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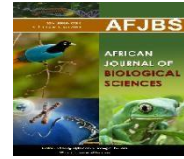## African Journal of Biological Sciences

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From Artificial Intelligence to Augmented Intelligence: Practical Guidance for Nurses

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Abstract: -
AI encompasses various technologies, including Machine learning which allows systems to learn from data and improve over time, Natural Language Processing, enabling computers to understand and generate human language, and deep learning, A subset of machine learning involving artificial neural networks inspired by the human brain.

**Keyword:** *Artificial Intelligence, Practical Guidance for Nurses*

Introduction: -

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, primarily computer systems. This includes learning, reasoning, and self-correction. Augmented Intelligence (AuI) builds upon AI by emphasizing the collaboration between humans & machines to enhance decision-making and problem-solving capabilities.
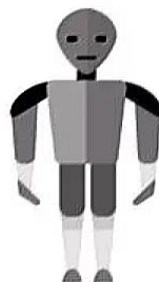
The **transition from AI to AuI in Nursing** is crucial as it shifts the focus from automation to augmentation, empowering nurses to make more informed decisions and provide better patient care.

Understanding Artificial Intelligence: -
AI encompasses various technologies, including Machine learning which allows systems to learn from data and improve over time, Natural Language Processing, enabling computers to understand and generate human language, and deep learning, A subset of machine learning involving artificial neural networks inspired by the human brain. **Examples of AI applications in healthcare include:** Diagnostic support system, Medication management tools, Virtual health assistants all of which aim to improve patient outcomes and streamline clinical workflows.

TRANSITION TO AUGMENTED INTELLIGENCE:
AuI differs from **AI** in that it emphasizes collaboration between **humans** and **machines**, with the goal of enhancing human intelligence rather than replacing it. Nurses play a crucial role in the transition to AuI by providing insights into: Clinical workflows, ensuring that AuI systems are aligned with patient-centered care principles, And advocation for ethical and responsible use of AI technologies. With the increasing amount of **data** available in the healthcare setting, coupled with **new emerging technologies** implemented on a daily basis, nurses are presented with many opportunities to **apply Data, Information,** And **knowledge to practice in novel ways.** Computers and other automated systems can manage and process the large amounts of data now available. Specific to the nursing profession, AI can be used as part of Daily workflows and has the potential to Eliminate inefficiencies that contribute to existing clinical burnout.

Revised Data Information Knowledge Wisdom Model 2013 Version
To offer a foundation for **data literacy**, let's review the **component of Nelson 2020 Model**, this includes a description of the types of **analytics processes in healthcare**. This foundation knowledge can be useful to support nursing involvement in AI related activities.
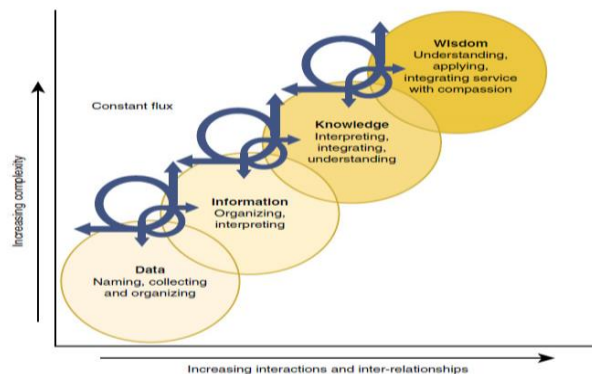
DATA: -
Data, also called **data elements**, they are collection of the facts that are unorganized. In healthcare, the biggest sources of data, typically in the form of text or pixel, in the **EHR. (Electronic Health Record).** They may be generated and collected by other providers using clinical technologies and tools that may not be connected to the EHR. Other ways to obtain data from patients in an **electronic fashion** using **monitoring devices, sensors, or mobile health applications.**

INFORMATION: -

Information is how **we understand facts or data** within context in a structured way. In healthcare, the context is specifically information to support clinical needs. It **not** only requires **contextualizing,** but **summarizing and analyzing data**, to uncover relationships that produces logical meaning for the clinician. **Example: - A group of blood pressure readings that are organized in a temporal fashion alongside other symptom data elements in a way that supports interpreting the significance of the readings is an example of information.**

KNOWLEDGE: -

Knowledge is a way to **formalize** the relationships between the **data and information.** It is the **result** of understanding the **implications of the information**. Knowledge might be represented as a set of rules to facilitate understanding, such as indication when a blood pressure may be out of range for a particular diagnosis.

WISDOM: -

Wisdom is the **application of data information, and knowledge** to make **decisions, implement nursing actions,** and **improve healthcare processes.** Wisdom is also connected to the ability to **integrate data** with professional values and **apply data to human problems**. An example is the provision of culturally appropriate, low-salt diet education materials to a patient with uncontrolled blood pressure.

CONSTANT FLUX: -

Depicted in the figure, the **interrelationship** between **data, information, knowledge, and wisdom** is represented by the theoretical framework: This framework serves as the foundation for explaining the role of AI systems in generating knowledge.

ANALYTICS: -

A field of computer science that uses maths, statistics, and machine learning to find meaningful patterns in data. Analytics – or data analytics – involves sifting through massive data sets to discover, interpret, and share new insights and knowledge. There are **four main levels** of **data analytics** that differ in the level of complexity of analysis. **Descriptive, diagnostics, and predictive** analytics are commonly used in healthcare, but **prescriptive** applications are in their infancy.

Descriptive Analytics is the most basic form of analytics. It is a way to explain what happened using data. It is beneficial for exploring the data. This type of analysis is more comprehensive and focuses on what they are describing in real time.

Diagnostic Analytics takes analysis a step further to understand, **why something happened within the data collected.** This is accomplished by using the **data identify** the **root cause** and then **isolating** any **confounding information.** With a **health data set**, **symptom data** and **patient history data** can be used to **generate diagnosis** for patients.

Predictive Analytics is used in forecasting what is likely to happen. By looking at historical patterns in the data, particular outcomes may be predicted. **Predicted outcomes** may be presented to **clinicians** to assist with **decision-making**. Once identified, decisions may be automated using algorithm and technologies.

Prescriptive Analytics is the most advance level of analytics. This method uses the data to recommend actions and strategies based on the forecast. Various outcomes are tested to identity the best result, given the data provided.

ARTIFICIAL INTELLIGENCE:
An **umbrella term** for a set of tools that make computers **'smarter'.** AI is a branch of **computer science** with many **sub-fields**, all of which strive to mimic some aspects of **human intelligence**. In the healthcare domain, AI-based applications are used to surface information from the EHR to clinicians and provide correlations from the data that might not be easily discoverable given current view.

Three types of AI
Machine Learning is currently the most common **subset of AI** used in **healthcare**. This statistical method enables a system to learn from data without explicitly being programmed. It can be used to automate predictive analytics and can support precision medicine activities that tailor treatments to a specific patient care profile. Some EHR software vendors have prebuilt machine learning models as part of their products, such as the Cerner EHR that uses **AI for A1C risk predictions.**
Natural Language Processing is an AI specialization area used to process and analyze large amounts of **human language data** in a **textual format.** NLP enables a computer to **read and understand data by mimicking natural language.** In **healthcare**, it is used to **understand and classify clinical documentation.** NLP systems can analyze Unstructured clinical notes on patients, give insight into understanding quality, and ultimately, Provide better results for patients.

Computer vision is the method of using advanced AI algorithms to assist with image processing that reads in real time. It is used to **discover patterns in images and videos for tasks that require a trained eye,** thereby increasing accuracy and saving time for clinicians. This **method** can be **used to detect and interpret early symptoms** through physiologic monitoring or detection of patient movement.

POTENTIAL BENEFITS OF AI
AI-based technologies have the potential to assist nurses in many tasks, freeing time to focus on patient care. Tasks accomplished by an AI-enabled robot or AI-based software support include lifting, staffing assignments, real-time documentation, and the review of patent generated health data e.g. health monitoring app on a smartphone.

ROBOTS, nurses injure themselves at high rates while assisting, turning, and lifting patients. AI-enabled robots can assist nurses when they need to move a patient such as with the **Robot for Interactive Body Assistance (RIBA)** robot from Japan which can lift patients upto 80 kilograms.

STAFFING, the assignment of patient care load has long stumped nurse managers. The savvy nurse understands how to distribute patients equally at the beginning of a shift, but it is impossible to know who will be transferred or how many patients will be admitted during a particular shift. Software can analyze patterns of patient transfer and possible admissions to predict the characteristics census over time. This level of analysis supports unit functions and provides transparency for unit staffing.

DOCUMENATION IMPROVEMENT, it is highly anticipated that AI solutions will soon be used to reduce the amount of time spent by nurses charting in front of a computer. This includes limiting the search for relevant data for clinical decision-making. Similarly, ambient voice enabled AI using smart speakers can be used to convert spoken words to clinical notes and documentation.

PATIENT GENERATED HEALTH DATA, there is a tidal wave of health-related data that patients collect using smart watches, apps and other devices. Patients are already trying to share these data with providers, but a new, voluminous data sources can be challenging for busy clinicians to review. AI software can efficiently filter these new data sources given the care context, present it to the nurse in a meaningful way, and allow the visualization of important trends when integrated into the EHR.

PRACTICAL GUIDANCE FOR NURSES:
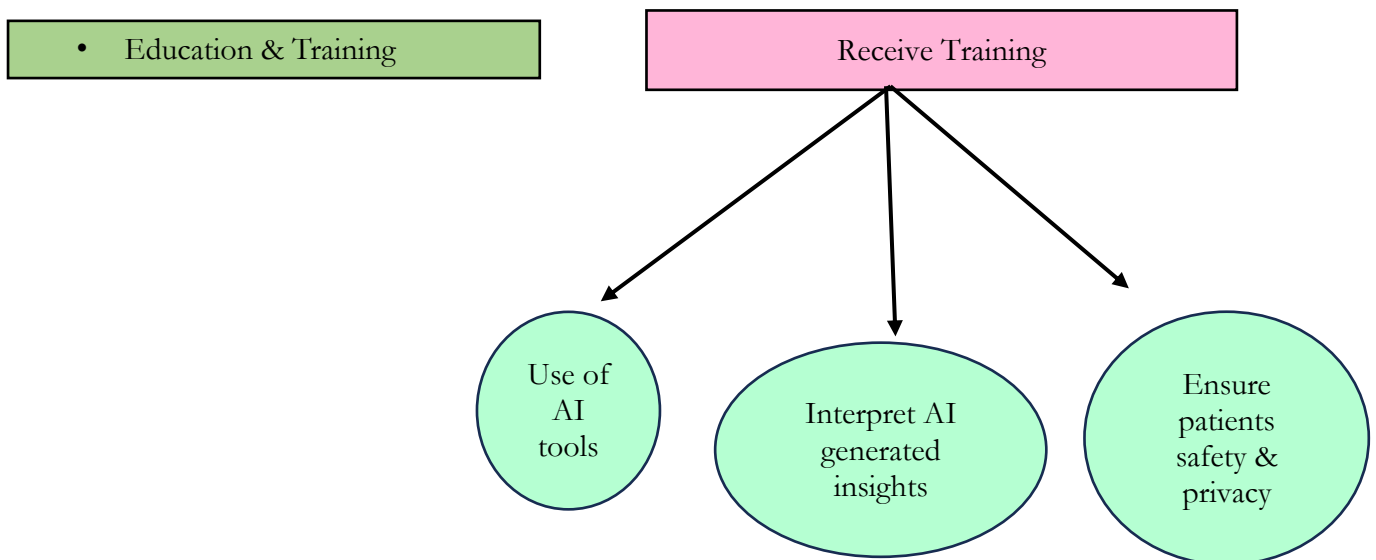
ETHICAL CONSIDERATION:
Nurses must consider the ethical principles:

CHALLENGES IN AI: - AI solutions promise to provide a number of improvements for healthcare, patients, and specifically nurses in practice. Several unintended consequences raised by clinicians are:

1. Job security or position replaced by technology
2. Trust needed to understand the mechanisms that lead to recommendations.
3. Diversity, equity and inclusion concerns about the applicability of AL solutions to a diverse set of patients and clinicians.

CONCLUSION: -

The transition from **AI to AuI** represents a **paradigm shift** in **nursing practice**, emphasizing collaboration between **humans** and **machines** to enhance **decision-making** and improve **patient outcomes.** Nurses have a critical role to play in shaping the future of AuI in healthcare, advocating for the responsible use of AI technologies and ensuring that patient safety and privacy are prioritized. By embracing AuI, nurses can harness the **power of technology** to enhance their **clinical practice** and **improve** the delivery of **patient care.**

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