Effective Health Care

Age as a Factor in Medication Administration Errors

Results of Topic Selection Process & Next Steps

The nominator is interested in information on factors in nursing that influence medication errors. They are specifically interested in the age as a factor.

We identified one study relevant to the nomination. Due to the absence of sufficient studies, a new review is not feasible. No further activity on this nomination will be undertaken by the Effective Health Care (EHC) Program.

Topic Brief

Topic Number and Name: Age as a factor in medication administration errors, #837

Nomination Date: 1/8/2019

Topic Brief Date: 5/10/2019

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Conflict of Interest: None of the investigators have any affiliations or financial involvement that conflicts with the material presented in this report.

Background

- Medication errors can occur at any step along the pathway that begins when a clinician prescribes a medication and ends when the patient receives the medication. These steps are:[1]
    - Ordering. The clinician selects the appropriate medication, and dose, frequency and duration
    - Transcribing. In a paper-based system, someone must read and interpret the prescription correctly
    - Dispensing. The pharmacist must check for drug–drug interactions and allergies, then release the appropriate quantity of the medication in the correct form.
    - Administration. The correct medication must be supplied to the correct patient at the correct time. In hospitals or long-term care settings, this is generally the responsibility of nurses or other trained staff; in ambulatory care the responsibility falls to patients or caregivers.
- Errors in medication administration happens at one of the final steps in the pathway between the decision to prescribe a mediation and a patient's receipt of the medication.[2]
- Medication administration errors can occur through failures in one of the five rights (right patient, medication, time, dose, and route).[2]
- Adverse drug events—harm experienced by a patient as a result of exposure to a medication—are often the result of medication errors and are likely the most common source of preventable harm in both hospitalized and ambulatory patients. Preventing adverse drug events is a major priority for accrediting bodies and regulatory agencies.[1]
- Preventable adverse drug events result from a medication error that reaches the patient and causes any degree of harm. It is generally estimated that about half of ADE are preventable.
- In a review of medication administration errors, the median error rate of 8-25% of all medications administered had a medication administration error. Most of the time this was related to administering medications at the wrong time. [3]
- This can be the result of factors at the individual level and system-level. Some of these factors are well-established.[2]
    - Individual level factors such as interruptions and distractions
    - System level factors include understaffing and human factors problems

Key Question and PICOs

The key question for this nomination are:

1. Is the nursing-related factor of age associated with higher rates of medication errors?

To define the inclusion criteria for the key questions, we specify the population, interventions, comparators, outcomes, and setting (PICOS) of interest (Table 1).

Table 1. Key Questions and PICOS

Key Questions	
Population	Patients in hospitals and long-term care settings
Interventions	Nursing staff administering medications to patients Subgroups: age ranges
Comparators	
Outcomes	Medication error Administration medication error
Setting	Inpatient, long-term care settings

Methods

We assessed nomination for priority for a systematic review or other AHRQ EHC report with a hierarchical process using established selection criteria. Assessment of each criteria determined the need to evaluate the next one. See Appendix A for detailed description of the criteria.

1. Determine the *appropriateness* of the nominated topic for inclusion in the EHC program.
2. Establish the overall *importance* of a potential topic as representing a health or healthcare issue in the United States.
3. Determine the *desirability of new evidence review* by examining whether a new systematic review or other AHRQ product would be duplicative.
4. Assess the *potential impact* a new systematic review or other AHRQ product.
5. Assess whether the *current state of the evidence* allows for a systematic review or other AHRQ product (feasibility).
6. Determine the *potential value* of a new systematic review or other AHRQ product.

Appropriateness and Importance

We assessed the nomination for appropriateness and importance.

Desirability of New Review/Duplication

We searched for high-quality, completed or in-process evidence reviews published in the last three years on the key questions of the nomination. See Appendix B for sources searched.

Impact of a New Evidence Review

The impact of a new evidence review was qualitatively assessed by analyzing the current standard of care, the existence of potential knowledge gaps, and practice variation. We considered whether it was possible for this review to influence the current state of practice through various dissemination pathways (practice recommendation, clinical guidelines, etc.).

Feasibility of New Evidence Review

We conducted a literature search in PubMed and CINAHL from the last five years. We reviewed all identified titles and abstracts for inclusion and classified identified studies by key question and study design to assess the size and scope of a potential evidence review. See Appendix C for search strategies.

Results

See Appendix A for detailed assessments of all EPC selection criteria.

Appropriateness and Importance

This is an appropriate and important topic.

Desirability of New Review/Duplication

A new evidence review would not be duplicative of an existing evidence review. We found no recent reviews that cited age as a factor in medication administration errors.

Impact of a New Evidence Review

A new systematic review may have limited impact. Other factors influencing medication administration is well-established. Age of nursing staff has not been identified as a relevant factor.

Feasibility of a New Evidence Review

A new evidence review is not feasible. We found one potentially applicable study. This study found that medication administration errors were highest among nurses 18-25 years old.[4] See Table 2, Feasibility column.

Table 2. Key Questions and Results for Duplication and Feasibility

Key Question	Duplication (5/2016-5/2019)	Feasibility (4/2014-5/2019)
KQ 1: Age and medication administration errors	Total number of identified systematic reviews: 0	Relevant Studies Identified: 1 • Cross-sectional: 1[4] Clinicaltrials.gov: 0

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; KQ=Key Question

Additional information

We did not identify systematic reviews that assessed age as a factor influencing rates of medication administration errors. However we identified related literature reviews and systematic reviews that assessed a range of individual and system-related factors affecting medication administration errors and adverse events.

- Schroers et al.[5] Characteristics of interruptions during medication administration: an integrative review of direct observational studies (2018). This integrative review characterized interruptions during the nursing medication administrative process. It did not correlate interruptions with medication errors. This review found that interruptions were most commonly caused by another nurse or staff member or are self-initiated. They usually lasted about a minute.
- Wolfe et al.[6] Incidence, causes and consequences of preventable adverse drugs events: a systematic review systematic reviews (2018).
- Al-Jumaili et al.[7] Comprehensive literature review of factors influencing medication safety in nursing homes using a systems model (2017). This literature review identified five categories of factors affecting medication safety in nursing homes: persons (resident and staff, organization, tools and technology, tasks and environment. Person characteristics included inadequate nursing staff medication knowledge and training. It noted that workload and time pressure negatively impacted staff task performance. Environmental characteristics such as staff distraction and interruption negatively affected medication safety.
- Oliveira et al.[8] Nursing workload and occurrence of adverse events in intensive care: a systematic review (2016). This systematic review specifically focused on workload in the ICU setting.
- Parry et al.[9] Factors contributing to registered nurse medication administration error: A narrative review (2015). This review found that themes related to the person domain were Registered Nurses' characteristics (experience and expertise, and demography) and their lived experience of work (fatigue and shift pattern, quality of working life).
- Keers et al.[3] Causes of medication administration errors in hospitals: a systematic review of quantitative and qualitative evidence (2013).

Summary of Findings

- Appropriateness and importance: The topic is both appropriate and important.
- Duplication: A new review would not be duplicative of an existing product. We found no relevant reviews.
- Impact: A new systematic review has unclear impact potential.
- Feasibility: A new review is not feasible.

References

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9. Parry AM, Barriball KL, While AE. Factors contributing to registered nurse medication administration error: a narrative review. Int J Nurs Stud. 2015 Jan;52(1):403-20. doi: 10.1016/j.ijnurstu.2014.07.003. PMID: 25443300. https://www.ncbi.nlm.nih.gov/pubmed/25443300

Appendix A. Selection Criteria Assessment

Selection Criteria	Assessment
1. Appropriateness	
1a. Does the nomination represent a health care drug, intervention, device, technology, or health care system/setting available (or soon to be available) in the U.S.?	Yes
1b. Is the nomination a request for a systematic review?	No
1c. Is the focus on effectiveness or comparative effectiveness?	No
1d. Is the nomination focus supported by a logic model or biologic plausibility? Is it consistent or coherent with what is known about the topic?	Yes
2. Importance	
2a. Represents a significant disease burden; large proportion of the population	Yes. The median error rate of 8-25% of all medications administered had a medication administration error.[3]
2b. Is of high public interest; affects health care decision making, outcomes, or costs for a large proportion of the US population or for a vulnerable population	Yes. Medication administration errors can result in adverse events. About half of all adverse events are preventable.[2]
2c. Represents important uncertainty for decision makers	No. The evidence is well-established for the association of individual and system-level factors with medication administration errors.[2]
2d. Incorporates issues around both clinical benefits and potential clinical harms	No, this relates to a harm
2e. Represents high costs due to common use, high unit costs, or high associated costs to consumers, to patients, to health care systems, or to payers	Yes
3. Desirability of a New Evidence Review/Duplication	
3. Would not be redundant (i.e., the proposed topic is not already covered by available or soon-to-be available high-quality systematic review by AHRQ or others)	No. We identified no reviews that cite age as a factor.
4. Impact of a New Evidence Review	
4a. Is the standard of care unclear (guidelines not available or guidelines inconsistent, indicating an information gap that may be addressed by a new evidence review)?	No
4b. Is there practice variation (guideline inconsistent with current practice, indicating a potential implementation gap and not best addressed by a new evidence review)?	Yes. There are many factors related to medication administration errors, and interventions will vary based on the cause.
5. Primary Research	
5. Effectively utilizes existing research and knowledge by considering: - Adequacy (type and volume) of research for conducting a systematic review - Newly available evidence (particularly for updates or new technologies)	We identified one primary study. A new review is not feasible.
6. Value	

6a. The proposed topic exists within a clinical, consumer, or policy-making context that is amenable to evidence-based change	Not assessed
6b. Identified partner who will use the systematic review to influence practice (such as a guideline or recommendation)	Not assessed

Abbreviations: AHRQ=Agency for Healthcare Research and Quality

Appendix B. Search for Evidence Reviews (Duplication)

Sources Searched
AHRQ: Evidence reports and technology assessments https://effectivehealthcare.ahrq.gov/; https://www.ahrq.gov/research/findings/ta/index.html; https://www.ahrq.gov/research/findings/evidence-based-reports/search.html
VA Products: PBM, and HSR&D (ESP) publications, and VA/DoD EBCPG Program https://www.hsrd.research.va.gov/publications/esp/
Cochrane Systematic Reviews http://www.cochranelibrary.com/
PubMed Health http://www.ncbi.nlm.nih.gov/pubmedhealth/
PROSPERO Database (international prospective register of systematic reviews and protocols) http://www.crd.york.ac.uk/prospero/
PubMed https://www.ncbi.nlm.nih.gov/pubmed/
Campbell Collaboration Systematic Review Library http://www.campbellcollaboration.org/
CINAHL (Cumulative Index of Nursing and Allied Health) https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete

Appendix C. Search Strategy & Results (Feasibility)

Pubmed
(("pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "medication"[All Fields]) AND ("organization and administration"[MeSH Terms] OR ("organization"[All Fields] AND "administration"[All Fields]) OR "organization and administration"[All Fields] OR "administration"[All Fields]) AND errors[All Fields] AND factors[All Fields]) AND ("2014/05/12"[PDat] : "2019/05/10"[PDat] AND "humans"[MeSH Terms])

https://clinicaltrials.gov/ct2/results?cond=&term=%22medication+administration+error%22&country=&state=&city=&dist=&Search=Search