to describe something concrete, e.g. leg, or abstract. A nursing terminology is a body of the terms used in nursing. There are many nursing terminologies, formal and informal. Nursing terminologies allows to capture, represents, access, and communicate nursing data, information, and knowledge.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
   • explain standardised nursing terminologies
   • describe the approaches to nursing terminologies
   • discuss nursing terminologies.

3.0   MAIN CONTENT
3.1   Standardised Nursing Terminologies
Nursing terminologies and vocabulary structures first developed in 1973, and many have changed significantly since their inceptions. Realising that the standardisation of nursing care documentation was a critical component to support interoperable health information, the ANA in 1989 created a process to recognise languages, vocabularies and terminologies that support the nursing practice (ANA, 2015). Current action plans and guidelines, descending from the work of individuals such as James J. Cimino and organisations such as the National Committee on Vital and Health Statistics (NCVHS) and the ANA, continue to be refined (Cimino J., 1998) (Cimino, Hripcsak, Johnson, & Clayton, 1989) (Sujansky, 2002). However, the inability to ensure the availability of sharable and comparable nursing data remains an issue. Increased focus on longitudinal and interdisciplinary documentation, care quality and value precipitates a need to accurately quantify the contribution of each care team member for optimization of care workflows across settings. Further, high-quality nursing data can assist in the optimal integration of registered nurses into high-value, lower-cost approaches to longitudinal care (Welton & Harper, Measuring Nursing Care Value, 2016).

Most of the ANA recognised, standardised terminologies are nursing specific; that is, they have more in common with nursing than any of the other health disciplines. This does not mean that

they cannot be used in other disciplines; rather it means that they address many specific nursing situations, not only the dependent functions of nursing, but also independent nursing functions. There are seven recognised terminologies in this category were designed specifically for use in nursing, they are as follows:

Clinical Care Classification

The Clinical Care Classification (CCC), originally named the Home Health Care Classification, was designed for electronic coding to predict home healthcare use for Medicare patients (Saba, 2012c). It has since evolved to be a full clinical care terminology and has been integrated into some electronic healthcare systems. There are 176 nursing diagnoses and 201 'Core Interventions' in the CCC (Saba, 2012a). Outcome is based on the original nursing diagnosis, and is documented as improved, stabilised, or deteriorated (Saba, 2012b). Users of the CCC found it very helpful in planning care and least helpful in organising patient care. One respondent, in discussing the CCC system, stated, "Easy to build based on the nursing assessment. Easy to set triggers and reminders."

International Classification of Nursing Practice

Only two of the four users found the International Classification of Nursing Practice (ICNP) useful; all five categories were found helpful by one of the two users. The U.S. National Library of Medicine (2012b, paragraph 3) states, "The ICNP terminology was developed to establish an international standard for the description and comparison of nursing practice, and to facilitate the development of cross-mapping between local terms and other terminologies." This terminology was originally a reference terminology, in that it was not originally designed as an interface terminology, or one that would be used in direct documentation. However, the International Council of Nursing (ICN) has developed, and is continuing to develop catalogues that have terms for diagnoses, outcomes, and interventions based on the ICNP concepts; these terms can be used to document patient care (International Council of Nurses, 2013).

North American Nursing Diagnosis Association - International

The North American Nursing Diagnosis Association- International (NANDA-I) was developed to allow nursing to identify and classify health problems within the domain of nursing (Jones, Lunney, Keenan, & Moorhead, 2010). Concomitant with this purpose were the goals of increasing the visibility of nursing, organising nursing data, and allowing costs to be assigned to nursing. Since the first national meeting of NANDA-I in 1973, where 100 nursing diagnoses were identified and organised alphabetically, it has evolved to a taxonomy with 13 domains, 47 classes, and 205 diagnoses (NANDA, n.d.). It is intended to "communicate the professional judgments that nurses make every day to patients, colleagues, members of other disciplines, and the public" (NANDA-I, 2012, paragraph 2).

Nursing Intervention Classification

The Nursing Interventions Classification (NIC) is a comprehensive, research-based, standardised classification of nursing interventions (Center for Nursing Classification & Clinical Effectiveness, 2013). It classifies interventions, both independent and inter-dependent, and the nursing activities required to implement them. The NIC has 554 interventions that are grouped into seven domains and thirty classes. It is intended to be used as part of the planning process in creating a nursing care plan. As would be expected, respondents checked generating appropriate interventions as the task for which they found the terminology most useful; 81% found this terminology helpful in planning care. Only 41.4% found it helpful in retrieving information on the same term for many patients.

Nursing Outcomes Classification

The nursing outcomes classification (NOC) is intended to provide a measurable way to evaluate the effect of nursing interventions on patient progress (Lu, Park, Ucharattana, Konicek, & Delaney, 2007). It consists of 490 outcomes with a list of indicators to evaluate the patient status (College of Nursing University of Iowa, 2013). Interestingly, the only extra task for NOC that was entered was 'use as an educational tool for nursing students.' Appropriately, 85.0% of users found that the most useful task for NOC in clinical care was generating appropriate outcomes; the next most useful task was help in planning care.

OMAHA System

The Omaha System was originally devised as a way for home healthcare nurses to document their care. Like the other nursing-specific terminologies, with the exception of the NNN terminologies, the Omaha System includes, within it, terminology for nursing diagnosis, interventions, and outcomes. Although differences between these tasks were small for users of the Omaha System, the task for which they found it most helpful was planning care. Individual respondents also found it helpful in publications and in communicating between disciplines. One participant wrote, "Does not address Lactation AT ALL! Had to manoeuvre the system to force it to work." This may be a statement that is applicable to other terminologies, particularly if there is a forced response from a limited list.

Perioperative Nursing Data Set

The Perioperative Nursing Data Set (PNDS) is intended to make visible to administrators the patient problems that perioperative nurses manage. It includes the entire surgical patient experience from preadmission to discharge; it consists of 93 nursing diagnosis, 151 nursing interventions, and 38 nurse sensitive patient outcomes (United States (U.S.) National Library of Medicine, 2012a). Eighty percent of users found this terminology helpful for both generating appropriate interventions and outcomes. One respondent added, "Helpful in providing consistent documentation."

Interdisciplinary Terminologies

The ANA recognised three interdisciplinary terminologies, the Alternative Billing Codes (ABC), SNOMED CT, and LOINC. The ABC codes are not used in direct clinical care and are not addressed here. There are other standardised, healthcare terminologies, but our survey studied only the ANA recognised, standardised terminologies. We will discuss the SNOMED CT and LOINC terminologies below.

Logical Observation Identifiers, Names, and Codes

Although originally designed for communicating laboratory assessments, the purpose of the Logical Observation Identifiers, Names, and Codes (LOINC) has expanded to include the coding of assessment data for the EHR. These measures include vital signs and assessments from standardised nursing terminologies (Matney, Bakken, & Huff, 2003). LOINC users gave the highest percentage of any of the terminologies to the choice of 'retrieving information on the same term for many patients.' The next highest terminology for this category was for SNOMED.

Minimum Data Sets

The general concept of a Uniform Minimum Health Data Set (UMHDS) can be defined as "a minimum set of items [or elements] of information with uniform definitions and categories, concerning a specific aspect or dimension of the health care system, which meets the essential needs of multiple data users" (Werley, Devine, Zorn, Ryan, & Westra, 1991). A minimum

data set typically is organised around a specific type of data in order to support data sharing, comparison and analyses. Possible values for each data element must be determined, such as lists of agreed terminology. ANA recognises two minimum data sets: The Nursing Minimum Data Set (NMDS) and the Nursing Management Minimum Data Set (NMMDS).

Nursing Minimum Data Set (NMDS).
The NMDS is a set of elements developed consistent with the general concept of a Uniform Minimum Health Data Set (UMHDS) and specifically intended for the collection of essential nursing care data. The NMDS includes 16 items organised into categories of nursing care (diagnoses, interventions and outcomes and intensity of nursing care), patient demographics and service elements (e.g. facility identifier, nurse identifier, admission and discharge dates). The elements of NMDS can be used as a framework by other nursing terminologies such as NANDA, NIC and NOC.

Nursing Management Minimum Data Set (NMMDS)
The NMMDS is a uniform minimum health data set that "specifically identifies variables essential to nursing administrators for decision-making about nursing care effectiveness" (Gardner-Huber, Delaney, Crossley, Mehmert, & Ellerbe). It was developed to provide a framework for the data needs of nurse executives and provides a "…collection of core data elements needed by nurse administrators to make management decisions and compare the effectiveness of institutions" (Gardner-Huber, Delaney, Crossley, Mehmert, & Ellerbe). The NMMDS framework is guided by the work of Werley and Lang's NMDS, the Iowa Model of Nursing Administration and Donabedian's components for measuring quality (Gardner-Huber, Delaney, Crossley, Mehmert, & Ellerbe). The NMMDS is structured around 18 elements associated with nursing environment, nursing care resources and   financial resources.

3.2   Approaches to Nursing Terminology
Nursing terminologies   have evolved significantly over the past several decades in line with best practices in terminology work, from simple lists of words or phrase to large, complex so-called ontologies (description of entities within a domain and the relationships between them). This evolution has been facilitated by advances in knowledge representations, e.g. the refinement of the description logic that underpin many contemporary ontologies, and in their accompanying technologies, e.g., automated reasoners that can check consistency and identify equivalence and subsumption (i.e., subclass-superclass) relationships within those ontologies. The following section expand on the two of the terminologies listed previously: NANDA and ICNP. These terminologies have been selected as examples to demonstrate the relative extremes of the terminological evolutionary path. No assumption should be made that either of the example terminologies is better than or worse than the other. Nor should any assumption be made that either of these terminologies is better than or worse than any other terminology. The example merely represents different approaches that serve to complement one another, affording an opportunity for synergism.

Enumerative Approach
With the enumerative approach, words or phrases are represented in a list or a simple hierarchy. In NANDA, a nursing diagnosis has an associated name or label and a textual definition. Each nursing diagnosis may have a set of defining characteristics and related or risk factors. These additional features do not constitute part of the core terminology. Instead, they are intended to be used as an aid to diagnosis. As earlier mentioned, NANDA's multiaxial taxonomy (i.e., taxonomy II) organises nursing diagnoses, it makes no attempt to organise nursing diagnoses among themselves; i.e., there are no hierarchical relationships among

NANDA nursing diagnoses. Furthermore, there are no associative relationships apart from the implicit and global sibling relationship; i.e. every nursing diagnosis appears at the same level of indention in the list, and there is no means to identify equivalent nursing diagnoses. However, what NANDA may lack in terms of hierarchical sophistication, it makes up for it in terms of simplicity and potential ease of implementation and use.

Ontological Approach
The ontological approach is compositional in nature and a partial representation of the entities within a domain and the relationships that hold between them. ICNP takes the ontological approach – a different approach than NANDA. ICNP is described as a unified nursing language system. It seeks to provide a resources that can be used to develop local terminologies and to facilitate cross-mapping between terminologies in order to compare and combine data from different sources – the existence of a number of overlapping standardised nursing terminologies is problematic in terms of data comparison and aggregation.

In conclusion, the majority of the commonly reported standardised nursing vocabularies take the form of taxonomic vocabularies. Taxonomic vocabularies are terminological systems in which concepts are related by hierarchical relations i.e. generic 'is-a' relation and partitive 'part-of' relation, and other associative and pragmatic relations.

1. Examples within nursing include the North American Nursing Diagnosis Association Taxonomy I (NANDA), the Nursing Interventions Classification (NIC), the Home Health Care Classification (HHCC) and the Omaha Community System (Omaha). These representations are seen as important because they provide a structure for retrieving and using nursing data from automated systems.

2. Other reasons cited for organising nursing concepts into taxonomies include: to formalise and expand knowledge about nursing practice, to assist in determining the cost of nursing services, to help to target resources more effectively and to make explicit the role played by nurses in health care.

Monohierarchic taxonomic vocabularies that are exhaustive and that guarantee disjunction are seen as useful for statistical evaluation. Thus, it could be argued that taxonomic vocabularies have a useful role to play in activities such as data retrieval and data analysis. However, there is increasing evidence to show that taxonomic nursing vocabularies are not able to represent the detailed clinical data within patient records. As such they are poorly suited for representing day-to-day nursing care.

4.0   CONCLUSION
Building a vocabulary of nursing terminology is important because it establishes a shorthand form of communication that can efficiently communicate key information about patient data and the regulations that govern the nursing profession. This efficiency can make it easier for nurse administrators and other advanced practice nurses to convey detailed care strategies to staff members and providers, ultimately leading to better patient outcomes.

The use of classification systems to effectively track care and administrative activities is also a crucial component of quality care delivery. Systematic categorizations can make it easy for staff members and health care providers to obtain broad yet fundamental metrics on a patient — data that is often essential in establishing and executing health care strategies. As

technology and tech-driven data delivery become even more integrated in health care, it is increasingly important for nurses to leverage these systems.

5.0 SUMMARY
In this unit, you have learned;
Various standardised nursing terminologies
Approaches to nursing terminologies

6.0 ONLINE DISCUSSIONS AND ASSIGNMENTS
Describe the seven recognised terminologies designed specifically for use in nursing?

7.0 REFERENCES/FURTHER READING
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MODULE 4: APPLICATION OF NURSING INFORMATICS
Module objectives
At the end of this module, you should be able to;
Describe Ethics and Bioethics
Discuss Ethical dilemma and morals
Applying ethics to informatics
Describe Ethical models for decision making

UNIT 1:   ETHICS AND BIOETHICS

CONTENTS
1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
       3.1   Ethics
       3.2   Bioethics
       3.3   Ethical Dilemma and Morals
4.0   Conclusion
5.0   Summary
6.0   Online discussions and assignments
7.0   References/Further Reading

1.0   INTRODUCTION
The American Nurses Association (ANA) has developed a Code of Ethics for Nurses, which serves as a guide to the implementation of nursing responsibilities in a manner consistent with quality in nursing care and ethical responsibilities of the profession. However, ethical thoughts are influenced by many factors such as culture, religion, education, individual values and opinions. These factors form our ethical views and influence the ethical decisions that affect nurses and their patients.

The basic values of protecting life and alleviating suffering are shared by members of the medical and nursing occupations. The codes of confidentiality, honesty and fellowship are also expected to ship within these groups. However, the soul of servitude and agreement questioned by Nightingale, but continued by many nurses since then, has created differences in the way they face dilemmas and context in which nurses and doctors consider professional ethics. The most common moral health is moral conflict in deciding how to balance the needs of "many" and "individual" rights. The classic examples of this dilemma are those who must be saved if not everyone can be saved and how individual privacy and freedom can be respected while still protecting and promoting the health of others.

2.0   INTENDED LEARNING OUTCOMES
By the of this unit, you will be able to:
   • explain Ethics and Bioethics and
   • differentiate between the two concepts.

3.0   MAIN CONTENT
3.1   Ethics
Ethics is a process of systematically examining varying viewpoints related to moral questions of right or wrong. The term ethics often describes the investigation and analysis of moral principles and dilemmas. The term ethics can also refer to rules or guidelines that establish what conduct is right and wrong for individuals and for groups. Ethicists have defined the term in a variety of ways, with each reflecting a basic theoretical philosophical perspective. Beauchamp and Childress (1994) refers to ethics as a generic term for various ways of understanding and examining the moral life. Ethical approaches to this examination may be normative, presenting standards of right or good action; descriptive, reporting what people believe and how they act; or explorative, analysing the concepts   and methods of ethics Informatics ethics.

Although one might argue that the history of information ethics begins with the ancient Greeks, in the latter half of the twentieth century, machine-based information and ethics were first seen together. At about the same time that the Nuremberg Code was being developed. From the 1970s onwards people like Kostrewski, Oppenheim and Robert Hauptman worked with ethical questions in informatics research. In 1997, Severson presented four principles of information ethics:

(1) respect for information,
(2) respect for privacy;
(3) equitable representation; and
(4) Non-maleficence.

Source: semanticscholar.org

The fast growth of informatics in the fields of nursing and public health is changing these practices. The acceptance of information technologies as well as enhancements in disease surveillance systems, large health database analysis tools and techniques, and increased access to health information through the implementation of electronic nursing record systems, are all a powerful incentive for advance in public health.

Information technology is a prominent tool in healthcare management. However, health care systems are often   unable to report concerns about privacy, confidentiality and integrity of information. Despite the existence of existing literature on ethical issues in medicine, as well as ethics in computing, information technology in medicine lead to new ethical issues not covered by nursing ethics or computing.

Source: proposalfomgos.com

Social media and ethics

Social media platforms include such electronic communication outlets as Facebook, Twitter, Linkedln, and YouTube. Other widely used means of instantaneous communications include wikis, blogs, tweeting, Skype, and the "hangout" on Google+. Even as recently as 5 years ago, some of these means of exchanging information were unknown (Spector &   Kappel, 2012, p. 1). Use of social networking has increased dramatically among all age groups, including a 78% increase in use among the 50- to 64-year-old age group, and a 42% increase in use among persons older than 65 years over a time frame of a little more than 3 years. Facebook reported in June 2012 that it had 955 million active monthly users.

Twitter's influence on health care is suggested by the fact that more than 100 million pieces of healthcare information have been tweeted, with as many as 140 million tweets being recorded in a day's time (Prasad, 2013, p. 492). Moreover, people spend more than 700 billion minutes per month actively engaged with the Facebook site (Miller, 2011, p. 307).

The rapid growth of social media has found many healthcare professionals unprepared to face the new challenges or to exploit the opportunities that exist with these forums. The need to maintain confidentiality presents a major obstacle to the healthcare industry's widespread adoption of such technology; thus, social networking has not yet been fully embraced by many health professionals (Anderson, 2012, p. l). Englund and colleagues (2012) note that undergraduate nursing students may face ambiguous and understudied professional and ethical implications when using social networking venues.

Source: anytime.org

Another confounding factor is the increased use of mobile devices by health professionals as well as the public (Swartz, 2011, p. 345). The mobile device known as the smartphone has the capability to take still pictures as well as make live recordings; it has found its way into treatment rooms around the globe.

As a consequence of more stringent confidentiality laws and more widespread availability and use of social and mobile media, numerous ethical and legal dilemmas have been posed to nurses. What are not well defined are the expectations of healthcare providers regarding this technology. In some cases, nurses employed in the emergency department (ED) setting have been subjected to video and audio recordings by patients and families when they perform procedures and give care during the ED visit. Nurses would be wise to inquire—before an

incident occurs—about the hospital policy regarding audio/video recording by patients and families, as well as the state laws governing two-party consent laws. Such laws require consent of all parties to any recording or eavesdropping   activity (Lyons & Reinisch, 2013, p. 54).

3.2   Bioethics
Bioethics is defined as the application of ethics to the field of medicine and healthcare. Bioethics can also be defined as the study and formulation of healthcare ethics. Bioethics is also the study of the ethical issues emerging from advances in biology   and medicine. It is also moral discernment as it relates to medical policy and practice. Bioethics are concerned with the ethical questions that arise in the relationships among life sciences, biotechnology, medicine and medical ethics, politics, law, theology and philosophy.

Bioethics   takes on relevant ethical problems experienced by healthcare providers in the provision of care to individuals and groups. The fundamental background of bioethics that forms its essential nature is; the nature and need of humans as living, thinking beings; the purpose and function of the healthcare system in a human society; and an increased cultural awareness of human beings' essential moral status. Bioethics arose in the 1970s as healthcare began to change its focus from a mechanistic approach of treating disease to a more holistic approach of treating people with illness. As technology advances, increased recognition and acknowledgement of rights and the needs of individuals and groups receiving this high-tech care also increased.

"Bioethics" can be understood in a broader or narrower way. Following the broader construal, bioethics includes not only philosophical study of the ethics of medicine, but also such areas as medical law, medical anthropology, medical sociology, health politics, health economics and even some areas of medicine itself. On the narrower construal, bioethics, although it may draw on these other disciplines, is itself only an area of philosophical   inquiry.

Fundamental Ethical principles
Beneficence and Nonmaleficence; to   seek benefit from those who work with them and are careful not to harm. In their professional work, psychologists seek to preserve the well-being and rights of those who interact professionally with them and other affected persons, and the well-being of animal research topics.

Fidelity and Responsibility; to develop trusting relationships with those who work with them. They are aware of their professional and scientific responsibilities towards the community and the specific communities in which   they work.

Integrity; to seek to promote accuracy, honesty and honesty in science, teaching and practicing well.

Justice; recognition of justice and justice qualify all people to access and benefit from the contributions and equal quality in the processes, procedures and services.

Respect for People's Rights and Dignity; to respect the dignity and worth of all people, the rights of individuals to privacy, confidentiality and self-determination.

Autonomy; Agree to respect the right of the other to self-determination; and to support independent decision-making.

Paternalism; Health care professionals make decisions about treating and diagnosing the patient. Based on the belief of the health care professional about what is in the patient's best interest, he chooses to reveal or obscure the patient information in these three important areas. This principle is heavily loaded as an application of authority to the patient.

Ethical Decision Making
Ethical decision making refers to the process of making informed choices about ethical dilemmas based on a set of standards differentiating right from wrong. This type of decision making reflects an understanding of the principles and standards of ethical decision making, as well as the philosophic approaches to ethical decision making, and it requires a systematic framework for addressing the complex and often controversial moral questions.

As the high-speed era of digital communications evolves, the rights and the needs of individuals and groups will be of the utmost concern to all healthcare professionals. The changing meaning of communication, for example, will bring with its new concerns among healthcare professionals about protecting patients' rights of confidentiality, privacy, and autonomy. Systematic and flexible ethical decision-making abilities will be essential for all healthcare professionals.

3.3 Ethical Dilemma and Morals

Ethical or moral dilemmas are situations real or imagined where a person *must* choose between courses of action, all of which are morally unacceptable. Ethical dilemmas, also known as a moral dilemmas, are situations in which there is a choice to be made between two options, neither of which resolves the situation in an ethically acceptable fashion.

Ethical dilemma arises when moral issues raise questions that cannot be answered with a simple, clearly defined rule, fact, or authoritative view.

Moral refers to social convention about right and wrong human conduct that are so widely shared that they form a stable (although usually incomplete) communal consensus.

Moral dilemmas arise with uncertainty as is the case when the evidence we are confronted with indicated an action is morally right and other evidence indicates that this action is also morally wrong.

Uncertainty is stressed and in the face of inconclusive evidence on both sides of the dilemma, cause the person to question what he or she should do. There are times when the individual concludes that based on his or her moral beliefs, he or she cannot act. Uncertainty also arise from unanticipated effects or unforeseeable behavioural responses to action or the lack of action. Adding uncertainty to the situational factors and personal beliefs that must be considered creates a need for an ethical decision-making model to help one choose the best action.

An ethical dilemma is a conflict between alternatives, where choosing any of them will lead to a compromise of some ethical principle and lead to an ethical violation. A crucial feature of an ethical dilemma is that the person faced with it should do both the conflicting acts, based on a strong ethical compass, but cannot; he may only choose one.

4.0   CONCLUSION

As science   and technology advance, and policy makers and healthcare providers continue to shape healthcare practices including information management, it is paramount that ethical decisions are made. Healthcare professionals are typically honest, trustworthy, and ethical, and they understand that they are duty bound to focus on the needs and rights of their patients. At the same time, their day-to-day work is conducted in a world of changing healthcare landscapes populated by new technologies, diverse patients, varied healthcare settings, and changing policies set by their employers, insurance companies, and providers. Healthcare professionals need to juggle all of these balls simultaneously, a task that often results in far too many grey areas or ethical decision-making dilemmas with no clear correct course of action.

Patients rely on the ethical competence of their healthcare providers, believing that their situation is unique and will be respected and evaluated based on their own needs, abilities, and limitations. The healthcare professional cannot allow conflicting loyalties to interfere with judicious, ethical decision making. Just as in the opening example of the Apollo mission, it is uncertain where this technologically heightened information era will lead, but if a solid foundation of ethical decision making is relied upon, duties and rights will be judiciously and ethically fulfilled.

5.0   SUMMARY

In this unit you have learnt
Ethics and Bioethics
Ethics and social media
Ethical Dilemma, Morals and Moral dilemma
Ethical decision making.

6.0   ONLINE DISCUSSIONS AND ASSIGNMENTS

Differentiate between ethics and bioethics?
Describe ethical dilemma and morals in relations to your practice as a nurse?

7.0   REFERENCES/FURTHER READING

American Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.

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UNIT 2   APPLYING ETHICS TO INFORMATICS

CONTENTS
1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main content
        3.1   Applying ethics to informatics
4.0   Conclusion
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1.0   INTRODUCTION
Applying the ethical model for ethical decision making to manage ethical dilemmas in nursing informatics. Ethics is a component of the education of health care managers and supervisors. Recent advances in the technologies of health informatics present these leaders with new ethical challenges. Holding the promise of beneficence, these technologies are purported to increase access, improve quality, and decrease the costs of care. Aspects of these technologies, however, create conflicts with the ethical principles of autonomy, fidelity, and justice. Infoethics is suggested as a means to examine these conflicts.

2.0   INTENDED LEARNING OUTCOMES
At the end of this unit, you would have been understood the various aspects ethics is applied to nursing informatics.

3.0   MAIN CONTENT
3.1   Applying ethics to informatics
With the Knowledge age has come global closeness, meaning the ability to reach around the globe instantaneously through technology. Language barriers are being broken through technologically based translators that can enhance interaction and exchange of data and information. Informatics practitioners are bridging continents, and international panels, committees, and organisations are beginning to establish standards and rules for the implementation of informatics. This international perspective must be taken into consideration when informatics dilemmas are examined from an ethical standpoint; it promises to influence the development of ethical approaches that begin to accept that healthcare practitioners are working within international networks and must recognise, respect, and regard the diverse political, social, and human factors within informatics ethics.

The various ethical approaches can be used to help healthcare professionals make ethical decisions in all areas of practice. The focus of this text is on informatics. Informatics theory and practice have continued to grow at a rapid rate and are infiltrating every area of professional life. New applications and ways of performing skills are being developed daily. Therefore, education in informatics ethics is extremely important.

Typically, situations are analysed using past experience and in collaboration with others. Each situation warrants its own deliberation and unique approach, because each individual patient seeking or receiving care has his or her own preferences, quality of life, and healthcare needs in a situational milieu framed by financial, provider, setting, institutional, and social context issues. Clinicians must take into consideration all of these factors when making ethical decisions.

The use of expert systems, decision support tools, evidence-based practice, and artificial intelligence in the care of patients creates challenges in terms of who should use these tools, how they are implemented, and how they are tempered with clinical judgment. All clinical situations are not the same, and even though the result of interacting with these systems and tools is enhanced information and knowledge, the clinician must weigh this information in light of each patient's unique clinical circumstances, including that individual's beliefs and wishes.

Patients are demanding access to quality care and the information necessary to control their lives. Clinicians need to analyse and synthesize the parameters of each distinctive situation using a specific decision-making framework that helps them make the best decisions. Getting it right the first time has a tremendous impact on expected patient outcomes. The focus should remain on patient outcomes while the informatics tools available are ethically incorporated.

Facing ethical dilemmas on a daily basis and struggling with unique client situations may cause many clinicians to question their own actions and the actions of their colleagues and patients. One must realise that colleagues and patients may reach very different decisions, but that does not mean anyone is wrong. Instead, all parties reach their ethical decision based on their own review of the situational facts and understanding of ethics. As one deals with diversity among patients, colleagues, and administrators, one must constantly strive to use ethical imagination to reach ethically competent decisions.

Balancing the needs of society, his or her employer, and patients could cause the clinician to face ethical challenges on an everyday basis. Society expects judicious use of finite healthcare resources. Employers have their own policies, standards, and practices that can sometimes inhibit the practice of the clinician. Each patient is unique and has life experiences that affect his or her healthcare perspective, choices, motivation, and adherence. Combine all of these factors with the challenges posed by informatics, and it is clear that the evolving healthcare arena calls for an informatics-competent, politically active, consumer-oriented, business-savvy, ethical clinician to rule this ever-changing landscape known as health care.

The goal of any ethical system should be that a rational, justifiable decision is reached. Ethics is always there to help the practitioner decide what is right. Indeed, the measure of an adequate ethical system or theory or approach is, in part, its ability to be useful in novel contexts. A comprehensive, robust theory of ethics should be up to the task of addressing a broad variety of new applications and challenges at the intersection of informatics and health care.

The information concerning an ethical dilemma must be viewed in the context of the dilemma to be useful. Bioinformatics could gather, manipulate, classify, analyse, synthesize, retrieve, and maintain databases related to ethical cases, the effective reasoning applied to various ethical dilemmas, and the resulting ethical decisions. This input would certainly be potent— but the resolution of dilemmas cannot be achieved simply by examining relevant cases from a database. Instead, clinicians must assess each situational context and the patient's specific situation and needs and make their ethical decisions based on all of the information they have at hand.

Ethics is exciting, and competent clinicians need to know about ethical dilemmas and solutions in their professions. Ethicists have often been thought of as experts in the arbitrary, ambiguous, and ungrounded judgments of other people. They know that they make the best decisions they can based on the situation and stakeholders at hand. Just as clinicians try to make the best healthcare decisions with and for their patients, ethically driven practitioners must do the same.

Each healthcare provider must critically think through the situation to arrive at the best decision.

To make ethical decisions about informatics technologies and patients' intimate healthcare data and information, the healthcare provider must be competent in informatics. To the extent that information technology is reshaping healthcare practices or promises to improve patient care, healthcare professionals must be trained and competent in the use of these tools. This competency needs to be evaluated through instruments developed by professional groups or societies; such assessment will help with consistency and quality. For the healthcare professional to be an effective patient advocate, he or she must understand how information technology affects the patient and the subsequent delivery of care. Information science and its effects on health care are both interesting and important. It follows that information technology and its ethiCal, social, and legal implications should be incorporated. The need for confidentiality was perhaps first articulated by Hippocrates; thus, if anything is different in today's environment, it is simply the ways in which confidentiality can be violated. Perhaps the use of computers for clinical decision support and data mining in research will raise new ethical issues. Ethical dilemmas associated with the integration of informatics must be examined to provide an ethical framework that considers all of the stakeholders. Patients' rights must be protected in the face of a healthcare provider's duty to his or her employer and society at large when initiating care and assigning finite healthcare resources. An ethical framework is necessary to help guide healthcare providers in reference to the ethical treatment of electronic data and information during all stages of collection, storage, manipulation, and dissemination. These new approaches and means come with their own ethical dilemmas. Often they are dilemmas not yet faced owing to the cutting-edge nature of these technologies incorporated into all levels of professional education.

Just as processes and models are used to diagnose and treat patients in practice, so a model in the analysis and synthesis of ethical dilemmas or cases can also be applied. An ethical model for ethical decision making facilitates the ability to analyze the dilemma and synthesize the information into a plan of action (McGonigle, 2000). The model presented here is based on the letters in the word ethical. Each letter guides and prompts the healthcare provider to think critically (think and rethink) through the situation presented. The model is a tool because, in the final analysis, it allows the nurse objectively to ascertain the essence of the dilemma and develop a plan of action.

4.0   CONCLUSION

In order to apply ethical decisions about informatics technologies and patients' intimate healthcare data and information, we must be informatics competent. Just as we use processes and models to diagnose and treat our patients in practice, we can also apply a model in the analysis and synthesis of ethical dilemmas or cases.

Consider the ethical issues created by genomic databases or by sharing information in a health information exchange to promote population health. Does public good outweigh individual interests in data collection and data mining?

5.0   SUMMARY

At the end of this unit, you should be able understand the type of ethical model to apply in dealing with various patients.

6.0   ONLINE DISCUSSION AND ASSIGNMENTS
Identify moral dilemmas in healthcare informatics that would best be approached with the use of an ethical decision-making framework.
Discuss the evolving health care ethics traditions within their social and historical context.

7.0 REFERENCES/FURTHER READING

American Nurses Association (ANA). (2008). Nursing informatics: Scope and standards of practice. Silver Spring, MD: Nursebooks.org.

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UNIT 3:   ETHICAL MODEL FOR ETHICAL DECISION MAKING

CONTENTS
1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
3.1   Ethical Model for Ethical Decision Making
3.2   Application of Ethical Model
4.0   Conclusion
5.0   Summary
6.0   Online discussions and assignments
7.0   References

1.0   INTRODUCTION
Ethical decision making refers to the process of making informed choices about ethical dilemmas based on a set of standards differentiating right from wrong. This type of decision making reflects an understanding of the principles and standards of ethical decision making, as well as the philosophic approaches to ethical decision making, and it requires a systematic framework for addressing the complex and often controversial moral questions.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
- explain the ethical model for ethical decision making and
- explain the application of ethical models.

3.0   MAIN CONTENT
3.1   ETHICAL MODEL FOR ETHICAL DECISION MAKING
Examine the ethical dilemma (conflicting values exist).
Thoroughly comprehend the possible alternatives available.
Hypothesize ethical arguments.
Investigate, compare, and evaluate the arguments for each alternative.
Choose the alternative you would recommend.
Act on your chosen alternative.
Look at the ethical dilemma and examine the outcomes while reflecting on the ethical decision.

3.2   APPLYING THE ETHICAL MODEL
Examine the ethical dilemma:
Use your problem-solving, decision-making, and critical-thinking skills.
What is the dilemma you are analyzing?
Collect as much information about the dilemma as you can, making sure to gather the relevant facts that clearly identify the dilemma.
You should be able to describe the dilemma you are analyzing in detail.
Ascertain exactly what must be decided.
Who should be involved in the decision-making process for this specific case?
Who are the interested players or stakeholders?
Reflect on the viewpoints of these key players and their value systems.
What do you think each of these stakeholders would like you to decide as a plan of action for this dilemma?
How can you generate the greatest good?

Thoroughly comprehend the possible alternatives available:
Use your problem-solving, decision-making, and critical-thinking skills.
Create a list of the possible alternatives.
Be creative when developing your alternatives.
Be open minded; there is more than one way to reach a goal. Compel yourself to discern at least three alternatives.

Clarify the alternatives available and predict the associated consequences—good and bad—of each potential alternative or intervention.
For each alternative, ask the following questions:
Do any of the principles or rules, such as legal, professional, or organisational, automatically nullify this alternative?
If this alternative is chosen, what do you predict as the best-case and worst-case scenarios?

Do the best-case outcomes outweigh the worst-case outcomes?
Could you live with the worst-case scenario?
Will anyone be harmed? If so, how will they be harmed?
Does the benefit obtained from this alternative overcome the risk of potential harm that it could cause to anyone?

Hypothesize ethical arguments:
Use your problem-solving, decision-making, and critical-thinking skills.
Determine which of the five approaches apply to this dilemma.
Identify the moral principles that can be brought into play to support a conclusion as to what ought to be done ethically in this case or similar cases.
Ascertain whether the approaches generate converging or diverging conclusions about what ought to be done.

Investigate, compare, and evaluate the arguments for each alternative:
Use your problem-solving, decision-making, and critical-thinking skills. ▪ Appraise the relevant facts and assumptions prudently.
Is there ambiguous information that must be evaluated?
Are there any unjustifiable factual or illogical assumptions or debatable conceptual issues that must be explored?

Rate the ethical reasoning and arguments for each alternative in terms of their relative significance.
4= extreme significance
3 = major significance
2 = significant
1 = minor significance

Compare and contrast the alternatives available with the values of the key players involved.
Reflect on these alternatives:
Does each alternative consider all of the key players?
Does each alternative take into account and reflect an interest in the concerns and welfare of all of the key players?
Which alternative will produce the greatest good or the least amount of harm for the greatest number of people?
Refer to your professional codes of ethical conduct. Do they support your reasoning?

Choose the alternative you would recommend:
Use your problem-solving, decision-making, and critical-thinking skills.
Make a decision about the best alternative available.
Remember the Golden Rule: Does your decision treat others as you would want to be treated?
Does your decision take into account and reflect an interest in the concerns and welfare of all of the key players?
Does your decision maximize the benefit and minimize the risk for everyone involved?

Become your own critic; challenge your decision as you think others might. Use the ethical arguments you predict they would use and defend your decision.
Would you be secure enough in your ethical decision-making process to see it aired on national television or sent out globally over the Internet?
Are you secure enough with this ethical decision that you could have allowed your loved ones to observe your decision-making process, your decision, and its outcomes?

Act on your chosen alternative:
Use your problem-solving, decision-making, and critical-thinking skills.
Formulate an implementation plan delineating the execution of the decision.
This plan should be designed to maximize the benefits and minimize the risks.
This plan must take into account all of the resources necessary for implementation, including personnel and money.

Implement the plan.
Look at the ethical dilemma and examine the outcomes while reflecting on your ethical decision:
Use your problem-solving, decision-making, and critical-thinking skills.
Monitor the implementation plan and its outcomes.
It is extremely important to reflect on specific case decisions and evaluate their outcomes to develop your ethical decision-making ability.
If new information becomes available, the plan must be re-evaluated.
Monitor and revise the plan as necessary.

Case Analysis Demonstration
The following case study is intended to help students think through how to apply the ethical model. Review the model and then read through the case. Try to apply the model to this case or follow along as the model is implemented. students are challenged to determine their decision in this case and then compare and contrast their response with the decision the authors reached. Several more case studies presented for practice in implementing the ethical model for ethical decision making are available on the following website for your practice (http://nursing.jbpub.com/informatics).

Allison is a charge nurse on a busy medical—surgical unit. She is expecting the clinical instructor from the local university at 2:00 pm to review and discuss potential patient assignments for the nursing students scheduled for the following day. Just as the university professor arrives, one of the patients on the unit develops a crisis requiring Allison's attention. To expedite the student nurse assignments for the following day, Allison gives her electronic medical record access password to the instructor.

Examine the Ethical Dilemma

Allison made a commitment to meet with the university instructor to develop student assignments at 2:00 pm. The patient emergency that developed prevented Allison from living up to that commitment. Allison had an obligation to provide patient care during the emergency and a competing obligation to the professor. She solved the dilemma of competing obligations by providing her electronic medical record access password to the university professor.

By sharing her password, Allison most likely violated hospital policy related to the security of healthcare information. She may also have violated the American Nurses Association code of ethics, which states that nurses must judiciously protect information of a confidential nature. Because the university professor was also a nurse and had a legitimate interest in the protected healthcare information, there might not be a code of ethics violation.

Thoroughly Comprehend the Possible Alternatives Available

The possible alternatives available include the following: (1) Allison could have asked the professor to wait until the patient crisis was resolved; (2) Allison could have delegated another staff member to assist the university professor; or (3) Allison could have logged on to the system for the professor.

Hypothesize Ethical Arguments

The utilitarian approach applies to this situation. An ethical action is one that provides the greatest good for the greatest number; the underlying principles in this perspective are beneficence and nonmaleficence. The rights to be considered are as follows: right of the individual to choose for himself or herself (autonomy); right to truth (veracity); right of privacy (the ethical right to privacy avoids conflict and, like all rights, promotes harmony); right not to be injured; and right to what has been promised (fidelity).

Does the action respect the moral rights of everyone? The principles to consider are autonomy, veracity, and fidelity.
As for the fairness or justice, how fair is an action?
Does it treat everyone in the same way, or does it show favouritism and discrimination?

The principles to consider are justice and distributive justice. Thinking about the common good assumes one's own good is inextricably linked to good of the community; community members are bound by pursuit of common values and goals and ensure that the social policies, social systems, institutions, and environments on which one depends are beneficial to all. Examples of such outcomes are affordable health care, effective public safety, a just legal system, and an unpolluted environment. The principle of distributive justice is considered.
Virtue assumes that one should strive toward certain ideals that provide for the full development of humanity. Virtues are attitudes or character traits that enable one to be and to act in ways that develop the highest potential; examples include honesty, courage, compassion, generosity, fidelity, integrity, fairness, self-control, and prudence. Like habits, virtues become a characteristic of the person. The virtuous person is the ethical person. Ask yourself, what kind of person should I be? What will promote the development of character within myself and my community? The principles considered are fidelity, veracity, beneficence, nonmaleficence, justice, and distributive justice.

In this case, there is a clear violation of an institutional policy designed to protect the privacy and confidentiality of medical records. However, the professor had a legitimate interest in the

information and a legitimate right to the information. Allison trusted that the professor would not use the system password to obtain information outside the scope of the legitimate interest. However, Allison cannot be sure that the professor would not access inappropriate information. Further, Allison is responsible for how her access to the electronic system is used.

Balancing the rights of everyone—the professor's right to the information, the patients' rights to expect that their information is safeguarded, and the right of the   patient   in   crisis   to expect the best possible care—is important and is the crux of the dilemma. Does the patient care obligation outweigh the obligation to the professor? Yes, probably. Allison did the right thing by caring for the patient in crisis. By giving out her system access password, Allison also compromised the rights of the other patients on the unit to expect that their confidentiality and privacy would be safeguarded.

Virtue ethics suggests that individuals use power to bring about human benefit. One must consider the needs of others and the responsibility to meet those needs. Allison must

simultaneously provide care, prevent harm, and maintain professional relationships.
Allison may want to effect a long-term change in hospital policy for the common good. It is reasonable to assume that this event was not an isolated incident and that the problem may recur in the future. Can the institutional policy be amended to provide professors with access to the medical records system? As suggested in the HIPAA administrative guidelines, the

professor could receive the same staff training regarding appropriate and inappropriate use of access and sign the agreement to safeguard   the
Case Analysis Demonstration
records. If the institution has tracking software, the professor's access could be monitored to watch for inappropriate use.

Identify the moral principles that can be brought into play to support a conclusion as to what ought to be done ethically in this case or similar cases. The International Council of Nurses (2006) code of ethics states that "The nurse holds in confidence personal information and uses judgment in sharing this information" (p. 4). The code also states, "The nurse uses judgment in relation to individual competence when accepting and delegating responsibilities" (p. 5). Both of these statements apply to the current situation.

Ascertain whether the approaches generate converging or diverging conclusions about what ought to be done. From the analysis, it is clear that the best immediate solution is to delegate assisting the professor with assignments to another nurse on the unit.
Review and think through the items listed in the table below

Table 1: *Investigate, Compare, and Evaluate the Arguments for Each Alternative*

Detail Analysis of Alternate Actions					
Alternative	Good Consequences	Bad Consequences	Do Any Rules Nullify	Expected Outcome	Potential Benefit > Harm
Wait until crisis was resolved	No policy right violation Patent Rights safeguarded	Not the best use of the Professor's time	No	Best: crisis will require a short time Worst: Crisis may take a long time	Patients right protected Collegial relationship jeopardised Patients right may take precedence
Delegate to another staff member	No policy violated	Other staff may be equally busy or might not be as familiar with all patients	No	Best: Assignment will be completed Worst: May not have benefit of expert advise	Confidentiality of record is assured May compromise student learning. Patients right may take precedence
Log on to the system for the professor	Professor can begin making assignment	May still be a violation of policy regarding system access	Rules regarding access to medical records	Best: Assignment can be completed. Worst: Abuse of access to information	Potential compromise of records. Patients in crisis is cared for

Choose the Alternative You Would Recommend
The best immediate solution is to delegate another staff member to assist the professor. The best long-term solution is to change the hospital policy to include access for professors, as described previously.

Act on Your Chosen Alternative
Allison should delegate another staff member to assist the professor in making assignments. Look at the Ethical Dilemma and Examine the Outcomes While Reflecting on the Ethical Decision.

As already indicated in the alternative analyses, delegation may not be an ideal solution because the staff nurse who is assigned to assist the professor may not possess the same extensive

information about all of the patients as the charge nurse. It is, however, the best immediate solution to the dilemma and is certainly safer than compromising the integrity of the hospital's computer system. As noted previously, Allison may want to pursue a long-term solution to a potentially recurring problem by helping the professor gain legitimate access to the computer system with the professor's own password. The system administrator would then have the ability to track who used the system and which types of information were accessed during use. This case analysis demonstration provides the writer's perspective on this case and the ethical decision made. If your decision did not match this perspective, what was the basis for the difference of opinion? If you worked through the model, you might have reached a different decision based on your individual background and perspective. This does not make the decision right or wrong. A decision should reflect the best decision one can make given review, reflection, and critical thinking about this specific situation.

4.0   CONCLUSION
Technology continues to transform nursing. While there are many advantages to utilizing nursing informatics, nurses must be careful about the way they handle patient information. Patients have a right to expect that their data and health information is correctly secured and used. Nurses should always follow state and federal regulations as well as their healthcare organisation's policies to take the necessary steps to safeguard a patient's privacy.

5.0   SUMMARY
At the end of this unit, you should have learned the various steps involved in examining and analysing ethical model for ethical decision making for the benefits of the patient

6.0   ONLINE DISCUSSION AND ASSIGNMENTS
What is your understanding of the following ethical model for ethical decision making?
Examine the ethical dilemma (conflicting values exist).
Thoroughly comprehend the possible alternatives available.
Hypothesize ethical arguments.
Investigate, compare, and evaluate the arguments for each alternative.
Choose the alternative you would recommend.
Act on your chosen alternative.
Look at the ethical dilemma and examine the outcomes while reflecting on the ethical decision.

7.0   REFERENCES/FURTHER READING
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UNIT 4   APPLY NURSING INFORMATICS TO NURSING ADMINISTRATION, RESEARCH, PRACTICE AND EDUCATION

CONTENTS
1.0   Introduction
2.0   Intended Learning Outcomes
3.0   MAIN CONTENT
3.1   Applying nursing informatics to nursing administration, research, practice and education
4.0   Conclusion
5.0   Summary
6.0   Online discussions and assignments
7.0   References

1.0   INTRODUCTION
The application of nursing informatics can be described as follows, they include:
1. User Liaison: A nurse in this role is involved in the installation of a computer information system and interfaces with the system vendor, the users and management of health care institutions.
2. Product manager: The nurse in this role is responsible for constantly updating a current product and keeping abreast of new developments in the field. They develop applications like decision support systems, nurse staffing systems, scheduling systems, bedside and handheld terminals.
3. Clinical systems installator: In this role, the nurse works with the vendor who sold the computer systems to the health care institution. She/he helps train users of the system, serves as liaison between the health care institution and the vendor and works closely with the system coordinator for the health care institution.
4. Systems analyst/programmer- The nurse in this role works in the information systems department analyzing and maintaining the system. Other roles of nurses in informatics include chief information officer, nursing informatics consultant, network administrator, data repository specialist, nursing informatics project manager, nursing informatics educator and clinical information liaison (Nicoll, 2002). In Nigeria, nursing informatics is a new specialty and therefore should cover major sectors of the healthcare system where nurses work; this includes the clinical, administrative, research and education   areas.

2.0   INTENDED LEARNING OUTCOMES
By the end of this unit, you will be able to:
•   explain the application of nursing informatics to:
nursing administration,
Nursing research,
Clinical practice and
Nursing education

3.0   MAIN CONTENT
3.1:   Apply nursing informatics to nursing administration, research, practice and education
These four areas interrelate to deliver evidence-based practice. The importance of nurses in informatics functioning in these sectors is outlined as follows:
Nursing Clinical practice

In nursing, as   with healthcare in general, informatics is being used to address the challenges of the day, significantly impacting the way nurses' function in patient care.

One of the primary ways that informatics has changed nursing practice is through documentation. Gone are the days of paper charts that had to be meticulously updated with handwritten notes. Today, nurses are more likely to input notes into electronic health records and other systems that keep a patient's medical history up-to-date and easily accessible.

The Healthcare Information and Management Systems Society reported that as the result of electronic charting, nurses are able to obtain information quickly and efficiently, using the information to improve the daily workflow. Storing the information electronically is more easily available to all members of the care team, including the physician and other care providers, as well as staff teams at other healthcare organisations that the patient may visit. As the U.S. population becomes more mobile, it is increasingly important that their personal medical records can travel with them to any office or medical organisation they may visit during their lifetime.

Nursing informatics is also an important part of care coordination in nursing. The ability to track staffing, workflow and communication can help nurses to identify areas where current processes can be improved. This can also help ensure that staffing levels remain adequate, which is critical for providing patients with the best possible care. If the nurse-to-patient ratio drops too low, patients are more likely to suffer adverse results. Maintaining adequate levels helps nurses provide the best possible care each day without burning out. Below are some of the application of nursing informatics to nursing   clinical practice.

Provides a   work list to remind staff of planned nursing interventions.
Electronic medical records and computer based patient record.
Monitoring devices that record vital signs and other measurement directly into the client record.
Computer generated nursing care plan and critical pathway.
Automatic billing for supplies and procedures or procedures with nursing documentation.
Reminders and prompts that appear during documentation to ensure comprehensive   charting.

Nursing administration
Nursing administration is a broad term that encompasses nursing professionals who are knowledgeable of leadership practices as they relate to the nursing profession. The *Journal of the Medical Library Association (JMAL)* defines nurse administrators, or leaders, as those who design, manage, and facilitate patient care delivery within any number of healthcare settings.

Nursing leadership professionals must be able to develop a successful vision for the nursing organisation and nurture collaborative relationships among interdepartmental staff and management in an effort to implement that vision. Nurse leaders must apply analytical and problem-solving skills on a daily basis, and provide direct guidance and mentorship to their unit nurses, often acting as a liaison between staff, various levels of management, and the hospital's executive team.

Nurse administrators are often responsible for large-scale policy planning, staff management, financial resource management, and business management, in addition to their core responsibilities of coordinating and supervising the delivery of health care. Below are some of the application of nursing informatics to nursing administrations.
Automated   staff scheduling.

E-mail for improved communication among departments.
Cost analysis and finding trends for budget purposes.
Quality assurance and   outcome analysis.

Nursing education
Nursing informatics facilitate the integration of information, data, and knowledge to support nurses, patients, and other providers in their various settings and decision-making roles. The foundation of knowledge model specifically prompts nurses to extend their theoretical and metaphorical knowledge into practical, holistic determination based on a variety of factors and context. Because competencies in informatics includes but are not limited to information literacy, computer literacy, and the ability to use strategies and applications to manage data, knowledge and information, the ability of nursing students to use computer-mediated communication skills is essential to their success in the nursing field and as a means to improve patients' safety.

The rise of telecommunication, computer-mediated communication, and virtual technologies has opened up opportunities for improving communication and extending care within the healthcare industry. Proponents of instructional applications of computer technology view it as a way to erase geographical boundaries to students, enhance the presentation of content, improving learning outcome, and even tailored instructions to individual learning needs. When carefully matched with curricular objectives, technology becomes and efficient and affordable avenue through which nursing faculty may provide useful knowledge to their students. Now going far beyond simple applications of word processing software or spreadsheet, technology applications have evolved greatly, taking advantage of modern capabilities to provide nursing and related healthcare students with simulations, complex multimedia, virtual reality-assisted clinical scenarios, and a host of information and literature gathering internet tools.

Below are some of the application of nursing informatics to nursing education
Computerized   record keeping.
Computerized assisted instruction.
Interactive video technology (Telenursing).
Distance learning web based courses and degree programmes.
Teaching and   presentations.

Nursing research
Nursing research has evolved with technology. In this era of evidenced-based practice, clinicians must continue to think critically about their actions. What is the science behind intervention? Things must no longer be done a certain way just because they have always been done that way. Instead one should research the problem, use evidenced-base resources. Research helps nurses determine effective best practices and improve patient care.

Nursing research has evolved with technology. NI enhances and facilitate collaboration; improves access to online libraries, critically select electronic and no-electronic references, consolidate the research findings and combine and compare the conclusions, present the findings and propose a solution.

Nursing research is conducted to generate knowledge that is used to meet the needs of healthcare delivery systems, organisations, nurses and patients. Through nursing research, the

researchers generate knowledge for nursing profession. Knowledge generations is extremely important in the advancement of nursing science.

Nursing research falls largely into two areas:

Quantitative research is based in the paradigm of logical positivism and is focused upon outcomes for clients that are measurable, generally using statistics. The dominant research method is the randomised controlled trial.

Qualitative research is based in the paradigm of phenomenology, grounded theory, ethnography and others, and examines the experience of those receiving or delivering the nursing care, focusing, in particular, on the meaning that it holds for the individual. The research methods most commonly used are interviews, case studies, focus groups and ethnography.

Below are some of the application of nursing informatics to research
Computerized literature searching.
Retrieval of evidence based practice.
The adoption of standardised language related to nursing terms.
The ability to find trends in aggregate data i.e. data derived from large population groups statistical software.
Use of knowledge bases via internet.

4.0   CONCLUSION
Nurses spend a significant proportion of their time on information related activities as part of clinical decision making in order to lead, co-ordinate and support the delivery of safe, effective, person cantered care. In order to provide high quality care for patients, nurses need up-to-date, accurate, relevant information about the person and access to the latest evidence or best practice at the point of care delivery. Hence, research, education, clinical practice and administrations in nursing is necessary for the development of nursing practice since nursing informatics is a new specialty.

5.0   SUMMARY
At the end of this unit, you should have acquired knowledge nursing practice, nursing education, nursing research, and nursing administration in relation to nursing informatics.

6.0   Online Discussions and Assignments
Describe how nursing informatics is applied in:
Nursing clinical practice
Nursing administration
Nursing education
Nursing education

7.0   REFERENCES/FURTHER READING
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