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Health Care Informatics IQ:
Fostering the Human Connection

Competency Refinement: Designing an EHR Alert using AI and Traditional Bibliographic Databases

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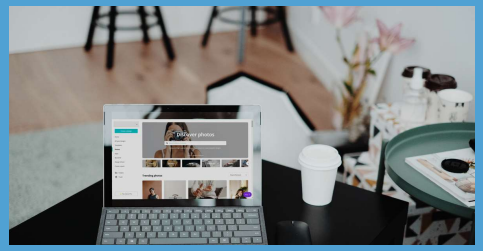
Learning Objectives

- Discuss survey results reflecting students' experience with their Clinical Information System and informatics competencies.
- Describe the revision of a competency on EHR alert design, including the integration of Artificial Intelligence (AI) tools in the competency.
- Assess student mastery of a competency focused on EHR alert design.
- Evaluate student feedback on the use of AI in the competency.

Background



Clinical Decision Support Tools

Patient Care
Clinical behavior

Best Practice Alerts

Embedded in Electronic health record (EHR)

Examples

Screen for risk factors – physical activity
Check labs – medication alerts

AACN Essentials

Informatics and Healthcare Technologies

"Information and communication technologies and informatics processes are used to provide care, gather data, form information to drive decision making, and support professionals …. to manage and improve the delivery of safe, high-quality, and efficient healthcare services …

8.1 Describe the various information and communication technology tools used in the care of patients, communities, and populations.

8.1g Identify best evidence and practices for the application of information and communication technologies to support care.

8.2 Use information and communication technology to gather data, create information, and generate knowledge.

8.2f Generate information and knowledge from health information technology databases.

The Essentials: Core competencies for Professional Nursing Education, p. 46-48

Background

SINI 2022

Item #	Item	MSN	DNP
9	Initiates alert for clinical decisions/standards	15.2%	10.9%

- SINI 2022 – Results from MUMSI survey
- Maturity-Sensitive Index (MUMSI)
  - Present and Used
  - Present and not used
  - Not present
  - Do not know

McBride, S., Tietze, M., Hanley, M. A., & Thomas, L. (2017). Statewide study to assess nurses' experiences with meaningful use-base electronic health records. CIN: Computers, Informatics, Nursing, 35(1), 18-28. Doi: https://dx.doi.org/10.1097/CIN.0000000000000290

Advanced-Level Nursing Education Strategies

- AACN Domain 8 guided strategy development directed at MUMSI items using case studies, simulations, data quality measures, quality improvement assignments, development of a toolkit, and plan-do-check cycles.

Competency 8.1 Describe the Various Information & Communication Technology Tools Used in the Care of Patients, Communities, & Populations.		
MUMSI Item	Strategy Purpose	Teaching & Learning Activities
09 Initiates alerts for clinical decision/standards	Proposes and discusses triggers on data within the electronic system that alerts the clinician on patient safety events These alerts could be driven by accreditation (2022 National Safety goals [pt. ID, medications, mistakes in the OR, infection, test results, and alarms) or an institutional safety issue not guided by the National Pt. safety goals. https://www.jointcommission.org/-/media/tjc/documents/standards/national-patient-safety-goals/2022/simple_2022-hap-npsg-goals-101921.pdf	1. Design an alert from a case study that addresses a patient safety concern. This assignment would address stakeholders, CDS interventions, and implementation strategies. 2. Participate in simulation experience: EHR provides alerts for DC catheter or xxx and responds by 1.) discussing data which prompted alert, 2.) where data found in EHR, and 3.) activities appropriate to address alert. (Essentials 8.1g; 8.2h; 8.3)

What is Artificial Intelligence (AI)?

Theory and development of computer systems capable of performing tasks that historically required human intelligence, such as recognizing speech, making decisions, and identifying patterns. AI is an umbrella term that encompasses a wide variety of technologies, including machine learning, deep learning, and natural language processing (NLP).

https://www.coursera.org/articles/what-is-artificial-intelligence

University of Michigan at the Forefront of Artificial Intelligence (AI)

The University of Michigan has been at the **forefront** and a **leader** in advocating for the integration of AI into **teaching and learning, with a strong emphasis on fairness, access, and equity, along with being responsible, ethical, and legal use**. A center has been established to explore and experiment with generative AI's potential role in teaching and learning. The University of Michigan has embraced generative AI and is actively working to integrate it into various aspects of campus life, all while prioritizing privacy and inclusivity.

https://ai.umich.edu/blog-posts/center-explores-experiments-with-generative-ais-potential-role-in-teaching-and-learning/

Study Aim

- Evaluate students' mastery of competency focused on designing electronic alert triggers using traditional bibliographic databases versus AI tools.

Methods

- Retrospective descriptive design
- Convenience sample
- Enrolled in online Informatics courses
- Students from two Midwest institutions
  - DNP students (NP and Nurse Executive concentrations)
  - MSN students (Leadership, Analytics, Innovation)
- IRB-exempt

Methods

MUMSI Survey

24 items based on Stage 1 of Meaningful Use measure

- Present and Used
- Present and not used
- Not present
- Do not know

Completed MUMSI Survey

- Baseline - Beginning of course
- Final - End of course

McBride, S., Tietze, M., Hanley, M. A., & Thomas, L. (2017). Statewide study to assess nurses' experiences with meaningful use-base electronic health records. CIN: Computers, Informatics, Nursing, 35(1), 18-28. Doi https://dx.doi.org/10.1097/CIN.0000000000000290

Methods

SANICS Survey

25 Items based on Nursing Informatics Competency

- Not competent (1)
- Somewhat competent (2)
- Competent (3)
- Proficient (4)
- Expert (5)

Completed SANICS Survey

- Baseline - Beginning of course
- Final - End of course

Yoon, S., Shaffer, J. A., & Bakken, S. (2015). Refining a self-assessment of informatics competency scale using Mokken scaling analysis. *Journal of Interprofessional Care*, *29*(6), 579-586. https://doi.org/10.3109/13561820.2015.1049340

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Methods - Assignment

Competency

- Designing an EHR Alert for Intimate Partner Violence

Data Analysis

- Student competency scores –
  1 (Mastered), 2 (Competent), or 3 (Did not master)
- Descriptives
- SPSS version 29

Competency – Screening for Intimate Partner Violence

- Find the research evidence for the groups of people that should be screened for intimate partner violence.
- UpToDate and PubMed
- Develop list of high-risk individuals for domestic violence.

Competency – Designing an EHR Alert for Intimate Partner Violence

- Revisions
  - AI added to competency
  - Alert design
  - Proposal to NI team

Competency – Designing an EHR Alert for Intimate Partner Violence

Objective:

Design and discuss an electronic alert for clinical decisions that inform clinicians about patient safety events, explicitly focusing on intimate partner violence.

Aims

Search for “intimate partner violence.” Based on the information:

- Who are the high-risk individuals to be included in your EHR system to trigger domestic violence screening?
- Cite the articles that informed your decision in APA format in the EHR Alert Template.

Competency –Designing an EHR Alert for Intimate Partner Violence

- Search for relevant literature
  - Traditional bibliographic databases
  - AI tools
- Select articles
- Identify alert triggers
- Design alert trigger and intervention screen
- Propose alert
- Use evidence-based research to support your proposal

Competency – Designing an EHR Alert for Intimate Partner Violence

PubMed and UpToDate

- Find two articles on high-risk individuals

. Search for “intimate partner violence.”

- Based on the information:

- Who are the high-risk individuals to be included in your EHR system to trigger domestic violence screening?

- Cite the articles that informed your decision.

Competency - Designing an EHR Alert for Intimate Partner Violence

Bard and Claude

- Find two articles on high-risk individuals

Use this prompt:
Could you identify 2 recent articles from a medical-oriented database like PubMed? The topic is intimate partner violence screening.
(You may have to follow up with additional prompts to get the desired result, i.e., a more recent article, etc. For more information on Generative AI tools, read this summary.)

***NOTE:** Bard and Claude are free Generative AI tools that can screen research article databases. You will have to create an account with both of them for access.

Results – MUMSI Scores

DNP Students – Baseline

In my facility, the Electronic Health Record (EHR): - 09. Initiates alerts for clinical decisions/standards (example: "Discontinue urinary catheter within 24 hours")

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present and used	71	59.2	63.4	63.4
	Present and not used	6	5.0	5.4	68.8
	Not present	21	17.5	18.8	87.5
	I don't know	14	11.7	12.5	100.0
	Total	112	93.3	100.0	

Results – MUMSI Scores

MSN Students – Baseline

In my facility, the Electronic Health Record (EHR): - 09. Initiates alerts for clinical decisions/standards (example: "Discontinue urinary catheter within 24 hours")

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present and used	11	64.7	64.7	64.7
	Present and not used	1	5.9	5.9	70.6
	Not present	2	11.8	11.8	82.4
	I don't know	3	17.6	17.6	100.0
	Total	17	100.0	100.0	

Results – Competency Mastery

DNP Students (n=84; 22 groups)

90% - Mastered

9% - Competent

1% - Did not master

MSN Students (n=14; 4 groups)

100% - Mastered

Results – Student Feedback

DNP Students

- Instances of erroneous and off-topic results.
- Some found tools easy to use and helpful to find recent articles.
- Need for extensive trial and error and challenge of verifying references.
- AI tools generally less reliable and efficient compared to traditional bibliographic databases.
- AI required several prompts to return results
- References returned by AI tools were not always accurate and required further searching.

Results – Student Feedback

DNP Students

- Using AI is a challenge to obtain relevant, topic-specific information compared to traditional databases

Results – Student Feedback

MSN Students

- Articles were identified with titles and journals, but the articles could not be found
- Citations could not be generated from the AI search given links were not provided
- Unable to verify sources (websites versus scholarly sources)
- Output was “no articles available”
- Specific order of requesting the search provided better results (specific IPV information, show articles, create citations for these articles).
- One AI search engine could not provide medical-oriented information
- AI search engines have a broad scope of information, but they are not always accurate
- Inconsistencies between the tile and listed author and year
- Multiple searches are needed to yield relevant literature
- Unable to validate the search methods and potential biases

Results – MUMSI Scores

DNP Students – Final

In my facility, the Electronic Health Record (EHR): - 09. Initiates alerts for clinical decisions/standards (example: "Discontinue urinary catheter within 24 hours")

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present and used	54	62.8	69.2	69.2
	Present and not used	4	4.7	5.1	74.4
	Not present	17	19.8	21.8	96.2
	I don't know	3	3.5	3.8	100.0
	Total	78	90.7	100.0	

Self Assessment Informatics Competency Scores

Competency Questions	MSN Baseline (n=17)	MSN Final (n=14)	DNP Baseline	DNP Final
Conduct online literature searches (e.g. PubMed)	2.71	3.57	3.03	3.50
Assess accuracy of health information on the Internet.	2.41	3.21	2.68	3.39
Identify, evaluate, and apply the most relevant information.	2.41	3.36	2.81	3.41

Conclusions

- Course redesign addressed student knowledge deficits about alerts within EHR.
- Using AI tools for searching the literature needs further investigation.
- Use of AI tools in designing a decision support competency needs further refinement.

Recommendations

Competency redesign –

- Select and appraise best article from traditional bibliographic databases.
- Use AI tools to appraise and select best alert triggers.
- Compare EHR alert designed by students in comparison to AI tools.
- Compare proposals on new EHR alert developed by students in comparison to AI tools.

Questions?

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