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A Scoping Review of Evidence-Based Practice Models and Frameworks

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| Complete List of Authors: | Dusin, Jarrod; Children's Mercy Kansas City, Department of Evidence Based Practice  
Melanson, Andrea; Children's Mercy Kansas City, Department of Evidence Based Practice  
Mische-Lawson, Lisa; The University of Kansas Medical Center |
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A Scoping Review of Evidence-Based Practice Models and Frameworks

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Word Count: 1938
Objectives: The aim of this scoping review was to identify and review current Evidence-based practice (EBP) models and frameworks. Specifically, how EBP models and frameworks used in healthcare settings align with the original model of (1) Asking the question, (2) Acquiring the best evidence, (3) Appraising the evidence, (4) Applying the findings to clinical practice, and (5) Evaluating the outcomes of change; along with patient expectations and clinical skills.

Design: A Scoping review

Data sources: Published articles were identified through searches within electronic databases (MEDLINE, EMBASE, Scopus, OVID) from 1990-January 2022.

Eligibility criteria: The English language EBP models and frameworks included in the review all included the five main steps of EBP. Excluded were models and frameworks focused on one domain or strategy (e.g., frameworks focused on applying findings).

Results: Of the 20,097 articles found by our search, Twenty-one models and frameworks met our inclusion criteria. The results showed a diverse collection of models and frameworks. Many models and frameworks were well developed and widely used, with supporting validation and updates. Some models and frameworks provided many tools and contextual instruction, while others provided only general process instruction. The models and frameworks reviewed demonstrated the user must possess the knowledge and related skills for the step of assessing evidence. The models/frameworks varied greatly in the level of instruction to assess the evidence. Only six models and frameworks integrated patient values and preferences into their processes.

Conclusion: Many EBP models and frameworks currently exist that provide diverse instructions on the best way to use EBP. However, the inclusion of patient values and preferences needs to be better integrated into EBP models and frameworks. Also, the issues of EBP expertise to assess evidence must be considered when choosing a model or framework.

Strengths and Limitations
- Currently no comprehensive review exists of EBP models and frameworks
- Well-developed models and frameworks may have been excluded for not including all five steps of original model for EBP
- This review did not measure the quality of the models and frameworks based on validated studies
INTRODUCTION

Evidence-based practice grew from evidence-based medicine to provide a process to review, translate, and implement research with practice to improve patient care, treatment, and outcomes. Gordon Guyatt coined the term evidence-based medicine (EBM) in the early 1990s. Over the last 25 years, the field of EBM has continued to evolve and is now a cornerstone of healthcare and a core competency for all medical professionals. At first, the term EBM was used only in medicine. However, the term evidence-based practice (EBP) now applies to the principles of other health professions. This expansion of the concept of EBM increases its complexity. The term EBP is used for this paper because it is universal across professions.

Early in the development of EBP, David Sackett created an innovative five-step model. This foundational medical model provided a concise overview of the process of EBP. The five steps are (1) asking the question, (2) acquiring the best evidence, (3) appraising the evidence, (4) applying the findings to clinical practice, and (5) evaluating the outcomes of change. Other critical components of Sackett’s model are considering patient expectations, clinical skills, and the best available evidence. The influence of this model has led to its integration and adaptation into every field of healthcare. Historically, the foundation of EBP has focused on asking the question, acquiring the literature, and appraising the evidence but has had difficulty integrating evidence into practice. Although the five steps appear simple, each area includes a vast number of ways to review the literature (e.g., PRISMA, Newcastle-Ottawa Scale) and entire fields of study, such as implementation science, a field dedicated to implementing EBP.

One way to manage the complexity of EBP in healthcare is by developing EBP models and frameworks that establish strategies to determine resource needs, identify barriers and facilitators, and guide processes. EBP models and frameworks provide insight into the complexity of transforming evidence into clinical practice. They also allow organizations to determine readiness, willingness, and potential outcomes for a hospital system. EBP can differ from implementation science, as EBP models include all five of Sackett’s steps of EBP, while the non-process models of implementation science typically focus on the final two steps. Currently no comprehensive review exists of EBP models and frameworks. Due to the complexity of EBP, the purpose of the scoping review was to explore how EBP theories, models, and frameworks used in healthcare settings align with the original five-step model.

METHODS
A scoping review synthesizes findings across various study types and provides a broad overview of the selected topic. The Arksey and O’Malley method and Preferred Reporting Items for Systematic Reviews and Meta-Analyses Scoping Review (PRISMA) procedures guided this review. The primary author established the research question and inclusion and exclusion criteria before conducting the review. An *a priori* protocol was not pre-registered. One research question guided the review: Which EBP theories, models, and frameworks align with Sackett’s original model?

**eligibility criteria**

To be included in the review, English-language published EBP theories/models/frameworks needed to include the five main steps of EBP (Asking the question, Acquiring the best evidence, Appraising the evidence, Applying the findings to clinical practice, and Assessing the outcomes of change) based on Sackett’s model. If the theories, models, or frameworks involved identifying problems or measured readiness for change, the criteria of “Asking the question” was met. Exclusions included theories, models, or frameworks focused on one domain or strategy (e.g., frameworks focused on applying findings). Also, non-peer-reviewed abstracts, letters, editorials, opinion articles, and dissertations were excluded.

**search and selection**

To identify potential studies, a medical librarian searched the databases MEDLINE (1990 to January 2022), EMBASE (1990 to January 2022), Scopus (1990 to January 2022), and OVID (1990 to January 2022) in collaboration with the primary author. The search strategy employed the following keywords: “Evidence-Based Practice” OR “evidence based medicine” OR “evidence-based medicine” OR “evidence based nursing” OR “evidence-based nursing” OR “evidence based practice” OR “evidence-based practice” OR “evidence based medicine” OR “evidence-based medicine” OR “evidence based nursing” OR “evidence-based nursing” OR “evidence based practice” OR “evidence-based practice” OR “evidence based medicine” OR “evidence-based medicine” AND “Hospitals” OR “Hospital Medicine” OR “Nursing” OR “Advanced Practice Nursing” OR “Academic Medical Centers” OR “healthcare” OR “hospital” OR “healthcare” OR “hospital” AND “Models, Organizational” OR “Models, Nursing” OR “framework” OR “theory” OR “theories” OR “model” OR “framework” OR “theory” OR “theories” OR “model.”

Additionally, reference lists in publications included for full-text review were screened to identify eligible theories/models/frameworks.

**selection of sources of evidence**
Two authors (JD & AM) independently screened titles and abstracts and selected studies for potential inclusion in the study, applying the predefined inclusion and exclusion criteria. Both authors then read the full texts of these articles to assess eligibility for final inclusion. Disagreement between the authors regarding eligibility was resolved by consensus between the three authors (JD, AM, & LML). During the selection process, many theories/models/frameworks were found more than once. Once a theory/model/framework article was identified, the seminal article was reviewed for inclusion. Once a theory/model/framework was identified and verified for inclusion, all other articles listing the theory/model/framework were excluded. This scoping review intended to identify theories/models/frameworks aligned with Sackett’s model; therefore, analyzing every article that used the included theory/model/framework was unnecessary.

**data extraction and analysis**

Data were collected on the following study characteristics: (1) Authors, (2) Publication year, (3) Theory/Model/Framework, and (4) Area(s) of focus in reference to Sackett’s five-step model. Data analysis focused on identifying (1) the general themes of the theories/models/frameworks, and (2) any knowledge gaps. Data extraction and analysis were done by the primary author (JD) and verified by one other author (AM).(12)

**RESULTS**

The search identified 6,523 potentially relevant references (see Figure 1). Following a review of the titles and abstracts, the primary author completed a more detailed screening of 38 full papers. From these, 21 models and frameworks were included. No theories met the inclusion criteria. Table 1 summarizes the 21 models and frameworks. Of the 21 models and frameworks assessed and mapped, 17 (80%) had broad target audiences, including healthcare or public health organizations or health systems. Only four (19%) models and frameworks included individual clinicians (e.g., physicians and nurses). (14-17)

**asking the question**

All 21 of the models and frameworks included a process for asking questions. Most focused on identifying problems that needed to be addressed on an organizational or hospital level. Only three used the PICO (population, intervention, comparator, outcome) format to ask specific questions related to patient care.(16-18)

**acquiring the evidence**
The models and frameworks gave basic instructions on acquiring literature, such as “conduct systematic search” or “acquire resource.”(19, 20) Three recommended sources from previously generated evidence, such as guidelines and systematic reviews.(6, 21, 22) While most models and frameworks did not provide specifics, others suggested this work be done through EBP mentors/experts.(17, 23, 24) Four models included qualitative evidence in the use of evidence(6, 16, 23, 25, 26), while only one model considered the use of patient preference and values as evidence.(23) Two models recommended internal data be used in acquiring information.(14, 17)

**assessing the evidence**

The models and frameworks varied greatly in the level of instruction provided in assessing the best evidence. All provided a general overview in assessing and grading the evidence. Four recommended this work be done by EBP mentors and experts.(17, 20, 23, 24) Six models developed specific tools to be used to assess the levels of evidence,(6, 14, 23, 24, 27, 28) while two referred users to tools created by other groups.(19, 29)

**applying the evidence**

The application of evidence also varied greatly for the different models and frameworks. Five models recommended pilot programs to implement change.(6, 18, 19, 24, 30) Five recommended the use of EBP mentors and experts to assist in the implementation of evidence and quality improvement as a strategy of the models and frameworks.(17, 19, 23, 24) Thirteen models and frameworks discussed patient values and preferences,(6, 14-16, 18, 19, 22-24, 28-31) but only six incorporated this topic into the model or framework.(18, 19, 22-24, 28) Eleven of the 21 models discussed using clinical expertise, but specifics were not provided.(6, 14-16, 18, 22-24, 28-30)

**evaluating the outcomes of change**

Evaluation varied among the models and frameworks, but most involved using implementation outcome measures to determine the project’s success. Learning Health Systems provided the most detailed instruction on using internal institutional data to determine success of application.(22) This framework uses internal and external data along with evidence in decision making but as a benchmark for successful implementation.

**DISCUSSION**

This scoping review identified 21 EBP models and frameworks that included the five main steps of EBP as described by Sackett.(5) The results showed that the themes of the models and frameworks are as diverse as the models and frameworks themselves. Some are well developed and widely used, with supporting validation and updates.(19, 23,
One such model, the Iowa EBP model, has received over 3,900 requests for permission to use it. Some models provided tools and contextual instruction, while others provided only general instruction.

### Gaps in the Evidence

A consistent finding in research of clinician experience with EBP is the lack of expertise that is needed to assess the literature. The models and frameworks reviewed demonstrated that the user must possess the knowledge and related skills for this step in the process. The models and frameworks varied greatly in the level of instruction to assess the evidence. Most provided a general overview in assessing and grading the evidence, while a few recommended that this work be done by EBP mentors and experts. Some models and frameworks provided robust tools and resources that would require administrative time and financial support. Some models offered vital resources or pointed to other resources for assessing evidence, but most did not. While a few used mentors and experts to assist with the problem of accessing expertise to assess literature, a majority did not address this persistent issue.

Sackett’s five-step model included another important consideration when implementing EBP: patient values and preferences. One criticism of EBP is that it ignores patient values and preferences. Over half of the models and frameworks reported the need to include patient values and preferences, but the tools, instruction, or resources for including them were limited. The Advancing Research and Clinical practice through close Collaboration (ARCC) model integrates patient preferences and values into the model, but it is up to the EBP mentor to accomplish this task.

There are many tools for assessing evidence, but few models and frameworks provide this level of guidance for incorporating patient preference and values.

### Limitations

Limitations of the study include that well-developed models and frameworks may have been excluded for not including all five steps. Also, some models and frameworks have been studied and validated over many years. It was beyond the scope of the review to measure the quality of the models and frameworks based on these other validated studies. Future research should consider appraising the quality and use of the different EBP models and frameworks to determine success.

### Conclusion
This scoping review of 21 models and frameworks shows considerable variation regarding how the EBP models and frameworks integrate the five steps of EBP. Most of the included models and frameworks provided a narrow description of the steps needed to assess and implement EBP, while a few provided robust instruction and tools. The reviewed models and frameworks provided diverse instructions on the best way to use EBP. However, the inclusion of patient values and preferences needs to be better integrated into EBP models. Also, the issues of EBP expertise to assess evidence must be considered when selecting a model or framework.
Figure 1 Retrieval and selection process.(13)
<table>
<thead>
<tr>
<th>Name</th>
<th>Steps of Model/Framework</th>
<th>General themes</th>
<th>Knowledge gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iowa Model (19)</strong></td>
<td>1. Extensive question development 2. Team searches, appraises, and synthesizes the literature 3. If literature is lacking, conduct research 4. If literature is available, develop, enact, and appraise a pilot solution 5. If the pilot is successful, implement it across the organization 6. If the pilot is unsuccessful, restart the process</td>
<td>- Recommended for use at an organizational level - Detailed flowchart guides decision-making process - Identified decision points and feedback loops throughout the model - Emphasizes pilot project before initiating system-wide project - Designed for interprofessional collaboration</td>
<td>Acquiring and assessing literature is beyond the scope of the model (other tools are provided to complete this step). User must possess a level of knowledge and related skills to assess evidence</td>
</tr>
<tr>
<td><strong>ARCC (23)</strong></td>
<td>1. Assess the healthcare organization for readiness for change 2. Identify potential and actual barriers and facilitators 3. Identify EBP champions 4. Implement evidence into practice 5. Evaluate EBP outcomes</td>
<td>- Well-developed training program with tools and scales to assess literature and implement - Focuses on mentors to undergo training - Identifies a network of supportive stakeholders - Emphasis on healthcare organizational readiness - Encompasses research, patient values, and clinical expertise as evidence - Control theory and cognitive behavior theory guide model</td>
<td>Limited direction on how patient values/preferences are integrated into the model</td>
</tr>
<tr>
<td>Model</td>
<td>Steps</td>
<td>Notes</td>
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</table>
| CETEP (18) | 1. Define the clinical practice question  
2. Assess the critical appraisal components  
3. Plan the implementation  
4. Implement the practice change  
5. Evaluate the practice change | - Evidence dissemination important part of the model  
- Authors reviewed existing literature and models and identified additional components believed to be vital in developing, reviewing, and/or revising patient care practices  
- Incorporates evidence factors, patient factors, and clinical setting  
- Most robust questions involving patient preference  
- Uses a pilot program for implementation |
| Stetler Model (14) | 1. Question development includes project context  
2. Identify the relevance of evidence sources and quality  
3. Summarize evidence  
4. Develop a plan  
5. Identify and collect data on outcomes to evaluate the effectiveness of the plan | - Designed to encourage critical thinking  
- Allows for categorization of evidence as external (e.g., research) or internal (e.g., organization outcome data)  
- Emphasizes use by single practitioner but may include groups |
| KTA (15)   | 1. Identify problems that need to be addressed and begin searching for evidence  
2. Adapt the knowledge use to a local context  
3. Identify barriers  
4. Select, adapt, and implement interventions  
5. Monitor implanted knowledge  
6. Evaluate outcomes related to knowledge use  
7. Sustain appropriate knowledge use | - Adapts for use with individuals, teams, and healthcare organizations  
- Is grounded in planned action theory  
- Breaks knowledge-to-action process into manageable sections  
- Discussion of providing evidence in a way that influences clinical practice, stakeholders, and end-users |
| EBMgt (16) | 1. Asking; acquiring; appraising; aggregating; applying; and assessing  
2. Predictors; barriers; training organizations; and research institutes | - There are methodological differences between medical research and management research  
- Evidence focuses more on qualitative evidence and tries to prove or disprove the effectiveness of different models of organization and management |
| St Luke’s (30) | 1. Area of interest  
2. Collect the most relevant and best evidence  
3. Critically appraise the evidence  
4. Integrate the evidence with one’s clinical expertise, patient preferences, and values in making a practice decision or change  
5. Evaluate the practice decision or change | - Hospital-level model adapted from Iowa Model  
- Model success focuses on clear directions, aggressive timeline, and the short-term commitment required of team members |

Patient Values Discussed, Not Incorporated into Models/Frameworks

<table>
<thead>
<tr>
<th>Model</th>
<th>Steps</th>
<th>Notes</th>
</tr>
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</table>
| Stetler Model (14) | 1. Question development includes project context  
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5. Evaluate the practice decision or change | - Hospital-level model adapted from Iowa Model  
- Model success focuses on clear directions, aggressive timeline, and the short-term commitment required of team members |
<table>
<thead>
<tr>
<th>Model for Change to Evidence Based Practice (6)</th>
<th>1. Identify the need to change practice 2. Approximate the problem with outcomes 3. Summarize the best scientific evidence 4. Develop a plan for changing the practice 5. Implement and evaluate change (pilot study) 6. Integrate and maintain change in practice 7. Monitor implementation</th>
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<td></td>
<td>• The model is based on change theory  • The model supports evidence-based practice changes derived from a combination of quantitative and qualitative data, clinical expertise, and contextual evidence  • Recommends the creation of team of stakeholders  • Piloted implementation</td>
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<td>• Focuses on methodological rigor, stakeholder engagement, and partnership  • Focus on stakeholder involvement, including patients  • Participatory involvement underpins process  • KTA informed a framework developed by MCHRI  • GRADE was used as an example to assess evidence.</td>
</tr>
<tr>
<td>The I3 Model for Advancing Quality Patient Centered Care (31)</td>
<td>1. Inquiry 2. Improvement 3. Innovation 4. Inquiry encompasses research 5. Improvement includes quality improvement projects 6. Innovation is discovery studies and best evidence projects</td>
</tr>
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<td></td>
<td>• Model focuses on options for EBP, quality improvement, and research needs  • Each process includes a step to obtain pre-data or best evidence  • Incorporates the voice of the customer</td>
</tr>
<tr>
<td>Johns Hopkins (32)</td>
<td>1. Practice Question: EBP question is identified 2. Evidence: The team searches, appraises, rates the strength of evidence 3. Translation: Feasibility is determined, an action plan is created, and change is implemented and evaluated</td>
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<td></td>
<td>• Well-developed tool kit that provides guide for question development, evidence-rating scale, and appraisal guide for various forms of evidence</td>
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<tr>
<td>Evidence Based Public Health (39)</td>
<td>1. Community assessment 2. Quantify the issue 3. Develop a concise statement of the issue 4. Determine what is known through the literature 5. Develop and prioritize program and policy options 6. Develop an action plan 7. Evaluate the program or policy</td>
</tr>
<tr>
<td></td>
<td>• Incorporates a framework with less emphasis on evidence hierarchy and more emphasis on knowledge translation  • Evidence: Qualitative and quantitative  • Matches question to research type</td>
</tr>
</tbody>
</table>

Patient Values Not Discussed

Tools provided for quality improvement process but not for assessing literature
User must possess a level of knowledge and related skills for assessing literature

User must possess a level of knowledge and related skills for assessing literature

Patient values/preference not clearly integrated into model

Lack of consensus on evidence analysis and hierarchy
Public health models different from medical models so concepts of public preference not discussed but focus is on health outcomes
<table>
<thead>
<tr>
<th>Model</th>
<th>Steps</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>ACE Star Model (26)</strong></td>
<td>1. Discovery: Searching for new knowledge</td>
<td>Promotes discovery of evidence through systematic reviews</td>
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<tr>
<td></td>
<td>2. Evidence Summary: Synthesize the body of research knowledge</td>
<td>Promotes transition of evidence through guideline creation</td>
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<td></td>
<td>3. Translation: Provide clinicians with a practice document (e.g., clinical practice guideline)</td>
<td>Includes use of qualitative evidence</td>
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<td></td>
<td>4. Integration: Changed through formal and informal channels</td>
<td>Expertise and patient preference are considered another form of evidence</td>
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<td></td>
<td>5. Evaluation: EBP outcomes are evaluated</td>
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<tr>
<td><strong>An Evidence Implementation Model for Public Health Systems (33)</strong></td>
<td>1. Circle 1 Evidence implementation target</td>
<td>Includes setting measurable evidence implementation targets</td>
</tr>
<tr>
<td></td>
<td>2. Circle 2 Actors involved in implementation</td>
<td>Includes all actors in all stages of knowledge transfer to increase shared aim and reduce barriers</td>
</tr>
<tr>
<td></td>
<td>3. Circle 3 Knowledge transfer</td>
<td>Model is broad with diverse implementation</td>
</tr>
<tr>
<td></td>
<td>4. Circle 4 Barriers and facilitators</td>
<td></td>
</tr>
<tr>
<td><strong>San Diego 8A’s EBP Model (17)</strong></td>
<td>1. Assessing a clinical or practice problem</td>
<td>Model was created to make it easier for nurses to complete EBP projects</td>
</tr>
<tr>
<td></td>
<td>2. Asking a clinical question in a PICOT (population/patient, implementation, comparison, outcome, and time) format</td>
<td>Derived primarily from previously published models</td>
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<tr>
<td></td>
<td>3. Acquiring existing sources of evidence</td>
<td>Change Theory part of the model</td>
</tr>
<tr>
<td></td>
<td>4. Appraising the levels of evidence</td>
<td>Utilizes mentors to implement</td>
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<td>5. Applying the evidence to a practice change</td>
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<tr>
<td></td>
<td>6. Analyzing the results of the change</td>
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<td></td>
<td>7. Advancing the practice change through internal and external dissemination</td>
<td></td>
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<td></td>
<td>8. Adopting the practice of sustainability over time</td>
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<tr>
<td><strong>Tyler Collaborative Model for EBP (20)</strong></td>
<td>Phase One: Unfreezing</td>
<td>Model focuses on barriers of nurses to implement EBP:</td>
</tr>
<tr>
<td></td>
<td>1. Building relationships</td>
<td>- Difficulty of practicing nurses to synthesize scientific evidence, and</td>
</tr>
<tr>
<td></td>
<td>2. Diagnosing the Problem</td>
<td>- Lack of adequate administrative commitment to make evidence-based nursing a priority</td>
</tr>
<tr>
<td></td>
<td>3. Acquiring Resources</td>
<td>Model utilizes EBP experts</td>
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<td>Phase Two: Moving</td>
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<td></td>
<td>1. Choosing the Solution</td>
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<td>2. Gaining Acceptance</td>
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<td>Phase Three: Refreezing</td>
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<tr>
<td></td>
<td>1. Stabilization</td>
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<tr>
<td><strong>The Practice Guidelines Development Cycle (40)</strong></td>
<td>1. Select/Frame clinical problem</td>
<td>Original EBP Model developed to create clinical guidelines</td>
</tr>
<tr>
<td></td>
<td>2. Generate evidence-based recommendations</td>
<td>Framework recommends facilitator to assign tasks and manage advancement</td>
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<td></td>
<td>3. Ratify evidence-based recommendations</td>
<td>Appropriate structure needs to be in place for framework to succeed</td>
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<td></td>
<td>4. Formulate practice guideline</td>
<td>Cycle tolerates discordance between EBP and clinical guidelines and guidelines and institutional policies but requires documentation</td>
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<td>5. Independent review</td>
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<td>6. Negotiate practice policies</td>
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<td></td>
<td>7. Adopt guideline policies</td>
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<td>8. Scheduled review</td>
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</table>
Acknowledgements  We thank Keri Swaggart from the Medical Writing Center at Children’s Mercy Kansas City for completing the data base searches and editing this manuscript.

Contributors  JD and LML conceived the idea of the study and were responsible for its design. JD & AM performed data acquisition and analysis. JD drafted the paper, AM revised it critically. LML contributed substantially to the draft of the article, provided input to the data analysis and the interpretation of the results, and revised the manuscript critically. All authors gave approval for the final version.

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Mesh terms:
Evidence-Based Medicine
Evidence-Based Practice
Implementation Science
Knowledge Translation
REFERENCES

Records identified through database searching
\( (n = 33,253) \)

Records identified through:
- Other sources \( (n = 7) \)

Records after duplicates removed
\( (n = 20,097) \)

Records screened for term "evidence based"
\( (n = 20,097) \)

Records excluded
\( (n = 8,017) \)

Records screened for term "Model, Theory, and/or Framework"
\( (n = 12,087) \)

Records excluded
\( (n = 5,571) \)

Records screened
\( (n = 6523) \)

Records excluded
\( (n = 6485) \)

Full-text articles assessed for eligibility
\( (n = 38) \)

Full-text articles excluded after primary/seminal article identified or did not meet inclusion criteria \( (n = 17) \)

Studies included in qualitative synthesis (systematic review)
\( (n = 21) \)
### Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

<table>
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<tr>
<th>SECTION</th>
<th>ITEM</th>
<th>PRISMA-ScR CHECKLIST ITEM</th>
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<tr>
<td><strong>TITLE</strong></td>
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<tr>
<td>Title</td>
<td>1</td>
<td>Identify the report as a scoping review.</td>
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<tr>
<td><strong>ABSTRACT</strong></td>
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<tr>
<td>Structured summary</td>
<td>2</td>
<td>Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.</td>
<td>2</td>
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<tr>
<td><strong>INTRODUCTION</strong></td>
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<tr>
<td>Rationale</td>
<td>3</td>
<td>Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.</td>
<td>3</td>
</tr>
<tr>
<td>Objectives</td>
<td>4</td>
<td>Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.</td>
<td>4</td>
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<tr>
<td><strong>METHODS</strong></td>
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<tr>
<td>Protocol and registration</td>
<td>5</td>
<td>Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.</td>
<td>Not done</td>
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<tr>
<td>Eligibility criteria</td>
<td>6</td>
<td>Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.</td>
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<tr>
<td>Information sources*</td>
<td>7</td>
<td>Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.</td>
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<tr>
<td>Search</td>
<td>8</td>
<td>Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.</td>
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<tr>
<td>Selection of sources of evidence†</td>
<td>9</td>
<td>State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.</td>
<td>5</td>
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<tr>
<td>Data charting process‡</td>
<td>10</td>
<td>Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>6</td>
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<tr>
<td>Data items</td>
<td>11</td>
<td>List and define all variables for which data were sought and any assumptions and simplifications made.</td>
<td>6</td>
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<tr>
<td>Critical appraisal of individual sources of evidence§</td>
<td>12</td>
<td>If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).</td>
<td>6</td>
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<tr>
<td>Synthesis of results</td>
<td>13</td>
<td>Describe the methods of handling and summarizing the data that were charted.</td>
<td>6</td>
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<tr>
<td>SECTION</td>
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<tr>
<td>RESULTS</td>
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<tr>
<td>Selection of sources of evidence</td>
<td>14</td>
<td>Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.</td>
<td>6</td>
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<tr>
<td>Characteristics of sources of evidence</td>
<td>15</td>
<td>For each source of evidence, present characteristics for which data were charted and provide the citations.</td>
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<tr>
<td>Critical appraisal within sources of evidence</td>
<td>16</td>
<td>If done, present data on critical appraisal of included sources of evidence (see item 12).</td>
<td>6-7</td>
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<tr>
<td>Results of individual sources of evidence</td>
<td>17</td>
<td>For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.</td>
<td>6-7</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>18</td>
<td>Summarize and/or present the charting results as they relate to the review questions and objectives.</td>
<td>6-7</td>
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<tr>
<td>DISCUSSION</td>
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<tr>
<td>Summary of evidence</td>
<td>19</td>
<td>Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.</td>
<td>8</td>
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<tr>
<td>Limitations</td>
<td>20</td>
<td>Discuss the limitations of the scoping review process.</td>
<td>9</td>
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<tr>
<td>Conclusions</td>
<td>21</td>
<td>Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.</td>
<td>10</td>
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<td>FUNDING</td>
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<tr>
<td>Funding</td>
<td>22</td>
<td>Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.</td>
<td>15</td>
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</table>

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where sources of evidence (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources (see first footnote).
‡ The frameworks by Arksey and O’Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of “risk of bias” (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

## Evidence-Based Practice Models and Frameworks in the Healthcare Setting: a Scoping Review

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<td>27-Mar-2023</td>
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<td>Complete List of Authors:</td>
<td>Dusin, Jarrod; Children's Mercy Hospitals and Clinics, Department of Evidence Based Practice Melanson, Andrea; Children's Mercy Hospitals and Clinics, Department of Evidence Based Practice Mische-Lawson, Lisa; The University of Kansas Medical Center, Therapeutic Science</td>
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<td>Secondary Subject Heading:</td>
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Evidence-Based Practice Models and Frameworks in the Healthcare Setting: a Scoping Review

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Word Count: 2695
Objectives The aim of this scoping review was to identify and review current Evidence-based practice (EBP) models and frameworks. Specifically, how EBP models and frameworks used in healthcare settings align with the original model of (1) asking the question, (2) acquiring the best evidence, (3) appraising the evidence, (4) applying the findings to clinical practice, and (5) evaluating the outcomes of change. Along with patient values and preferences and clinical skills.

Design A Scoping review

Included sources and articles Published articles were identified through searches within electronic databases (MEDLINE, EMBASE, Scopus) from January 1990- April 2022. The English language EBP models and frameworks included in the review all included the five main steps of EBP. Excluded were models and frameworks focused on one domain or strategy (e.g., frameworks focused on applying findings).

Results Of the 20 097 articles found by our search, nineteen models and frameworks met our inclusion criteria. The results showed a diverse collection of models and frameworks. Many models and frameworks were well developed and widely used, with supporting validation and updates. Some models and frameworks provided many tools and contextual instruction, while others provided only general process instruction. The models and frameworks reviewed demonstrated that the user must possess EBP expertise and knowledge for the step of assessing evidence. The models and frameworks varied greatly in the level of instruction to assess the evidence. Only seven models and frameworks integrated patient values and preferences into their processes.

Conclusion Many EBP models and frameworks currently exist that provide diverse instructions on the best way to use EBP. However, the inclusion of patient values and preferences needs to be better integrated into EBP models and frameworks. Also, the issues of EBP expertise and knowledge to assess evidence must be considered when choosing a model or framework.

Strengths and Limitations
- Currently no comprehensive review exists of EBP models and frameworks
- Well-developed models and frameworks may have been excluded for not including all five steps of original model for EBP
- This review did not measure the quality of the models and frameworks based on validated studies
INTRODUCTION

Evidence-based practice grew from evidence-based medicine to provide a process to review, translate, and implement research with practice to improve patient care, treatment, and outcomes. Gordon Guyatt coined the term evidence-based medicine (EBM) in the early 1990s.(1) Over the last 25 years, the field of EBM has continued to evolve and is now a cornerstone of healthcare and a core competency for all medical professionals.(2, 3) At first, the term EBM was used only in medicine. However, the term evidence-based practice (EBP) now applies to the principles of other health professions. This expansion of the concept of EBM increases its complexity.(4) The term EBP is used for this paper because it is universal across professions.

Early in the development of EBP, David Sackett created an innovative five-step model.(5) This foundational medical model provided a concise overview of the process of EBP. The five steps are (1) asking the question, (2) acquiring the best evidence, (3) appraising the evidence, (4) applying the findings to clinical practice, and (5) evaluating the outcomes of change. Other critical components of Sackett’s model are considering patient value and preferences and clinical skills with the best available evidence.(5) The influence of this model has led to its integration and adaption into every field of healthcare. Historically, the foundation of EBP has focused on asking the question, acquiring the literature, and appraising the evidence but has had difficulty integrating evidence into practice.(6)

Although the five steps appear simple, each area includes a vast number of ways to review the literature (e.g., Preferred Reporting Items for Systematic Reviews and Meta-Analyses PRISMA, Newcastle-Ottawa Scale) and entire fields of study, such as implementation science, a field dedicated to implementing EBP. (7, 8) Implementation science can be traced to the 1960s with Everett Rogers’ Diffusion of Innovation Theory and has grown alongside EBP over the last 25 years.(7, 9)

One way to manage the complexity of EBP in healthcare is by developing EBP models and frameworks that establish strategies to determine resource needs, identify barriers and facilitators, and
guide processes. EBP models and frameworks provide insight into the complexity of transforming evidence into clinical practice. They also allow organizations to determine readiness, willingness, and potential outcomes for a hospital system. EBP can differ from implementation science, as EBP models include all five of Sackett’s steps of EBP, while the non-process models of implementation science typically focus on the final two steps. There are published scoping reviews of implementation science, however, no comprehensive review of EBP models and frameworks currently exists. Though there is overlap of EBP, implementation science, and knowledge translation models and frameworks, the purpose of the scoping review was to explore how EBP models and frameworks used in healthcare settings align with the original EBP five-step model.

METHODS

A scoping review synthesizes findings across various study types and provides a broad overview of the selected topic. The Arksey and O’Malley method and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-ScR) procedures guided this review (see online supplemental for PRISMA-ScR checklist). The primary author established the research question and inclusion and exclusion criteria before conducting the review. An a priori protocol was not pre-registered. One research question guided the review: Which EBP models and frameworks align with Sackett’s original model?

eligibility criteria

To be included in the review, English-language published EBP models and frameworks needed to include the five main steps of EBP (asking the question, acquiring the best evidence, appraising the evidence, applying the findings to clinical practice, and assessing the outcomes of change) based on Sackett’s model. If the models or frameworks involved identifying problems or measured readiness for change, the criteria of “asking the question” was met. Exclusions included models or frameworks...
focused on one domain or strategy (e.g., frameworks focused on applying findings). Also, non-peer-reviewed abstracts, letters, editorials, opinion articles, and dissertations were excluded.

search and selection

To identify potential studies, a medical librarian searched the databases from January 1990 to April 2022 for in MEDLINE, EMBASE, and Scopus in collaboration with the primary author. The search was limited to 1990 because the term EBP was coined in the early 90s. The search strategy employed the following keywords: “Evidence-Based Practice” OR “evidence based medicine” OR “evidence-based medicine” OR “evidence based nursing” OR “evidence-based nursing” OR “evidence based practice” OR “evidence-based practice” OR “evidence based medicine” OR “evidence-based medicine” OR “evidence based nursing” OR “evidence-based nursing” OR “evidence based practice” OR “evidence-based practice” AND “Hospitals” OR “Hospital Medicine” OR “Nursing” OR “Advanced Practice Nursing” OR “Academic Medical Centers” OR “healthcare” OR “hospital” OR “healthcare” OR “hospital” AND “Models, Organizational” OR “Models, Nursing” OR “framework” OR “theory” OR “theories” OR “model” OR “framework” OR “theory” OR “theories” OR “model.” Additionally, reference lists in publications included for full-text review were screened to identify eligible models and frameworks (See online supplemental appendix A for searches).

selection of sources of evidence

Two authors (JD & AM) independently screened titles and abstracts and selected studies for potential inclusion in the study, applying the predefined inclusion and exclusion criteria. Both authors then read the full texts of these articles to assess eligibility for final inclusion. Disagreement between the authors regarding eligibility was resolved by consensus between the three authors (JD, AM, & LML). During the selection process, many models and frameworks were found more than once. Once a model or framework article was identified, the seminal article was reviewed for inclusion. If models or frameworks had been changed or updated since the publication of their seminal article, the most
current iteration published was reviewed for inclusion. Once a model or framework was identified and verified for inclusion, all other articles listing the model or framework were excluded. This scoping review intended to identify model or framework aligned with Sackett’s model; therefore, analyzing every article that used the included model or framework was unnecessary (see online supplemental appendix B for tracking form).

**Data extraction and analysis**

Data were collected on the following study characteristics: (1) Authors, (2) Publication year, (3) Model or Framework, and (4) Area(s) of focus in reference to Sackett’s five-step model. After initial selection, models and frameworks were analyzed for key features and alignment to the five step EBP process. A data analysis form was developed to map detailed information (see online supplemental appendix C for full data capture form). Data analysis focused on identifying (1) the general themes of the model or frameworks, and (2) any knowledge gaps. Data extraction and analysis were done by the primary author (JD) and verified by one other author (AM).

**Patient and public involvement**

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**RESULTS**

The search identified 6,523 potentially relevant references (see Figure 1). Following a review of the titles and abstracts, the primary author completed a more detailed screening of 37 full papers. From these, 19 models and frameworks were included. Table 1 summarizes the 19 models and frameworks. Of the 19 models and frameworks assessed and mapped, 15 had broad target audiences, including healthcare or public health organizations or health systems. Only five models and frameworks included a target audience of individual clinicians (e.g., physicians and nurses). (17-22)

**asking the question**
All 19 of the models and frameworks included a process for asking questions. Most focused on identifying problems that needed to be addressed on an organizational or hospital level. Five used the PICO (population, intervention, comparator, outcome) format to ask specific questions related to patient care. (19-25)

**acquiring the evidence**

The models and frameworks gave basic instructions on acquiring literature, such as “conduct systematic search” or “acquire resource.” (20) Four recommended sources from previously generated evidence, such as guidelines and systematic reviews. (6, 21, 22, 26) Although most models and frameworks did not provide specifics, others suggested this work be done through EBP mentors/experts. (20, 21, 25, 27) Seven models included qualitative evidence in the use of evidence (6, 19, 21, 24, 27-29), while only four models considered the use of patient preference and values as evidence. (21, 22, 24, 27) Six models recommended internal data be used in acquiring information. (17, 20-22, 24, 27)

**assessing the evidence**

The models and frameworks varied greatly in the level of instruction provided in assessing the best evidence. All provided a general overview in assessing and grading the evidence. Four recommended this work be done by EBP mentors and experts. (20, 25, 27, 30) Seven models developed specific tools to be used to assess the levels of evidence. (6, 17, 21, 22, 24, 25, 27)

**applying the evidence**

The application of evidence also varied greatly for the different models and frameworks. Seven models recommended pilot programs to implement change. (6, 21-25, 31) Five recommended the use of EBP mentors and experts to assist in the implementation of evidence and quality improvement as a strategy of the models and frameworks. (20, 24, 25, 27) Thirteen models and frameworks discussed patient values and preferences, (6, 17-19, 21-27, 31, 32) but only seven incorporated this topic into the
model or framework (21-27), and only five included tools and instructions. (21-25) Twelve of the 20 models discussed using clinical skill, but specifics of how this was incorporated was lacking in models and frameworks. (6, 17-19, 21-27, 31)

**Evaluating the outcomes of change**

Evaluation varied among the models and frameworks, but most involved using implementation outcome measures to determine the project’s success. Five models and framework provide tools and in-depth instruction for evaluation. (21, 22, 24-26) Monash Partners Learning Health Systems provided detailed instruction on using internal institutional data to determine success of application. (26) This framework uses internal and external data along with evidence in decision making as a benchmark for successful implementation.

**Discussion**

EBP models and frameworks provide a process for transforming evidence into clinical practice and allow organizations to determine readiness and willingness for change in a complex hospital system. (12) The large number of models and frameworks complicates the process by confusing what the best tool is for healthcare organizations. This review examined many models and frameworks and assessed the characteristics and gaps that can better assist healthcare organizations to determine the right tool for themselves. This review identified 19 EBP models and frameworks that included the five main steps of EBP as described by Sackett. (5) The results showed that the themes of the models and frameworks are as diverse as the models and frameworks themselves. Some are well developed and widely used, with supporting validation and updates. (21, 22, 24, 27) One such model, the Iowa EBP model, has received over 3,900 requests for permission to use it and has been updated from its initial development and publication. (24) Other models provided tools and contextual instruction such as the Johns Hopkin’s model which includes a large number of supporting tool for developing PICOs, instructions for grading literature, and project implementation. (17, 21, 22, 24, 27) By contrast, the ACE Star model and the An...
Evidence Implementation Model for Public Health Systems only provide high level overview and general instructions compared to some models and frameworks. (19, 29, 33)

gaps in the evidence

A consistent finding in research of clinician experience with EBP is the lack of expertise that is needed to assess the literature. (24, 34, 35) The models and frameworks reviewed demonstrated that the user must possess the knowledge and related skills for this step in the process. The models and frameworks varied greatly in the level of instruction to assess the evidence. Most provided a general overview in assessing and grading the evidence, though a few recommended that this work be done by EBP mentors and experts. (20, 25, 27) ARCC, The Clinical Scholars Model, JBI, and Johns Hopkins provided robust tools and resources that would require administrative time and financial support (21, 22, 25, 27). Some models and frameworks offered vital resources or pointed to other resources for assessing evidence (24), but most did not. While a few used mentors and experts to assist with the problem of accessing expertise to assess literature, a majority did not address this persistent issue.

Sackett’s five-step model included another important consideration when implementing EBP: patient values and preferences. One criticism of EBP is that it ignores patient values and preferences. (36) Over half of the models and frameworks reported the need to include patient values and preferences, but the tools, instruction, or resources for including them were limited. The ARCC model integrates patient preferences and values into the model, but it is up to the EBP mentor to accomplish this task. (37) There are many tools for assessing evidence, but few models and frameworks provide this level of guidance for incorporating patient preference and values. The inclusion of patient and family values and preferences can be misunderstood, insincere, and even tokenistic but without it there is reduced chance of success of implementation of EBP. (38, 39)

strengths and limitations
Similar to other well-designed scoping reviews, the strengths of this review include a rigorous search conducted by a skilled librarian, literature evaluation by more than one person, and the utilization of an established methodological framework (PRISMA-ScR). Additionally, utilizing the EBP five-step models as a point of alignment allows for a more comprehensive breakdown and established reference points for the reviewed models and frameworks. While scoping reviews have been completed on implementation science and knowledge translation models and frameworks, to our knowledge, this is the first scoping review of EBP models and frameworks. Limitations of the study include that well-developed models and frameworks may have been excluded for not including all five steps. For example, the Promoting Action on Research Implementation in Health Services (PARIHS) framework is a well-developed and validated implementation framework but did not include all five steps of an EBP model. Also, some models and frameworks have been studied and validated over many years. It was beyond the scope of the review to measure the quality of the models and frameworks based on these other validated studies.

Implications and future research

Healthcare organizations can support evidence-based practice by choosing a model or framework that best suits their environment and providing clear guidance for implementing the best evidence. Some organizations may find the best fit with the ARCC and the Clinical Scholars Model because of the emphasis on mentors or the Johns Hopkins model for its tools for grading the level of evidence. In contrast, other organizations may find the Iowa model useful with its feedback loops throughout its process.

Another implication of this study is the opportunity to better define and develop robust tools for patient and family values and preferences within EBP models and frameworks. Patient experiences are complex and require thorough exploration, so it is not overlooked, which is often the case. The utilization of EBP model and frameworks provide an opportunity to explore this area and provide...
the resources and understanding that are often lacking. (38) Though varying, models such as the Iowa Model, JBI, and Johns Hopkins developed tools to incorporate patient and family values and preferences, but a majority of the models and frameworks did not. (21, 22, 24) An opportunity exists to create broad tools that can incorporate patient and family values and preferences into evidence based practice to a similar extent as many of the models and frameworks used for developing tools for literature assessment and implementation. (21-25)

Future research should consider appraising the quality and use of the different EBP models and frameworks to determine success. Additionally, greater clarification on what is considered patient and family values preferences and how they can be integrated into the different models and frameworks is needed.

CONCLUSION

This scoping review of 19 models and frameworks shows considerable variation regarding how the EBP models and frameworks integrate the five steps of EBP. Most of the included models and frameworks provided a narrow description of the steps needed to assess and implement EBP, while a few provided robust instruction and tools. The reviewed models and frameworks provided diverse instructions on the best way to use EBP. However, the inclusion of patient values and preferences needs to be better integrated into EBP models. Also, the issues of EBP expertise to assess evidence must be considered when selecting a model or framework.
<table>
<thead>
<tr>
<th>Name</th>
<th>Steps of Model or Framework</th>
<th>General themes</th>
<th>Knowledge gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Model (24)</td>
<td>1. Question development 2. Searches, appraises, and synthesizes the literature 3. If literature is lacking, conduct research</td>
<td>4. Develop, enact, and appraise a pilot solution 5. If successful, implement across organization 6. If unsuccessful, restart process</td>
<td>• Recommended for use at an organizational level • Detailed flowchart guides decision-making process • Identified decision points and feedback loops throughout the model • Emphasizes pilot project before initiating system-wide project • Designed for interprofessional collaboration</td>
</tr>
<tr>
<td>The Clinical Scholar Model (25)</td>
<td>1. Observation 2. Analysis 3. Synthesis</td>
<td>4. Application/Evaluation 5. Dissemination</td>
<td>• Training program with tools to assess literature &amp; implementation • Focused on mentors undergo training • Identifies a network of supportive stakeholders • Emphasis on organization readiness</td>
</tr>
<tr>
<td>JBI (22)</td>
<td>1. Global Health 2. Evidence Generation 3. Evidence synthesis</td>
<td>4. Evidence (knowledge) transfer 5. Evidence Implementation</td>
<td>• Utilizes different types of evidence (SR, Guidelines, Expert opinion). • Expert opinion includes patients • Evidence dissemination important part of the model</td>
</tr>
<tr>
<td>CETEP (23)</td>
<td>1. Define the clinical practice question 2. Assess the critical appraisal components 3. Plan the implementation</td>
<td>4. Implement the practice change 5. Evaluate the practice change</td>
<td>• Authors reviewed literature, models and additional components believed vital in developing, reviewing, and revising patient care practices • Incorporates evidence factors, patient factors, and clinical setting • Most robust questions involving patient preference • Uses a pilot program for implementation</td>
</tr>
<tr>
<td>Johns Hopkins (21)</td>
<td>1. Practice Question: EBP question is identified 2. Evidence: The team searches, appraises, rates the strength of evidence 3. Translation: Feasibility, action plan, and change implemented &amp; evaluated</td>
<td>• Well-developed tool kit that provides guidance for question development, evidence-rating scale, and appraisal guide for various forms of evidence</td>
<td>• User must possess a level of knowledge and related skills to assess evidence</td>
</tr>
<tr>
<td>Stetler Model (17)</td>
<td>1. Question development includes project context 2. Identify the relevance of evidence sources and quality 3. Summarize evidence 4. Develop a plan 5. Identify/collate data outcomes to evaluate effectiveness of plan</td>
<td>• Designed to encourage critical thinking • Allows for categorization of evidence as external (e.g., research) or internal (e.g., organization outcome data) • Emphasizes use by single practitioner but may include groups</td>
<td>• Focus single practitioner • Patient value/preference not clearly integrated • User must possess a level of knowledge and related skills to assess evidence</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
<td>General Themes</td>
<td>Knowledge gaps</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Asking; acquiring; appraising; aggregating; applying; and assessing</td>
<td>Methodological differences between medical and management research</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Predictors; barriers; training organizations; and research institutes</td>
<td>Evidence focuses more on qualitative evidence to prove or disprove different models of organization and management</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Area of interest; Collect the best evidence; Critically appraise the evidence</td>
<td>Hospital-level model adapted from Iowa Model</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Integrate the evidence, clinical skill, and patient preferences/values</td>
<td>Model success focuses on clear directions, aggressive timeline, and the short-term commitment required of team members</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Evaluate the practice change</td>
<td>Provides a general overview of assessing literature without specifics direction or tools</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Inquiry; Innovation; Innovation</td>
<td>Tools provided for quality improvement but not assessing literature</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Inquiry encourages research process; Improvement includes quality improvement projects; Innovation is discovery studies and best evidence projects</td>
<td>User must possess a level of knowledge and related skills for assessing literature</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preference not clearly integrated into model</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Incorporates a framework with less emphasis on evidence hierarchy and more emphasis on knowledge translation</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Evidence: Qualitative and quantitative; Matches question to research type</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Identify need to change practice; Approximate problem with outcomes; Summarize best scientific evidence; Develop plan for changing practice; Monitor implementation</td>
<td>Promotes discovery of evidence through systematic reviews; Promotes transition of evidence through guideline creation</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>The model is based on change theory; Supports EBP changes derived from a combination of qualitative and quantitative data, clinical skill, and contextual evidence; Recommends the creation of team of stockholders; Piloted implementation</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Public health models different from medical models</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Simple overview of each step with limited resources discussed</td>
<td></td>
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<tr>
<td>15</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
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<tr>
<td>18</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
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</tr>
<tr>
<td>19</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
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</tr>
<tr>
<td>22</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
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<td>23</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
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<td>24</td>
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<td>Lack of consensus on evidence analysis and hierarchy</td>
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<tr>
<td>25</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
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</tr>
<tr>
<td>26</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
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<td>27</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
<td></td>
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<tr>
<td>28</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
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<tr>
<td>29</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
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<td>Lack of consensus on evidence analysis and hierarchy</td>
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<td>31</td>
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<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
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<td>33</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
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<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
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<tr>
<td>36</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
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<td>37</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>38</td>
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<tr>
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<tr>
<td>40</td>
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<td>41</td>
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<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
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<td>42</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
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<td>43</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Implement and evaluate change (pilot study)</td>
<td>Patient values/preferences different from medical focus is on health outcomes</td>
<td></td>
</tr>
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<td>45</td>
<td>Community assessment; Quantify the issue; Develop Statement of the issue; Determine what is known evidence; Develop and prioritize program and policy options; Develop an action plan; Evaluate the program or policy</td>
<td>Lack of consensus on evidence analysis and hierarchy</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Discovery: Searching for new knowledge; Evidence Summary: Synthesize the body of research knowledge; Translation: Provide clinicians with a practice document; Integration: Changed through formal and informal channels; Evaluation: EBP outcomes are evaluated</td>
<td>Public health models different from medical focus is on health outcomes</td>
<td></td>
</tr>
</tbody>
</table>
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Contributions All Authors have read and approved the final manuscript. JD conceptualized the study design, screened the articles for eligibility, extracted data from included studies, and contributed to the writing and revision of the manuscript. LML conceptualized the study design, provided critical feedback on the manuscript, and revised the manuscript. AM screened the articles for eligibility, extracted data from the studies, provided critical feedback on the manuscript, and revised the manuscript.

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Patient consent for publication Not required.

Research Ethics Approval This study does not involve human participants and did not require approval.

Provenance and peer review Not commissioned; externally peer-reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as online supplemental information. All relevant study data are included in the article or in online supplemental documents.

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Jarrod Dusin http://orcid.org/0000-0003-4394-9235
Lisa Mische Lawson http://orcid.org/0000-0002-1601-9465

Mesh terms:
Evidence-Based Medicine
Evidence-Based Practice
Implementation Science
Knowledge Translation

Figure 1. Retrieval and selection process
REFERENCES

Figure 1 Retrieval and selection process.
Appendix A: Literature search strategy

Database: Embase

#8


#4

#1 AND #2 AND #3

#3

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#2

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#1

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Database: Ovid MEDLINE(R)

In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to April 01, 2022>

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2 exp Health Services/ or exp Hospitals/ or exp Hospital Medicine/ or exp Academic Medical Centers/ or healthcare.ti,ab,kw,kf. or hospital*.ti,ab,kw,kf. 3624136

3 exp Models, Organizational/ or model*.ti,ab,kw,kf. or framework*.ti,ab,kw,kf. or theory.ti,ab,kw,kf. or theories.ti,ab,kw,kf. or exp Models, Theoretical/ 4765738

4 1 and 2 and 3

5 limit 4 to yr="1990 -Current"

6 limit 5 to ("in data review" or in process or medline)

7 limit 6 to (english language or no language specified)

8 exp Research Design/ or exp Research/ or "Journal Article".pt. or Review.pt. 31240784

9 6 and 8

10 limit 9 to (english language or no language specified)
Database: Scopus

( TITLE-ABS-KEY (framework* OR model* OR theory OR (theoretical model*)) OR theories OR (organizational model*)) ) AND ( TITLE-ABS-KEY (health service*) OR {university hospital*} OR hospital* OR {hospital medicine*} OR {health care} OR healthcare OR {Academic Medical Center*} ) ) AND ( TITLE-ABS-KEY (evidence based practice) OR {evidence based medicine} OR {evidence-based practice} OR {evidence-based medicine} ) ) AND ( LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013) OR LIMIT-TO (PUBYEAR, 2012) OR LIMIT-TO (PUBYEAR, 2011) OR LIMIT-TO (PUBYEAR, 2010) OR LIMIT-TO (PUBYEAR, 2009) OR LIMIT-TO (PUBYEAR, 2008) OR LIMIT-TO (PUBYEAR, 2007) OR LIMIT-TO (PUBYEAR, 2006) OR LIMIT-TO (PUBYEAR, 2005) OR LIMIT-TO (PUBYEAR, 2004) OR LIMIT-TO (PUBYEAR, 2003) OR LIMIT-TO (PUBYEAR, 2002) OR LIMIT-TO (PUBYEAR, 2001) OR LIMIT-TO (PUBYEAR, 2000) OR LIMIT-TO (PUBYEAR, 1999) OR LIMIT-TO (PUBYEAR, 1998) OR LIMIT-TO (PUBYEAR, 1997) OR LIMIT-TO (PUBYEAR, 1996) OR LIMIT-TO (PUBYEAR, 1995) OR LIMIT-TO (PUBYEAR, 1994) OR LIMIT-TO (PUBYEAR, 1993) ) AND ( LIMIT-TO (LANGUAGE, "English") ) AND ( LIMIT-TO (SRCTYPE, "j") ) AND ( LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "sh") )
## Appendix B: Initial Tracking Form

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<th>both/yes</th>
<th>In search</th>
<th>Yes/No</th>
<th>Name</th>
<th>Model/Frame</th>
<th>EBP/KT/Impl</th>
<th>Reference in Rayyan</th>
<th>Seminal or Updated article reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Adoption</td>
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<td>Model</td>
<td>EBP</td>
<td>Description</td>
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<td>The Coordinated Implementation Model</td>
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<td>Lomas J. Retailing research: increasing the role of evidence in clinical services for childbirth. The Milbank Quarterly. 1993 Jan 1;439-75.</td>
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<td>EBP Model</td>
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<td>Frame work</td>
<td>Impl</td>
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### Appendix C: Full Data Capture Form

<table>
<thead>
<tr>
<th>Author</th>
<th>Name</th>
<th>Framework/ Mode</th>
<th>EBP/ Imp/ KT/ EBP/ EBMgt</th>
<th>Key features (areas of focus)</th>
<th>Summarize general themes</th>
<th>Identify knowledge gaps</th>
<th>Ask</th>
<th>Acquire</th>
<th>Assess</th>
<th>Apply</th>
<th>Evaluate</th>
<th>Pt Discussed</th>
<th>Pt Incorp</th>
<th>Pt Tools</th>
<th>Clinical Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enticott (2017)</td>
<td>Iowa Model</td>
<td>Model</td>
<td>EBP</td>
<td>1) Identify either a “problem-focused trigger” or “knowledge-focused trigger.” 2) Determine whether the “trigger” is a healthcare organization’s priority. 3) Reflect a team’s topic of interest and include interested stakeholders. The team will search, appraise, and synthesize literature related to the topic. 4) Evaluate the availability and merit (e.g., level of evidence, quality of evidence) of evidence. If evidence availability and merit are lacking, conduct research. 5) If credible and reliable evidence is available, pilot the practice change. 6) Appraise pilot for level of success. If pilot is successful, disseminate findings within the organization and implement recommended change into practice.</td>
<td>Summarize study states need for asking if the problems is a priority.</td>
<td>User must possess a level of knowledge and related skills to assess evidence</td>
<td>Assemble, Appraise and Synthesize Body of Evidence</td>
<td>Conduct systematic search</td>
<td>Weigh quality, quantity, consistency, and risk</td>
<td>Identify and engage key personnel</td>
<td>Hardware change into system</td>
<td>Monitor key indicators through quality improvement</td>
<td>Reinfuse as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For peer review only - [http://bmjopen.bmj.com/site/about/guidelines.xhtml](http://bmjopen.bmj.com/site/about/guidelines.xhtml)**
<table>
<thead>
<tr>
<th>Melnyk (2012)</th>
<th>ARCC</th>
<th>Model</th>
<th>Impl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Assess the healthcare organization for readiness for change and implementation of EBP project.</td>
<td>1) Well-developed training program with tools and scales to assess literature and implement EBP</td>
<td>1) Assess the healthcare organization for readiness for change and implantation of EBP project.</td>
<td>1) Assess the healthcare organization for readiness for change and implantation of EBP project.</td>
</tr>
<tr>
<td>2) Identify potential and actual barriers to and facilitators of EBP project.</td>
<td>2) Focuses on EBP mentors to undergo training</td>
<td>2) Identify potential and actual barriers to and facilitators of EBP project.</td>
<td>2) Identifies a network of stakeholders who are supportive of the EBP project</td>
</tr>
<tr>
<td>3) Identify EBP champions to work with specific clinical units.</td>
<td>3) Emphasis on healthcare organizational readiness and identification of facilities and barriers (Scale provided)</td>
<td>3) Identify EBP mentors to work with specific clinical units.</td>
<td>3) Identifies a network of stakeholders who are supportive of the EBP project</td>
</tr>
<tr>
<td>4) Implement evidence into practice.</td>
<td>4) Encompasses research, patient values, and clinical expertise as evidence</td>
<td>4) Implement evidence into practice.</td>
<td>4) Identifies a network of stakeholders who are supportive of the EBP project</td>
</tr>
<tr>
<td>5) Evaluate EBP outcomes.</td>
<td>5) Control theory and cognitive behavior theory guides model</td>
<td>5) Evaluate EBP outcomes.</td>
<td>5) Control theory and cognitive behavior theory guides model</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strout (2009)</th>
<th>The clinical scholar model</th>
<th>Model</th>
<th>EBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Predicated on the development of a cadre of point-of-care nurses who become clinical scholars, committed to patient care, knowledge development, research translation, and evidence implementation.</td>
<td>1) Predicated on the development of a cadre of point-of-care nurses who become clinical scholars, committed to patient care, knowledge development, research translation, and evidence implementation.</td>
<td>1) Observation</td>
<td>1) Observation</td>
</tr>
<tr>
<td>2) Analysis</td>
<td>2) Analysis</td>
<td>2) Analysis</td>
<td>2) Analysis</td>
</tr>
<tr>
<td>3) Synthesis</td>
<td>3) Synthesis</td>
<td>3) Synthesis</td>
<td>3) Synthesis</td>
</tr>
<tr>
<td>5) Dissemination.</td>
<td>5) Dissemination.</td>
<td>5) Dissemination.</td>
<td>5) Dissemination.</td>
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<p>| | | | |
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| | | | |</p>
<table>
<thead>
<tr>
<th>Authors</th>
<th>Model</th>
<th>EBP</th>
<th>1) Global Health</th>
<th>2) Evidence Generation</th>
<th>3) Evidence Synthesis</th>
<th>4) Evidence Implementation</th>
<th>5) Evaluate the practice change</th>
<th>6) Implement the practice change</th>
<th>7) Evidence Generation</th>
<th>8) Evidence Synthesis</th>
<th>9) Evidence Implementation</th>
<th>10) Practice Question: Using a team approach, the EBP question is identified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan (2019)</td>
<td>JBI</td>
<td>EBP</td>
<td>1) Defines the clinical practice question; 2) Assesses the clinical appraisal components; 3) Plans the implementation; 4) Implements the practice change; and 5) Evaluates the practice change.</td>
<td>User must possess a level of knowledge and related skills to assess evidence.</td>
<td>1) Global health (includes knowledge needs)</td>
<td>2) Evidence Generation</td>
<td>3) Evidence Synthesis</td>
<td>4) Evidence Implementation</td>
<td>5) Evaluate the practice change</td>
<td>6) Implement the practice change</td>
<td>7) Evidence Generation</td>
<td>8) Evidence Synthesis</td>
</tr>
<tr>
<td>Collins (2007)</td>
<td>CETEP</td>
<td>EBP</td>
<td>1) Defines the clinical practice question; 2) Assesses the critical appraisal components; 3) Plans the implementation; 4) Implements the practice change; and 5) Evaluates the practice change.</td>
<td>User must possess a level of knowledge and related skills to assess evidence.</td>
<td>1) Global health (includes knowledge needs)</td>
<td>2) Evidence Generation</td>
<td>3) Evidence Synthesis</td>
<td>4) Evidence Implementation</td>
<td>5) Evaluate the practice change</td>
<td>6) Implement the practice change</td>
<td>7) Evidence Generation</td>
<td>8) Evidence Synthesis</td>
</tr>
</tbody>
</table>
| Johns Hopkins (2007) | Model | EBP | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | User must possess a level of knowledge and related skills to assess evidence. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change. | 1) Practice Question: Using a team approach, the EBP question is identified. 2) Evidence: The team searches, appraises, rates the strength of evidence, describes quality of evidence, and makes a practice recommendation on the strength of evidence. 3) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 4) Translation: In this stage, feasibility is determined, an action plan is created, and change is implemented. 5) Evaluate the practice change.
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation: Identify a priority need. Identify the purpose of the EBP project, context in which the project will occur, and relevant sources of evidence.</td>
</tr>
<tr>
<td>2</td>
<td>Validation: Assess sources of evidence for level and overall quality. Determine whether source has merit and goodness of fit and whether to accept or reject the evidence in relation to project purpose.</td>
</tr>
<tr>
<td>3</td>
<td>Comparative Evaluation/Decision Making: Evidence findings are logically summarized and similarities and differences among sources of evidence are evaluated. Determine whether it is acceptable and feasible to apply summation of findings to practice.</td>
</tr>
<tr>
<td>4</td>
<td>Translation/Application: Develop the “how to’s” for implementation of summarized findings. Identify practice implications that justify application of findings for change.</td>
</tr>
<tr>
<td>5</td>
<td>Evaluation: Identify expected outcomes of the project and determine whether the goals of EBP were successfully achieved.</td>
</tr>
</tbody>
</table>

Primary focus is single practitioner. Patient value/preference not clearly integrated into model. User must possess a level of knowledge and related skills.

Validation: Assess sources of evidence for level and overall quality. Determine whether source has merit and goodness of fit and whether to accept or reject the evidence in relation to project purpose.

Specific about the need for clarity of purpose and potential significance of internal or external factors.

Evaluation: Identify expected outcomes of the project and determine whether the goals of EBP were successfully achieved.
<table>
<thead>
<tr>
<th>Moodie (2011)</th>
<th>KTA Framework</th>
<th>KT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Identify problems that need to be addressed and begin searching for evidence and research about the identified problem.</td>
<td>1) Adapts well for use with individuals, teams, and healthcare organizations. 2) Is grounded in planned action theory. 3) Breaks knowledge-to-action process into manageable sections. 4) Discussion of providing evidence in a way that influences clinical practice, stakeholders, and end-users in a way to promote uptake of knowledge.</td>
<td>Patient values/preferences not clearly integrated into model. User must possess a level of knowledge and related skills for knowledge creation.</td>
</tr>
<tr>
<td>2) Adapt the knowledge use to a local context.</td>
<td>1) Identify problems that need to be addressed and begin searching for evidence and research about the identified problem.</td>
<td>1) Identify problems that need to be addressed and begin searching for evidence and research about the identified problem.</td>
</tr>
<tr>
<td>3) Identify barriers to use of knowledge. 4) Select, adapt, and implement interventions. 5) Monitor the use of implanted knowledge. 6) Evaluate outcomes related to knowledge use. 7) Sustain appropriate use.</td>
<td>3) Identify barriers to use of knowledge. 4) Select, adapt, and implement interventions.</td>
<td>3) Identify barriers to use of knowledge. 4) Select, adapt, and implement interventions.</td>
</tr>
<tr>
<td>8) Janati (2018)</td>
<td>EBmg</td>
<td>Model</td>
</tr>
<tr>
<td>Approach to improve the practice of health care management, at the same time as it may stimulate research on the organization and management of health care. Evidence Based Management means that healthcare managers should learn to search for and critically appraise evidence from management research as a basis for their practice. Phase 1: 1) asking; 2) acquiring; 3) appraising; 4) aggregating; 5) applying; 6) assessing. Phase 2: predictors, barriers, training organizations and research institutes.</td>
<td>1) There are methodological differences between medical research and management research. 2) Evidence focuses more on qualitative evidence. The evidence based approach means to try to prove or disprove the effectiveness and efficiency of different models of organization and management. Sources of evidence: a) Scientific and research b) Facts &amp; information of hospital c) Political-social development plans d) Manager’s professional expertise e) Ethical-Moral Evidence f) Value and expectations of all stakeholders.</td>
<td>User must possess a level of knowledge and related skills for assessing literature, Model discusses this lack of skill. Lack of time and skill is the major limiting factor. Lack of specifics on patient value/preference discussed.</td>
</tr>
<tr>
<td>1) Asking</td>
<td>2) Acquire</td>
<td>3) Appraising</td>
</tr>
<tr>
<td>Anderson (2009) St Luke’s Model</td>
<td>Adopted from Iowa model 1. Area of interest 2. Collect the most relevant and best evidence. 3. Critically appraise the evidence. 4. Integrate the evidence with one's clinical expertise, patient preferences, and values in making a practice decision or change. 5. Evaluate the practice decision or change.</td>
<td>EBP 1) Hospital level model adapted from Iowa model 2) Model success focuses on clear directions, aggressive timeline, and the short-term commitment required of team members 1) Patient preference not clearly integrated into model. Provides a general overview of assessing literature without specifics direction or tools</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Hagle (2019) The I3 Model for Advancing Quality Patient Centered Care Model</td>
<td>1) Inquiry, 2) Improvement 3) Innovation. Inquiry encompasses research, improvement includes QI projects, and innovation is discovery in studies and best evidence projects. 1) Model focuses on options for EBP, QI, and research needs. 2) Each process includes a step to obtain pre-data or best evidence. 3) The I3 Model incorporates the voice of the customer (VOC) Tools provided for QI process but not for assessing literature. User must possess a level of knowledge and related skills for assessing literature (not specified)</td>
<td>1) Inquiry 1) Inquiry 1) Inquiry 2) Improvement</td>
</tr>
<tr>
<td>Rosswurm (1999) Model for Change to Evidence Based Practice Model</td>
<td>1) Identify the need to change practice; 2) Approximate the problem with outcome indicators; 3) Summarize the best scientific evidence (systematic review) considering feasibility, benefits and risks for its implementation; 4) Develop a plan for changing the practice, including the necessary resources; 5) Implement and evaluate change (inform if a pilot study is conducted); 6) Integrate and maintain change in practice (communicate results to strategic leaders); 7) Monitor implementation (evaluate process and results).</td>
<td>1) The model is based on theoretical and research literature related to evidence-based practice, research utilization, standardized language, and change theory. 2) The model supports evidence-based practice changes derived from a combination of quantitative and qualitative data, clinical expertise, and contextual evidence. (Assessment worksheet provided and risk and benefit discussed) 3) Recommends the creation of EBP Team of stakeholders and implementation should be piloted Patient values/preferences not clearly integrated into model</td>
</tr>
<tr>
<td>Model</td>
<td>EBPH</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Hess (2014)</td>
<td>Evidence Based Public Health</td>
<td></td>
</tr>
<tr>
<td>Kring [2008]</td>
<td>ACE Star Model</td>
<td></td>
</tr>
</tbody>
</table>

**1) Discovery:** This stage involves searching for new knowledge found in traditional quantitative and qualitative methodologies.  
2) Evidence Summary: The primary task is to synthesize the body of research knowledge into a meaningful statement of evidence for a given topic. This is a knowledge-generating stage, which occurs simultaneously with new findings that may arise from the synthesis.  
3) Translation: The aim of translation is to provide clinicians with a practice document (e.g., clinical practice guideline) derived from the synthesis and summation of research findings.  
4) Integration: Practitioner and healthcare organization practices are changed through formal and informal channels.  
5) Evaluation: An array of EBP outcomes are evaluated on impact, quality, and satisfaction.

**1) EPBH:** Incorporates a framework with less emphasis on evidence hierarchy and more emphasis on knowledge translation.  
2) Evidence: Qualitative and quantitative evidence analysis has the least consensus.  
3) Focuses on matching question to research type.

**Steps:**  
1. Community assessment  
2. Quantifying the issue  
3. Developing a concise statement of the issue  
4. Determine what is known through the literature  
5. Developing and prioritizing program and policy options  
6. Developing an action plan and implementing interventions  
7. Evaluating the program or policy

**3) Translation:** The aim of translation is to provide clinicians with a practice document (e.g., clinical practice guideline) derived from the synthesis and summation of research findings.

**4) Determine what is known through the literature**

**5) Developing and prioritizing program and policy options**

**6) Developing an action plan and implementing interventions**

**7) Evaluating the program or policy**

**Patient values/preference not clearly integrated into model (pt. satisfaction measured)**

**Simple overview of each step with limited resources discussed**
<table>
<thead>
<tr>
<th>Model</th>
<th>EBP</th>
<th>Not a linear model</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Evidence Implementation Model for Public Health Systems</td>
<td>1) Broad framework developed to help decision makers, researchers, knowledge brokers and implementers identify opportunities to strengthen needed action  2) Includes setting measurable evidence implementation targets  3) Includes all actors in all stages of knowledge transfer to increase shared aim and reduce barriers  4) Model is broad with diverse implementation</td>
<td>Provides a general overview without specifics</td>
</tr>
<tr>
<td>San Diego 8A's EBP Model</td>
<td>The 8 A's refer to:  1) Assessing a clinical or practice problem;  2) Asking a clinical question in a PICOT (population/patient, implementation, comparison, outcome, and time) format;  3) Acquiring existing sources of evidence;  4) Appraising the levels of evidence;  5) Applying the evidence to a practice change (implementation)  6) Analyzing the results of the change as compared to the previous implementation state  7) Advancing the practice change through internal and external dissemination  8) Adopting the practice for sustainability over time.</td>
<td>No specifics on Patient preference/value incorporation</td>
</tr>
</tbody>
</table>

1) Model was created to make it easier for nurses to complete EBP projects.  2) The San Diego 8A's EBP model was derived primarily from previously published models  3) Change Theory part of the model  4) Utilizes mentors to implement  5) Assessing a clinical or practice problem;  6) Asking a clinical question in a PICOT (population/patient, implementation, comparison, outcome, and time) format;  7) Acquiring existing sources of evidence;  8) Appraising the levels of evidence;  9) Applying the evidence to a practice change (implementation)  10) Analysing the results of the change as compared to the previous implementation state  11) Advancing the practice change through internal and external dissemination  12) Adopting the practice for sustainability over time.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Model Name</th>
<th>Phase One: Unfreezing</th>
<th>Phase Two: Moving</th>
<th>Phase Three: Refreezing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4) Choosing the Solution</td>
<td>5) Gaining Acceptance</td>
<td>6) Stabilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No mention of patient preference/value</td>
<td>2) Diagnosing the Problem</td>
<td>3) Acquiring Resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Choosing the Solution</td>
<td>5) Gaining Acceptance</td>
<td>6) Stabilization</td>
</tr>
</tbody>
</table>

Model focuses on barriers of nurses to implement EBP:
1) Difficulty of practicing nurses to synthesize scientific evidence, and
2) Lack of adequate administrative commitment to make evidence-based nursing a priority.

EBP Consultants should be funded to work with the EBP round table (EBP group).

Model discusses the need to put the same emphasis currently given to conducting research on the provision of consultation services for the translation of research into practice.

No mention of patient preference/value

|             | Framework | 4) Formulate practice guideline | 5) Independent review | 6) Negotiate practice policies |
|             | EBP       | 7) Adopt guideline policies | 8) Scheduled review | |
|             |           | No mention of patient preference/value | 2) Generate evidence-based recommendations | 3) Generate evidence-based recommendations |
|             |           | User must possess a level of knowledge and related skills for assessing literature (not specified) | 4) Formulate practice guideline | 5) Independent review |
|             |           | 6) Negotiate practice policies | 7) Adopt guideline policies | 8) Scheduled review |
|             |           | 1) Select/Frame clinical problem | 2) Generate evidence-based recommendations | 3) Generate evidence-based recommendations |
|             |           | 4) Formulate practice guideline | 5) Independent review | 6) Negotiate practice policies |
|             |           | 7) Adopt guideline policies | 8) Scheduled review | 12/19 (63%) 7/19 (37%) 4/19 (21%)
References


**Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist**

<table>
<thead>
<tr>
<th>SECTION</th>
<th>ITEM</th>
<th>PRISMA-ScR CHECKLIST ITEM</th>
<th>REPORTED ON PAGE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Title</td>
<td>Identify the report as a scoping review.</td>
<td>1</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>Structured summary</td>
<td>Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.</td>
<td>2</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>Rationale</td>
<td>Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.</td>
<td>4</td>
</tr>
<tr>
<td>METHODS</td>
<td>Protocol and registration</td>
<td>Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.</td>
<td>Not done</td>
</tr>
<tr>
<td></td>
<td>Eligibility criteria</td>
<td>Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Information sources*</td>
<td>Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Search</td>
<td>Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Selection of sources of evidence†</td>
<td>State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Data charting process‡</td>
<td>Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Data items</td>
<td>List and define all variables for which data were sought and any assumptions and simplifications made.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Critical appraisal of individual sources of evidence§</td>
<td>If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).</td>
<td>6</td>
</tr>
<tr>
<td>SECTION</td>
<td>ITEM</td>
<td>PRISMA-ScR CHECKLIST ITEM</td>
<td>REPORTED ON PAGE #</td>
</tr>
<tr>
<td>------------------</td>
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</tr>
<tr>
<td>Synthesis of results</td>
<td>13</td>
<td>Describe the methods of handling and summarizing the data that were charted.</td>
<td>6</td>
</tr>
<tr>
<td>RESULTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of sources of evidence</td>
<td>14</td>
<td>Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.</td>
<td>6</td>
</tr>
<tr>
<td>Characteristics of sources of evidence</td>
<td>15</td>
<td>For each source of evidence, present characteristics for which data were charted and provide the citations.</td>
<td>6-7</td>
</tr>
<tr>
<td>Critical appraisal within sources of evidence</td>
<td>16</td>
<td>If done, present data on critical appraisal of included sources of evidence (see item 12).</td>
<td>6-7</td>
</tr>
<tr>
<td>Results of individual sources of evidence</td>
<td>17</td>
<td>For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.</td>
<td>6-8</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>18</td>
<td>Summarize and/or present the charting results as they relate to the review questions and objectives.</td>
<td>6-8</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of evidence</td>
<td>19</td>
<td>Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.</td>
<td>8</td>
</tr>
<tr>
<td>Limitations</td>
<td>20</td>
<td>Discuss the limitations of the scoping review process.</td>
<td>10</td>
</tr>
<tr>
<td>Conclusions</td>
<td>21</td>
<td>Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.</td>
<td>11</td>
</tr>
<tr>
<td>FUNDING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>22</td>
<td>Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.</td>
<td>18</td>
</tr>
</tbody>
</table>

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where sources of evidence (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources (see first footnote).
‡ The frameworks by Arksey and O’Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of “risk of bias” (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).