Making Healthcare Safer IV

Final Report on Prioritization of Patient Safety Practices for a New Rapid Review or Rapid Response

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PATIENT SAFETY

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

The information in this report is intended to help healthcare decision makers—patients and clinicians, health system leaders, and policymakers, among others—make well-informed decisions and thereby improve the quality of healthcare services. This report is not intended to be a substitute for the application of clinical judgment. Anyone who makes decisions concerning the provision of clinical care should consider this report in the same way as any medical reference and in conjunction with all other pertinent information, i.e., in the context of available resources and circumstances presented by individual patients.

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Preface

Recognized for excellence in conducting comprehensive systematic reviews, the Agency for Healthcare Research and Quality (AHRQ) is expanding its portfolio to include rapid evidence products. The Evidence-based Practice Center (EPC) Program has begun to develop a range of rapid evidence products to assist end-users in making specific decisions in a limited timeframe. AHRQ is using this format for the fourth edition of its Making Healthcare Safer series of reports, produced by the EPC Program and the General Patient Safety Program. The Final Report describes the process for identifying which patient safety practices to include in the series.

To shorten timelines, reviewers must make strategic choices about which processes to abridge. However, these adaptations may limit the certainty and generalizability of the review findings, particularly in areas with a large literature base. Transparent reporting of the methods used, the resulting limitations of the evidence synthesis, and the quality of included studies is extremely important.

AHRQ expects that these rapid evidence products will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. Transparency and stakeholder input are essential to AHRQ.

If you have comments on this report, they may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 5600 Fishers Lane, Rockville, MD 20857, or by email to epc@ahrq.hhs.gov.

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Contents

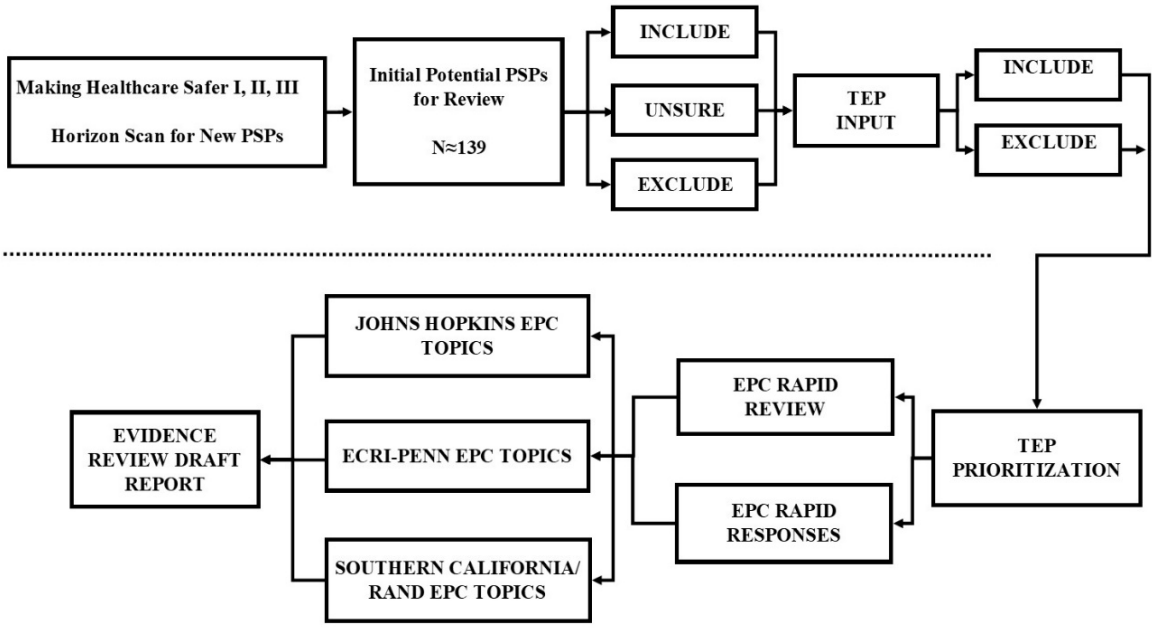
Background

The fourth installment of the Making Healthcare Safer (MHS) series of reviews will mark close to a quarter century's progress in efforts to meet the challenge of reducing and ultimately eliminating preventable patient harm. Throughout this patient safety journey, the MHS series has synthesized and disseminated evidence on the effectiveness of patient safety practices (PSPs).

For this project, we define PSPs as interventions, strategies, or approaches intended to prevent or mitigate unintended consequences of the delivery of healthcare and to improve the safety of healthcare for patients.[1] The MHS series has guided the field about what works, and where more research and rigorous evaluation is needed.[1] The science and practice of patient safety improvement has evolved in the last 20 years, and while certain areas[2-6] have realized improvements, healthcare continues to struggle with improvement rates much lower than desired. A recent report from the National Academies of Sciences, Engineering, and Medicine goes as far to claim that "the country is at a relative standstill in patient safety progress,"[7] a claim supported by a recent meta-analysis indicating that as many as 1 in 20 patients continue to experience preventable harm.[8] A recent report from the U.S. Department of Health and Human Services' Office of Inspector General (OIG) revealed that 25 percent of Medicare patients experience harm, with 43 percent of those harm events judged to be preventable.[9] The leading types of harm found in the OIG report (i.e., medication errors, pressure ulcers, surgical procedural errors, and infections) align with the topics in the initial MHS report issued over 20 years ago. Additionally, the coronavirus disease 2019 (COVID-19) pandemic has eroded some of the hard-won gains in reducing preventable harm such as central line-associated blood stream infections (CLABSIs).[10] The current state of the patient safety movement heightens the importance of this fourth installment of MHS as an opportunity to renew focus on foundational elements of safe patient care and move the field forward.

The purpose of this report is to identify the PSPs that merit highest priority for inclusion in the MHS IV series of reviews. An overview of the MHS IV project is provided in Figure 1. Our analytic framework for this project (Table 1) builds on frameworks from past MHS reports as well as the broader literature on classifying and analyzing PSPs.[11] We have made efforts to align with terminology from the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Net (PSNet) to promote consistency across AHRQ activities. The purpose of this framework is to organize the overall scope of the effort and guide organization of the final report.

Figure 1. Overview of the Making Healthcare Safer IV Project



EPC = Evidence-based Practice Center; PSP = patient safety practice; TEP = technical expert panel

Table 1. Framework for organizing patient safety practices

Domain	Description	Attributes To Consider
Safety Target	The safety targets include specific preventable harms (e.g., hospital-acquired infections), care delivery processes (e.g., medication management), and performance shaping factors (e.g., fatigue, device design).	• Is the focus on common or rare events? • Is the safety concern pervasive in the setting, or only relevant to specific patients?
Setting of Care/ Clinical Area	The setting of care and clinical area may include the focus of care delivery, the physical setting, transitions between settings, and the technological mediation of care.	• Is the focus preventive, acute, chronic, or end-of-life care? • Is the setting outpatient, acute care facility, post-acute, or long-term care, or transitions between settings? • What role does telehealth play?
PSP Attributes	Attributes of the PSP include its approach to improving safety and related factors that impact its implementation and effectiveness.	• What is the approach to improving safety? (e.g., human factors, teamwork, decision support) • What is the maturity of the PSP? • What is the degree of certainty about evidence for the PSP? • What level does the PSP target (clinical point of care or health care system.)? • What is the degree of behavioral change required? • Is this a one-time structural change or an ongoing process? • Is this an individual activity or organizational change? • Is it feasible to implement across multiple settings?

Domain	Description	Attributes To Consider
Contextual Factors	Contextual factors include a broad range of internal (to the organization) and external concepts that may impact the PSP's implementation or effectiveness.	• What is the regulatory and financial environment regarding the safety target and the PSP? • Factors to consider include safety culture, health information technology, patient and family engagement, physical environment, organizational design, and learning health system maturity

PSP = patient safety practice

Methods

Identification and Preliminary Assessment of Patient Safety Practices (PSPs) for Prioritization

We identified PSPs by reviewing the content of the three previous Making Healthcare Safer (MHS) reports and by conducting a horizon scan for PSPs not covered in previous MHS reports. The MHS I–III reports were reviewed by the Johns Hopkins University (JHU) Evidence-based Practice Center (EPC) and the horizon scan was performed by the ECRI-Penn EPC (see Appendix A for details about the horizon scan). For the PSPs covered in previous MHS reports, we first conducted a harmonization process. Past reports had treated PSPs differently, using different terminology and adopting different approaches to combining and separating PSPs. The JHU team collated PSP definitions for each of the PSPs and combined duplicative entries. We then assessed all PSPs according to the following criteria: appropriateness, importance of the condition, duplication, impact of a review, and feasibility. The criteria are defined in Table 2. The ECRI-Penn EPC used the same criteria to assess the PSPs that were identified by the horizon scan.

Table 2. PSP prioritization ratings

Criterion	Definition	Response Categories

Appropriateness	Whether or not a proposed practice meets the definition of a PSP
	
	Definition of a PSP: interventions, strategies, or approaches intended to prevent or mitigate unintended consequences of the delivery of healthcare and to improve the safety of healthcare for patients.
		• Yes: practice meets definition of a PSP
		• No: practice does not meet definition of a PSP for one of the following reasons:
		  ○ A PSP was assessed to no longer be supported by evidence (harms exceed benefits) (e.g., beta-blockers and reduction of perioperative cardiac events)
		  ○ Practice as defined is not a clear intervention (e.g., alarm risk assessment is problem finding only; "do not use list" is a list only)
		  ○ Practice was assessed to currently be viewed as standard of care (e.g., nutritional support)
		  ○ Practice was assessed to currently be viewed as quality improvement rather than a safety intervention (e.g., multidisciplinary geriatric consultation)

Importance: likelihood to harm & scope of harm	The likelihood to harm a patient and scope of the condition addressed by the PSP	**Likelihood to harm:** • High, Moderate, Low, Unclear **Scope:** • Widespread (multiple occurrences with potential to impact most/all), pattern (multiple occurrences with potential to impact some), limited (unique occurrence that is not routine practice), unclear
Duplication	Are there existing guidelines or high-quality systematic reviews published or updated within the last 5 years? If yes, a review may likely be duplicative.	• Duplicative • Partly duplicative: some reviews may exist for portions of the PSP, or in specific contexts or populations, but not a comprehensive review • Not duplicative

Criterion	Definition	Response Categories
Feasibility	Are there enough studies to merit an updated review on a PSP? Considerations include: • Number of new studies on the PSP that have been published in the last 3 years (MHS III was published in 2020); • Whether studies address a pre-existing, modified, or new PSP; • Whether data is from an eligible type of study design (randomized controlled trial or nonrandomized study with a comparison group).	• Yes • No
Impact: current use & certainty of evidence	The goal is assessing potential impact of reviewing the PSP, determined by how widely it is used, and whether a review would help to establish certainty about the effectiveness of the PSP.	**Current use:** • Widespread adoption • Less than widespread adoption **Certainty of evidence of effectiveness:** • High certainty of effectiveness • Less than high certainty of effectiveness

PSP = patient safety practice

We then prepared a preliminary version of this prioritization document that included a brief description of all identified PSPs, a brief description of our methods, and a summary of our assessments of the prioritization criteria with preliminary recommendations on which PSPs merit further consideration for an update with a Rapid Review or Rapid Response. The Rapid Response mechanism is ideal for PSPs with less evidence, those studies without health outcomes, and those high priority PSPs with recent high-quality comprehensive systematic reviews (e.g., covering all aspects of the PSP and relevant clinical contexts) that can be used to do an update. We sought to identify any PSPs having more evidence as candidates for a Rapid Review or potentially a full systematic review (the latter would require support beyond the scope of the current task order and thus would require explanation of the rationale for suggesting a full review).

Prioritization of PSPs by the Technical Expert Panel (TEP)

Our approach to prioritization drew heavily from processes used in MHS II and III, the versions of the report which considered both prior PSPs and newly identified PSPs. Specifically, outputs from the horizon scan were combined with the assessments of prior PSPs receiving a review.

The JHU team worked with the team from the Southern California/Rand EPC to recruit 15 experts in patient safety to serve on a TEP that was charged with establishing consensus about how to prioritize the PSPs for inclusion in MHS IV (see Appendix B). The TEP included representatives of important stakeholders and perspectives, including U.S. governmental agencies (Centers for Disease Control and Prevention, Defense Health Agency, Department of Veterans Affairs, and Food and Drug Administration), healthcare stakeholders (e.g., Leapfrog Group and UnitedHealth Group), clinical specialists (critical care, hospital medicine, nursing, pharmacy, primary care, and surgery), experts in patient safety issues (health equity, information systems, quality improvement, and social science), and a patient/consumer perspective (Informed Patient Institute).

Led by the Southern California/RAND EPC, we used a modified Delphi technique to obtain a consensus from the TEP on the PSPs that merited the highest priority for a review. To achieve consensus, we started by sending the TEP a survey that asked the panel to independently make a recommendation about whether each PSP should be included or excluded in the MHS IV series of reviews. This survey offered "unsure" as a response option. The survey focused on the PSPs that the EPC team identified as having high or moderate importance. Due to the number of PSPs that were considered, we asked the TEP to use a simple rubric for making their recommendation about how to prioritize a PSP for a Rapid Review or Rapid Response. The Southern California/RAND EPC collated the results of the initial survey and prepared a series of slides to present to the TEP at a virtual meeting held on December 9, 2022. The slide presentation included an overview of the purpose of the project and the prioritization process, followed by a listing of the PSPs to be considered and for each PSP a summary of our preliminary assessments (according to the criteria described in Table 2) and the premeeting TEP survey responses. During the TEP meeting, we asked the TEP members to share their thoughts about how to prioritize each PSP. After the discussion of each PSP, we asked the TEP members to independently submit their votes on whether to include or exclude the PSP for a review. Unsure was not a response option at that point. TEP members who were unable to attend the discussion were allowed to submit votes after we briefed them on what was discussed at the larger TEP meeting.

We then collated the results of the final voting, aiming to identify up to 24 PSPs that merited the highest priority for a Rapid Review or Rapid Response. The JHU team reviewed the ratings and assessments of the top priority PSPs and then made recommendations about what was best suited for a Rapid Review versus a Rapid Response.

Results

Preliminary Prioritization of Patient Safety Practices (PSPs)

Appropriateness and Regrouping

From the horizon scan and previous Making Healthcare Safer (MHS) reports, we identified a total of 136 PSPs that could be reviewed. The MHS I–III reports together included 108 PSPs in 27 categories (see Appendix C). The horizon scan yielded 26 PSPs that are modifications of prior PSPs or not included in prior reports (see Appendix A). We excluded 16 items that did not meet the appropriateness criterion for being a specific PSP (as listed in Table 3). We excluded 41 PSPs that were merged into one of the other PSPs in our revised framework for classifying the PSPs (as listed in Table 4).

Table 3. List of items that did not meet appropriateness criterion for being a specific PSP

Category (listed in proposal)	Item	Reason Not Considered a PSP
Adverse Drug Events: General Medication Topics	The Joint Commission's "Do Not Use" List	This is a list, with no clear intervention
Alarm Fatigue	Alarm Risk Assessment	This is a "problem-finding" process with no clear intervention
Cross-Cutting: Other Topics	Monitoring, Auditing, and Feedback	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
Diabetes and Hyperglycemia Management	Inpatient Intensive Glucose Control Strategies To Reduce Death and Infection	The recommendation from MHS II was to stop this PSP (strong evidence of harm; moderate to high evidence it does not help)
	Teach-Back	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
Education and Training	Staff Education and Training (Simulation)	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
General Clinical Topics	Nutritional Support	Practice is now standard of care
Infection Control: Miscellaneous Topics	Pneumococcal Vaccination Prior to Hospital Discharge	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
Patient and Family Engagement	Obtaining Informed Consent From Patients	Practice was assessed to currently be viewed as standard of care or quality improvement rather than a safety intervention
Safety Practices for Hospitalized or Institutionalized Elders	Geriatric Evaluation and Management Units for Hospitalized Patients	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
	Multidisciplinary Geriatric Consultation Services	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention

Category (listed in proposal)	Item	Reason Not Considered a PSP
Surgery, Anesthesia, and Perioperative Medicine	Learning Curves for New Procedures – the Case of Laparoscopic Cholecystectomy	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
	Localizing Care to High-Volume Centers	Practice was assessed to currently be viewed as quality improvement rather than a safety intervention
	Operating Room Integration and Display Systems	Practice was assessed to currently be viewed as standard of care or quality improvement rather than a safety intervention
	The Impact of Intraoperative Monitoring on Patient Safety	Practice was assessed to currently be viewed as standard of care or quality improvement rather than a safety intervention
	Beta-Blockers and Reduction of Perioperative Cardiac Events	PSP was assessed to no longer be supported by evidence (harms exceed benefits, no longer recommended)

MHS = Making Healthcare Safer; PSP = patient safety practice

Table 4. List of PSPs that were merged into one of the PSPs in our revised framework

Category	Item
Adverse Drug events: General Medication Topics	Computer Adverse Drug Event Detection and Alerts
	Medication Reconciliation Supported by Clinical Pharmacists
	The Clinical Pharmacist's Role in Preventing Adverse Drug Events
Adverse Drug Events: Harms due to Anticoagulants	Single Provider
Adverse Drug Events: Infusion Pumps/Medication Error	Staff Education and Training
	Structured Process Changes/Workflow Redesign
Adverse Drug Events: Reducing Adverse Drug Events in Older Adults	Use of Screening Tool of Older People's Prescriptions (STOPP) Criteria
Alarm Fatigue	Safety Culture
Care Transitions	Better Outcomes for Older Adults Through Safe Transitions
	Care Transition Intervention
	Interventions To Improve Care Transitions at Hospital Discharge
	Transitional Care Model
Cross-Cutting: Health Information Technology	Computerized Physician Order Entry With Clinical Decision Support Systems
	Information Transfer
Delirium	Staff Education and Training
Diagnostic Error	Patient Safety Practices Targeted at Diagnostic Errors
	Staff Education and Training
Education and Training	Crew Resource Management and its Applications in Medicine
Failure To Rescue	Sepsis Recognition – Patient Monitoring Systems
	Sepsis Recognition – Screening Tools and Algorithms
	Multicomponent Sepsis Interventions
General Clinical Topics	Tubing Miscommunications
Infection Control: *Clostridioides difficile* Infection	Environmental Cleaning & Decontamination
	Hand Hygiene
	Impact of Changes in Antibiotic Use Practices on Nosocomial Infections and Antimicrobial Resistance - *Clostridioides difficile* and Vancomycin-Resistant *Enterococcus*
	Surveillance
	Testing
Infection Control: Infections due to Other Multidrug-Resistant Organisms	Environmental Cleaning & Disinfection
	Hand Hygiene

Category	Item
	Surveillance
	Transmission-Based Precautions: Contact Precautions, Patient Isolation, Dedicated Staff
Infection Control: Miscellaneous Topics	Impact of Barrier Precautions in Reducing the Transmission of Serious Nosocomial Infections
	Practices To Improve Handwashing Compliance
Infection Control: Urinary Tract Infection	Prevention of Nosocomial Urinary Tract Infections
Opioid Safety and Pain Management	Medication-Assisted Treatment
	Pain Management
Patient and Family Engagement	Advance Planning for End-of-Life Care
	Cultural Competency
	Other Practices Related to Patient Participation
Safety practices for hospitalized or institutionalized elders	Prevention of Delirium in Older Hospitalized Patients
Venous thromboembolism	Post-Surgical Prophylaxis Using Aspirin

PSP = patient safety practice

Preliminary List of Patient Safety Practices (PSPs)

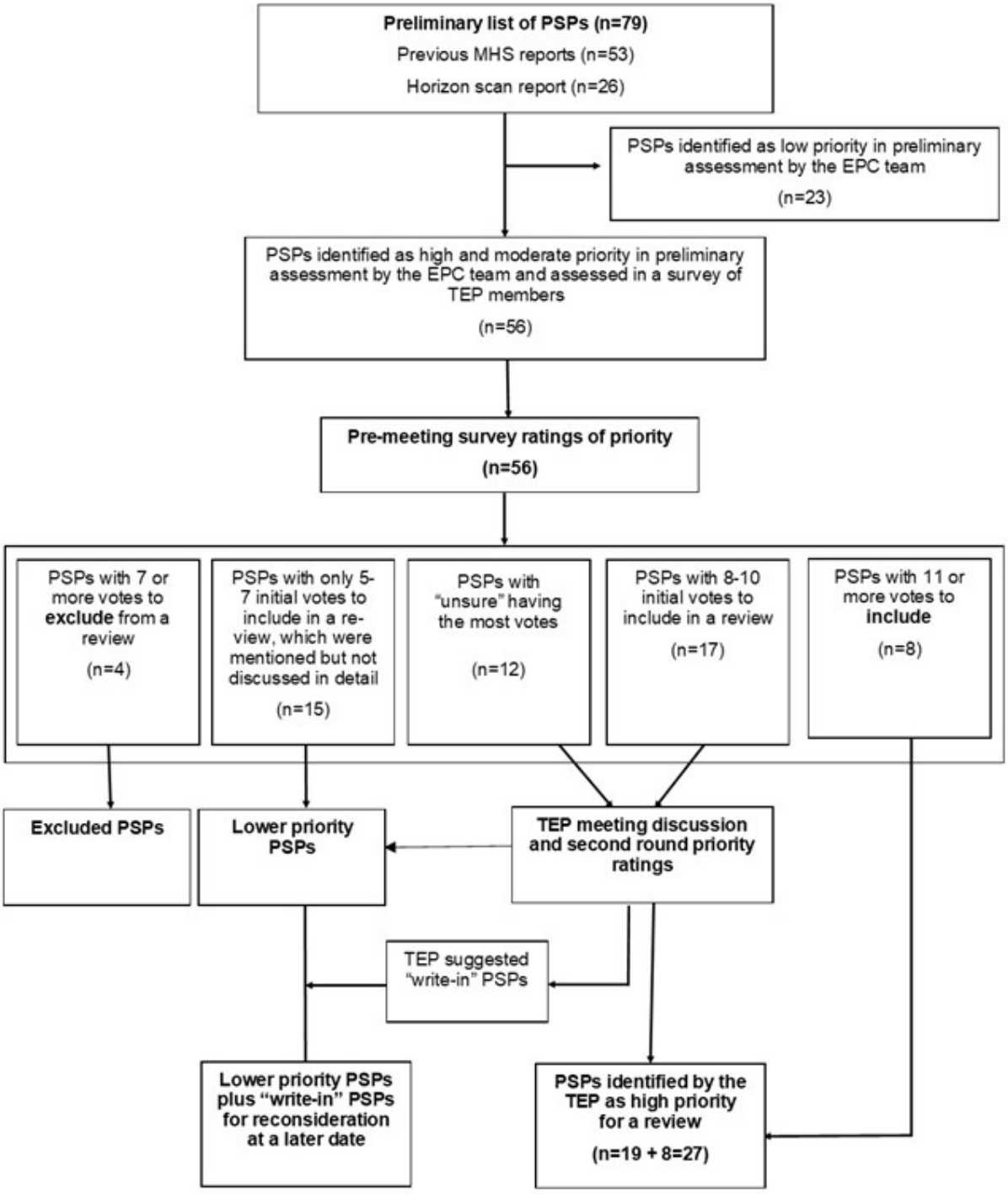
As shown in Figure 2, we identified 79 distinct PSPs that were considered further. Of these 79 PSPs, 23 were identified as having a low priority for review based on the preliminary assessment of the Evidence-based Practice Center (EPC) teams about the importance of the harm addressed by each PSP (in terms of the likelihood of harm from the condition and the scope of the condition addressed by the PSP, as described above). That left 56 PSPs on the list to be prioritized by the Technical Expert Panel (TEP) for inclusion in the MHS IV series of Rapid Reviews and Rapid Responses. Appendixes A and C provide details of the preliminary assessments of the PSPs including a description of each PSP, ratings of the prioritization criteria, and summative notes.

Final Prioritization of PSPs

As depicted in Figure 2, the TEP guided the final prioritization of topics. The initial TEP survey responses were used to create four categories of PSPs prior to the TEP meeting: *excluded* PSPs (any PSP with 7 or more votes to exclude), *lower priority PSPs* (PSPs with 5 to 7 votes to include), *high-priority PSPs* (PSPs with 11 or more votes to include), and *PSPs targeted for TEP discussion and a second round of priority ratings* (PSPs with "unsure" as the most common response, or 8 to 10 votes to include). PSPs categorized as excluded, lower priority, and high priority were not discussed in the TEP meeting. We focused on discussing the 29 PSPs with more uncertainty in the pre-meeting ratings. The TEP members reviewed the list of excluded, lower and high priority PSPs and were given the opportunity to discuss any PSPs they believed deserved further discussion. For each remaining PSP, the TEP reviewed a brief description of the PSP, EPC team assessments, and pre-survey TEP ratings to frame the discussion. As planned, after each PSP was discussed, the TEP members submitted their final votes about whether to include or exclude the PSP in the MHS IV series.

The final list of top priority PSPs is presented in Table 5 with additional supporting details in Appendix D. Based on the discussion with the TEP, we recommend that lower priority PSPs (including the TEP's "write in" suggestions for PSPs which are listed in Appendix E) be reassessed later in the MHS IV process.

Figure 2. TEP prioritization process



EPC = Evidence-based Practice Center; MHS = Making Healthcare Safer; PSP(s) = Patient safety practice(s); TEP = technical expert panel

Table 5. Patient safety practices identified by the 15-member Technical Expert Panel as high priority for a Rapid Response, Rapid Review, or systematic review by the Making Healthcare Safer Team

Patient Safety Practices	Recommendation
Antimicrobial stewardship	Systematic review
Handoff protocols	Rapid review
Opioid stewardship	Rapid review
Transmission-based precautions	Rapid review
Clinical decision support	Rapid review
Rapid response systems	Rapid review
Sepsis prediction, recognition, and intervention	Rapid review
Engaging family caregivers	Rapid review
Supply chain disruption	Rapid review
High reliability	Rapid review
Interventions to prevent non-ventilator–associated pneumonia for inpatients	Rapid review
Patient monitoring systems	Rapid response
Barcode verification	Rapid response
Implicit bias training	Rapid review
Post-event communication program	Rapid response
Protocols for high-risk drugs: reducing adverse drug events related to anticoagulants	Rapid response
Person and family engagement	Rapid response
Use of report cards and outcome measurements to improve safety of surgical care	Rapid response
Test result notification systems	Rapid response
Automated medication dispensing devices and dose drug distribution systems	Rapid response
Staff shortage	Rapid response
Deprescribing	Rapid response
Hours of service, fatigue, and sleepiness	Rapid response
Infection surveillance and testing	Rapid response
Performance review and feedback focused on diagnostic errors	Rapid response
Prevention of pressure ulcers in older patients	Rapid response
Capnography	Rapid review

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Appendix A. Horizon Scan Report

Summary of Task 2: Horizon Scan for Making Healthcare Safer IV

Introduction

The purpose of Task 2 was to identify and prioritize up to 30 patient safety practices (PSPs) for potential inclusion in Making Healthcare Safer (MHS) IV that were not summarized in any prior MHS reports. PSPs identified by this process will then be added to the prior set, so that the combined set of PSPs can be assessed by the technical expert panel (TEP) for prioritization for rapid reviews.

Methods and Results

We conducted this task in four phases: *Generation*, *Refinement*, *Selection*, and *Prioritization*. Our methods and results for each phase appear next.

Generation

To generate a pool of potential PSPs for consideration, we utilized two sources: input from patient safety experts, and gray literature searches. We solicited input from 46 patient safety experts with a range of expertise from ECRI, the University of Pennsylvania, and Johns Hopkins University. We provided background on the project, our definition of a PSP ("Interventions, strategies, or approaches intended to prevent or mitigate unintended consequences of the delivery of healthcare and to improve the safety of healthcare for patients"), and we emphasized the intent to identify PSPs *not* covered in earlier MHS reports (they were sent a list of all 109 such PSPs). One expert from the Institute for Safe Medication Practices (ISMP) searched ISMP's database for potential topics. Experts were asked to submit suggestions to an online form; 27 of 46 provided suggestions, resulting in a total of 275 potential PSPs.

From gray literature, we searched the following resources: AHRQ Patient Safety Network (PSNet), Becker's Hospital Review, the Joint Commission Patient Safety Goals, National Quality Forum Patient Safety Report, PCORI Health Care Horizon Scanning System, ECRI's Top 10 Patient Safety Concerns, and various databases (Medline, Pubmed, Embase, Google, and Scopus) for patient safety opinion articles since 2019. An ECRI analyst reviewed these materials and identified an additional 51 potential PSPs for consideration. Thus, we identified a total 326 potential PSPs.

Refinement

The 326 potential PSPs then underwent refinement by a patient safety expert on the team. She excluded 148 for the following reasons:

- 30 were not PSPs as defined for this project
- 37 were too similar to PSPs already covered in earlier MHS reports
- 60 were too similar to other items in the list of 326
- 21 were removed for other reasons (e.g., too vague/broad, or patient safety was only an indirect outcome of the action)

For the 60 "too similar," the ones they were similar to did proceed to the next phase (Selection) but may not have proceeded to the final Prioritization phase (if the team de-prioritized them).

The remaining 178 were then categorized so that in the Selection phase, the team could examine them as a group, and determine whether PSPs should be combined or separated.

All 326 initial PSPs appear in Table A-1. PSPs are grouped by source–expert suggestion or gray literature. Reasons for inclusion versus exclusion during the refinement phase are listed for each PSP. Exclusion reasons are identified for each excluded PSP.

Selection

We convened an online meeting of 5 patient safety experts from the ECRI-ISMP-Penn team to select topics for prioritization. This meeting was moderated by two experts with expertise in evidence synthesis. Prior to the meeting, the five patient safety experts each independently examined the remaining 178 items to designate which PSPs (if any) should *clearly* be considered for an evidence review. Eighty-eight of the 178 items were selected by at least one team member before the meeting, and another 3 were selected by the group during the online meeting.

Thus, the team discussed 91 items that represented a total of 32 unique PSPs (many items were combined into a single PSP). The other 87 items were effectively excluded at this point, though in some cases, they were used to edit the wording of related PSPs.

The five experts rated the 32 PSPs with respect to five factors:

- **Appropriateness**: Whether a proposed practice meets the definition of a PSP (Yes/No)
- **Importance**: Likelihood to harm (High/Moderate/Low/Unclear)
- **Importance**: Scope (Widespread, Pattern, Limited, Unclear)
- **Impact**: Current use of PSP (Widespread, Less than Widespread)
- **Impact**: Certainty of evidence of effectiveness (High, Less than high)

Because literature searches had not yet been conducted, the team did not consider duplication (whether a recent high-quality systematic review or clinical practice guideline exists) or feasibility (the number and types of studies of this PSP). These factors were assessed in the next phase (Prioritization).

After the meeting, each expert independently ranked their "top 10" PSPs based on their perception of the importance of the harm and impact of performing a rapid review of the PSP. These rankings were also used in the next phase.

Prioritization

After selection, one topic was removed as team leaders decided it was already covered in prior MHS reports. For the remaining 31 PSPs, a team of information specialists with experience performing searches for systematic reviews and rapid reviews performed searches for each PSP to identify relevant studies. Specifically, information specialists searched for studies, systematic reviews, meta-analyses, and guidelines published in 2018 or later.

Searches identified 5,742 citations for consideration. Ten analysts were each assigned one to six topics. For each topic, one analyst examined its identified titles and abstracts. Based on the screening, a team leader organized potentially relevant evidence for each PSP into one of the following seven categories:

- Randomized trials
- Controlled non-randomized studies

- Uncontrolled nonrandomized studies
- Systematic reviews/meta-analyses
- Guidelines
- Relevant study, but study design unclear
- Relevance unclear from the title/abstract

For all 31 PSPs, the counts of the seven categories appear in TableA-2.

We used these counts to inform team judgments about duplication and feasibility. For duplication, we identified any recent systematic reviews focused on a respective PSP in the last five years to assess whether a new rapid review could be duplicative. For topics with one relevant systematic review identified during screening, team leaders reviewed the systematic review for scope, methodology, and search date. Ultimately, no identified systematic reviews were deemed sufficiently recent or high quality to justify excluding any topics based on duplication. For feasibility, we assessed whether enough recent studies addressing the respective PSP exist to warrant a new systematic review.

Examining the volume of evidence, we excluded five PSPs for five or fewer articles and relatively low importance/impact:

- T11 Establishing a respiratory protection program in the long-term care setting (2 articles)
- T14 Use of liquid medication dosing tools, such as oral syringes instead of cups to reduce liquid medication errors (5 articles)
- T16 Measure and document patient weights in metric units only when on weight-based drugs (e.g., vasopressors, dopamine, insulin, chemotherapeutics) (1 article)
- T17 Segregate, sequester, and differentiate all neuromuscular blocking agents (NMBs) from other medications, wherever they are stored in the organization (1 article)
- T27 Preoperative surgical fire risk assessment for high-risk procedures (above xiphoid process) (1 article)

The 26 prioritized PSPs appear in **Table A-3**. The first 7 we consider relatively high priority for review, the next 12 we consider moderate priority for review, and the last 7 we consider relatively low priority for review. This categorization was based on the amount/quality of evidence as well as the core-team ratings of importance, impact, and feasibility (all 26 PSPs were appropriate and feasible).

Table A-3 also indicates the number of core-team experts (out of 4, since one of the initial 5 did not provide this) who placed that PSP in their top 10 of importance/impact. One notable PSP is T18 (protocols/pathways for rescue drugs), which we placed in the High Priority category even though only 1 study was deemed sufficiently relevant. This PSP was placed in the top 10 by 3 of 4 core-team experts, was deemed high likelihood to harm, and scope was considered widespread. Thus, review of this topic may be important to demonstrate the paucity of evidence and possibly motivate future research. Another justification is that the single screener for T18 may have been too stringent regarding relevance, and additional screeners may deem more studies relevant.

Comments

We identified over 300 new potential PSPs from suggestions of 27 experts and numerous searches of safety databases and gray literature. Our refinement, selection, and prioritization processes, which considered five key factors (appropriateness, importance, impact, duplication, feasibility) resulted in a list of 26 prioritized PSPs for consideration by the TEP.

Table A-1. Pool of 326 potential PSPs

Category	PSP	Source	Reason for Exclusion in Refinement Phase
Included in subsequent Selection phase	Use of single use or partially disposable endoscopes to reduce the risk of pathogen transmission	Expert suggestion	NA
	Integrating infusion pumps with Electronic Health Record (EHR) for population of med order and for auto-documentation	Expert suggestion	NA
	Evaluate the effect of staffing ratios on incidents and outcomes	Expert suggestion	NA
	Develop flexible action plans to deliver safe patient care during staff shortages, including closing units or diverting patients	Expert suggestion	NA
	Incorporate the use of tele-Intensive Care Unit capabilities to maximize critical care settings	Expert suggestion	NA
	Utilize technology to monitor for safety alerts and hazards	Expert suggestion	NA
	Assume accountability for physical and psychological safety and a healthy work environment that fosters the joy of the health care workforce	Expert suggestion	NA
	Recognize cognitive biases and their effects on diagnosis.	Expert suggestion	NA
	Use simulation training to help clinicians become aware of their biases and visualize their potential outcomes. Consider training with “cognitive forcing strategies,” such as intentional consideration of other diagnoses.	Expert suggestion	NA
	Examine the racial demographics of reported patient safety events and root-cause analyses performed by the organization for serious events. Determine whether racial or ethnic disparities exist in the types of events being reported and analyzed.	Expert suggestion	NA
	Take seriously all allegations of racism, bias, or discrimination that originate from within the organization, and implement appropriate measures to thoroughly investigate and address such reports and to ensure that such reports are not closed out inappropriately.	Expert suggestion	NA
	Implement a comprehensive vaccine promotion program	Expert suggestion	NA
	Use evidence-based criteria to standardize surveillance protocols and conduct regular surveillance to identify cases of non-ventilator healthcare- associated pneumonia (NV-HAP).	Expert suggestion	NA
	Collaborate with infection preventionists to integrate NV-HAP as a quality and safety issue within the organization’s safety and performance improvement plans.	Expert suggestion	NA
	Design screening tools to proactively identify patients or residents at high risk of developing NV-HAP, including older adults with underlying medical conditions.	Expert suggestion	NA
	Provide families and caregivers with education to prevent NV-HAP and encourage them to speak up when their loved ones need assistance with oral care or feeding.	Expert suggestion	NA
	Leverage health information technology resources to hard wire risk assessments and reminders to complete NV-HAP prevention care activities.	Expert suggestion	NA
	Promote holistic strategies such as providing smoking cessation strategies, encouraging personal/hand hygiene, evaluating aspiration risks, and assessing patient nutritional status.	Expert suggestion	NA
	Administer end-user surveys, interviews, and focus groups to assess telehealth needs of providers and patients. Include participants across clinical specialties (ex, oncology), patient age groups (ex, pediatrics, geriatrics), and care settings (ex, home care)	Expert suggestion	NA
	Ask questions that solicit information about a user’s physical or working environment, technological capabilities, and expectations	Expert suggestion	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Conduct user testing to ensure feasibility, to assess integration with EHR systems and patient portals, and to evaluate vendors	Expert suggestion	NA
	Identify critical supplies and drugs for which your facility would be most vulnerable if a supply chain disruption were to occur. Identify alternatives for each supply; include both domestic and international alternatives when possible.	Expert suggestion	NA
	Monitor drug shortages, employing resources from the American Society of Health-System Pharmacists (see Current Drug Shortages) and the U.S. Food and Drug Administration (FDA) (see FDA Drug Shortages), as well as information from wholesalers, manufacturers, and other healthcare organizations.	Expert suggestion	NA
	To minimize the risk of future supply disruptions, demand transparency from distributors and manufacturers regarding: minimum inventory levels, country of origin for product and raw material suppliers, surge capacity plans	Expert suggestion	NA
	Establish and maintain communication with local, state, and federal government agencies to determine which stockpiles are accessible during a crisis.	Expert suggestion	NA
	Reexamine sole-source, dual-source, and multisource agreements. If there are supply disruption related to these agreements, reassess the partnership, insist on specific improvements, and terminate relationships, if necessary.	Expert suggestion	NA
	Follow the recommendations in self-assessment: vetting nontraditional suppliers.	Expert suggestion	NA
	Establish initial and routine quality control protocols for products from nontraditional suppliers.	Expert suggestion	NA
	Assign supervision of Emergency Use Authorization (EUA) product management to an appropriate committee or committees (product evaluation, therapeutics, and/or medical device)	Expert suggestion	NA
	Inventory all EUA products and documents	Expert suggestion	NA
	Monitor EUA status (ex, by subscribing to FDA's email alert services)	Expert suggestion	NA
	Inform providers which products have EUAs, and advise them to be alert for EUA product safety and efficacy risks	Expert suggestion	NA
	Implement methods for reporting EUA safety and efficacy concerns internally and to FDA and ECRI	Expert suggestion	NA
	For revised EUAs, replace product documents with new versions as indicated	Expert suggestion	NA
	For EUA revocations and terminations (absent FDA approval of the product), inform providers and discuss disposition with the manufacturer	Expert suggestion	NA
	If applicable, consider adding appropriate clinical decision-support alerts	Expert suggestion	NA
	For revocations of unapproved products, secure the product, labeling it "do not use," until disposition	Expert suggestion	NA
	Before continuing a permissible use after revocation or termination, consider safety issues (ex, by reviewing revocation letters)	Expert suggestion	NA
	Establish criteria for initiation, reassessment, and discontinuation of telemetry monitoring.	Expert suggestion	NA
	Permit nurses to adjust settings only within default limits. Require a physician's order to adjust settings outside the default limits.	Expert suggestion	NA
	Set pulse oximetry alerts to 90% to reduce nonactionable alarms.	Expert suggestion	NA
	Improve nursing ratios to ensure adequate patient coverage during shift change or times of high patient census and workflows to facilitate routine and timely patient observation.	Expert suggestion	NA
	Evaluate incidents when monitoring system alarm fails.	Expert suggestion	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Determine how many channels one person can safely monitor.	Expert suggestion	NA
	Improve waveform visibility by placing noninteractive remote displays throughout the care unit (ex, hallway, bedside).	Expert suggestion	NA
	Create an emergency plan for telemetry equipment malfunction and scheduled downtime.	Expert suggestion	NA
	Adopt security measures to protect against remote interference (e.g., hackers silencing alarms or generating false alarms).	Expert suggestion	NA
	Update software regularly and use segregated networks, firewalls, virtual private networks, and network monitors.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: conduct a skin assessment.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: use pressure redistribution devices.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: select an appropriate mattress or an overlay.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: ensure that the endotracheal tube securing device is removed and the endotracheal tube is secured with tapes.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: use a liquid film-forming protective dressing.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: lubricate the eyes and tape them closed.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: use the swimmer's position.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: reposition the patient every 2 h.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: keep the skin clean.	Expert suggestion	NA
	Prevent pressure injuries for prone patients: assess the pressure points	Expert suggestion	NA
	Prevent pressure injuries for prone patients:	Expert suggestion	NA
	Use a risk-based prioritization process to determine causal analysis process for safety events	Expert suggestion	NA
	Use root cause analysis and action process to investigate, analyze and action plan for serious safety events	Expert suggestion	NA
	Use evidence-base analysis tools to determine contributing and causal factors	Expert suggestion	NA
	Use human factor analysis classification system to identify systemwide issues, both active and latent	Expert suggestion	NA
	Ensure all preventive action plans have at least one strong action item	Expert suggestion	NA
	Ensure that leaders are informed of serious safety events with 24 hours of occurring	Expert suggestion	NA
	Provide emotional support for staff involved in serious safety events	Expert suggestion	NA
	Share learnings from safety events and causal analysis occur health systems to increase awareness and knowledge of risks and prevention activities	Expert suggestion	NA
	Work for Patient Safety Organizations to submit safety events and receive feedback on patient safety activities	Expert suggestion	NA
	Facilitate both intra- and inter-organizational learning	Expert suggestion	NA
	Accelerate the development of the best possible safety learning networks	Expert suggestion	NA
	Initiate and develop systems to facilitate interprofessional education and training on safety	Expert suggestion	NA
	Develop shared goals for safety across the continuum of care	Expert suggestion	NA
	Expedite industry-wide coordination, collaboration, and cooperation on safety	Expert suggestion	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Implement patient and family communication and resolution program for when patient safety events occur	Expert suggestion	NA
	Ensure safety is a demonstrated core value	Expert suggestion	NA
	Assess capabilities and commit resources to advance safety	Expert suggestion	NA
	Widely share information about safety to promote transparency	Expert suggestion	NA
	Implement competency-based governance and leadership	Expert suggestion	NA
	Implement tactics that allow for rapid and clear communication of safety risks between the frontline staff and leadership	Expert suggestion	NA
	Create a just culture model, policy and process to evaluate and respond to behaviors that facilitated harm events or near misses	Expert suggestion	NA
	Maximize culture of safety assessment data to drive meaningful change	Expert suggestion	NA
	New ways of communication potentially leading to miscommunication: virtual visits, patient portals	Expert suggestion	NA
	Preoperative surgical fire risk assessment for high risk procedures (above xiphoid process)	Expert suggestion	NA
	Chronic disease - remote patient monitoring	Expert suggestion	NA
	Proactive systems improvement - Failure Mode and Effects Analysis (FMEA)	Expert suggestion	NA
	Pre-use elimination of air from IV bags used in inflatable pressure infusers	Expert suggestion	NA
	Screening for/preventing post-intensive care syndrome	Expert suggestion	NA
	Preventing patient falls (in non-elderly patients)	Expert suggestion	NA
	Telehealth and digital therapeutics for treating opioid use disorder	Expert suggestion	NA
	Transition of procedures to outpatient care/ASCs and appropriate patient selection	Expert suggestion	NA
	Continuous monitoring of: (a) Patients receiving parenteral and neuraxial opioids in medical-surgical and general care areas, and (b) Patients receiving opioids in hospitals and ambulatory surgery/endoscopy facilities during procedural sedation and while in post anesthesia care units	Expert suggestion	NA
	Monitoring the adequacy of ventilation of these patients either with capnography—that is, the measurement of end-tidal carbon dioxide —or by assessing minute ventilation	Expert suggestion	NA
	Physiologic monitoring to prevent oversedation during patient-controlled anesthesia for infusion pumps	Expert suggestion	NA
	Double check by a second clinician all patient-controlled anesthesia orders and pump programming, to prevent oversedation during patient-controlled anesthesia for infusion pumps	Expert suggestion	NA
	Adequate cleaning of complex reusable instruments to prevent infections	Expert suggestion	NA
	Appropriate selection and use of personal protective equipment (PPE) in the COVID + population	Expert suggestion	NA
	Proper donning and doffing of PPE	Expert suggestion	NA
	Recognizing change of condition in the post-acute patient	Expert suggestion	NA
	Establishing a proactive purposeful rounding program to reduce falls, readmissions, and increase patient/resident satisfaction	Expert suggestion	NA
	Training staff on trauma informed care	Expert suggestion	NA
	Establishing a respiratory protection program in the long-term care setting	Expert suggestion	NA
	Video feedback on surgery for surgeon and operating room workflow/teamwork	Expert suggestion	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Telemonitoring for fall risk, elopement risk and suicide risk	Expert suggestion	NA
	Wireless pumps for prevent medication errors	Expert suggestion	NA
	Providing ready to use naloxone upon emergency department or inpatient discharge with patients with opioid use disorder	Expert suggestion	NA
	Automated pre-use checks built into Anesthesia Machines	Expert suggestion	NA
	Artificial intelligence to improve interpretation of images and reduce the dose or time to create the image	Expert suggestion	NA
	Use of Safety II approaches to patient safety culture and problems	Expert suggestion	NA
	Speaking up for safety / behaviors to promote psychological safety training (part of team training but may want to look at this separately)	Expert suggestion	NA
	Communication of incidental findings to providers and patients	Expert suggestion	NA
	diagnostic time-outs or checklists	Expert suggestion	NA
	Dashboards for diagnostic safety measurement	Expert suggestion	NA
	Reducing overuse of diagnostic tests in general (diagnostic stewardship) or reducing blood culture overuse; the latter is related to sepsis recognition	Expert suggestion	NA
	Maintaining family presence at the bedside for hospitalized patients	Expert suggestion	NA
	Engaging family caregivers for safe care transitions	Expert suggestion	NA
	Self-management support programs for patients with diabetes and other select chronic conditions	Expert suggestion	NA
	Monitor the diagnostic process and identify, learn from, and reduce diagnostic errors and near misses as a component of their research, quality improvement, and patient safety programs	Expert suggestion	NA
	Implement procedures and practices to provide systematic feedback on diagnostic performance to individual health care professionals, care teams, and clinical and organizational leaders; specialty consultations/second opinions to reduce diagnostic error	Expert suggestion	NA
	Diagnostic performance dashboards: tracking diagnostic errors using big data	Expert suggestion	NA
	Data visualizations of diagnostic test results (easier to detect possible diagnostic errors)	Expert suggestion	NA
	simulation and virtual patients to reduce diagnostic error	Expert suggestion	NA
	Multidisciplinary diagnosis partnering with allied health professionals to reduce diagnostic errors (see https://pubmed.ncbi.nlm.nih.gov/28758055/)	Expert suggestion	NA
	Language services - at all points of contact in health system (e.g., security, registration, triage, clinician visit, lab) as a preventive intervention for all types of errors	Expert suggestion	NA
	Barcode scanning - to prevent med/vaccine administration errors	Expert suggestion	NA
	team huddles / huddle boards - also in ambulatory	Expert suggestion	NA
	Use of liquid medication dosing tools, such as oral syringes instead of cups to reduce liquid medication errors	Expert suggestion	NA
	High Reliability training and simulation	Expert suggestion	NA
	Do not crush medications	Expert suggestion	NA
	Safety event analysis -- human factors and utilization of Natural Language Processing	Expert suggestion	NA
	Safety event capture following discharge	Expert suggestion	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Alarm design - use of human factors engineering principles to increase the informativeness and decrease cognitive load associated with alarms	Expert suggestion	NA
	Use of relational coordination approaches to improve collaboration within and across teams (could fit into 17.2. Safety Culture)	Expert suggestion	NA
	Use of structured handoff protocols for intrahospital transitions	Expert suggestion	NA
	Early warning scoring system to prompt nurses to call rapid response teams	Gray Literature	NA
	Consistent implementation of debriefing after a critical event	Gray Literature	NA
	Food and Drug Administration (FDA) risk evaluation and mitigation strategy in preventing inappropriate prescribing of transmucosal immediate-release fentanyl	Gray Literature	NA
	Electronic trigger tools that use electronic health record data to detect and measure diagnostic error	Gray Literature	NA
	Pharmacy robots to reduce medication dispensing errors	Gray Literature	NA
	OR Black Box, a novel monitoring technology that integrates continuous monitoring of intraoperative data with video and audio recording of operative procedures	Gray Literature	NA
	Infectious diseases physician approval for placement of peripherally inserted central catheters	Gray Literature	NA
	Revised Safer Dx Instrument to help users retrospectively identify and assess the likelihood of a missed diagnosis	Gray Literature	NA
	ECHO-Care Transitions to ensure continuity of care and alleviate the risk of patient safety issues occurring because of hospital transition	Gray Literature	NA
	MOQI to reduce avoidable hospitalization	Gray Literature	NA
	Hospital at Homes program	Gray Literature	NA
	HomeMeds Medication Safety Program	Gray Literature	NA
	Trauma reception and resuscitation system	Gray Literature	NA
	Verification screen with prominent patient photograph to reduce errors caused by orders placed in wrong chart	Gray Literature	NA
	Point of emission air filtration to protect healthcare workers against skin contamination with virus aerosol	Gray Literature	NA
	Post-Anesthesia Team Handover (PATH) checklist	Gray Literature	NA
	Ultraviolet-C decontamination cabinets for filtering facepiece respirators	Gray Literature	NA
	Safety processes in anatomic pathology laboratories	Gray Literature	NA
	Use at least two ways to identify patients. For example, use the patient's name and date of birth. This is done to make sure that each patient gets the correct medicine and treatment.	Gray Literature	NA
	Novel antimicrobial environmental surface coatings to prevent health care–acquired infections	Gray Literature	NA
	Negative-pressure tents to limit airborne transmission of coronavirus	Gray Literature	NA
	Nickel foam air filters to reduce the risk of coronavirus transmission	Gray Literature	NA
	Dispense vincristine and other vinca alkaloids in a minibag of a compatible solution and not in a syringe.	Gray Literature	NA
	Use a weekly dosage regimen default for oral methotrexate in electronic systems when medication orders are entered.	Gray Literature	NA
	Require a hard stop verification of an appropriate oncologic indication for all daily oral methotrexate orders.	Gray Literature	NA

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Provide specific patient and/or family education for all oral methotrexate discharge orders.	Gray Literature	NA
	Weigh each patient as soon as possible on admission and during each appropriate* outpatient or emergency department encounter. Avoid the use of a stated, estimated, or historical weight.	Gray Literature	NA
	Measure and document patient weights in metric units only.	Gray Literature	NA
	Segregate, sequester, and differentiate all neuromuscular blocking agents (NMBs) from other medications, wherever they are stored in the organization.	Gray Literature	NA
	Administer medication infusions via a programmable infusion pump utilizing dose error-reduction system	Gray Literature	NA
	Maintain a compliance rate of greater than 95% for the use of dose error-reduction systems.	Gray Literature	NA
	Monitor compliance with use of smart pump dose error-reduction software on a monthly basis.	Gray Literature	NA
	If your organization allows for the administration of an intravenous bolus or a loading dose from a continuous medication infusion, use a smart pump that allows programming of the bolus (or loading dose) and continuous infusion rate with separate limits for each.	Gray Literature	NA
	Ensure all appropriate antidotes, reversal agents, and rescue agents are readily available. Have standardized protocols and/or coupled order sets in place that permit the emergency administration of all appropriate antidotes, reversal agents, and rescue agents used in the facility. Have directions for use/administration readily available in all clinical areas where the antidotes, reversal agents, and rescue agents are used.	Gray Literature	NA
	When compounding sterile preparations, perform an independent verification to ensure that the proper ingredients (medications and diluents) are added, including confirmation of the proper amount (volume) of each ingredient prior to its addition to the final container.	Gray Literature	NA
	Eliminate injectable promethazine from the formulary.	Gray Literature	NA
	Seek out and use information about medication safety risks and errors that have occurred in other organizations outside of your facility and take action to prevent similar errors.	Gray Literature	NA
	Verify and document a patient's opioid status (naïve versus tolerant*) and type of pain (acute versus chronic) before prescribing and dispensing extended-release and long-acting opioids.	Gray Literature	NA
	a) Limit the variety of medications that can be removed from an automated dispensing cabinet (ADC) using the override function.	Gray Literature	NA
	b) Require a medication order (e.g., electronic, written, telephone, verbal) prior to removing any medication from an ADC, including those removed using the override function.	Gray Literature	NA
	c) Monitor ADC overrides to verify appropriateness, transcription of orders, and documentation of administration.	Gray Literature	NA
	d) Periodically review for appropriateness the list of medications available using the override function.	Gray Literature	NA
	Safeguard against errors with oxytocin use.	Gray Literature	NA
	Maximize the use of barcode verification prior to medication and vaccine administration by expanding use beyond inpatient care areas.	Gray Literature	NA
	Layer numerous strategies throughout the medication-use process to improve safety with high-alert medications.	Gray Literature	NA
Excluded during	Establish flexible staffing models	Expert suggestion	Not a PSP
	Map workloads on each shift, utilize care extenders, and offer flexible work hours	Expert suggestion	Not a PSP

Category	PSP	Source	Reason for Exclusion in Refinement Phase
Refinement phase	Vet temporary and agency staff and confirm competencies	Expert suggestion	Not a PSP
	Maintain proper skin preparation where leads attach to skin (ex, clip hair and prepare skin).	Expert suggestion	Not a PSP
	Move leads every 24 hours	Expert suggestion	Not a PSP
	Implement a standardized battery replacement schedule	Expert suggestion	Not a PSP
	Reluctance to intervene, delayed treatment (for example in obstetrics, for political reasons)	Expert suggestion	Not a PSP
	Reluctance to discuss errors (Vanderbilt case)	Expert suggestion	Not a PSP
	New or expanded locations of care: American Senior Communities, hospital-at-home, long term care	Expert suggestion	Not a PSP
	Cyber threats, limited preparedness	Expert suggestion	Not a PSP
	Environmental hazards (global warming and its consequences), limited preparedness	Expert suggestion	Not a PSP
	Emerging pathogens, increase in multi-drug resistant organisms	Expert suggestion	Not a PSP
	At-home dialysis	Expert suggestion	Not a PSP
	At-home infusion therapy	Expert suggestion	Not a PSP
	Health Insurance Portability and Accountability Act / privacy issues in telehealth	Expert suggestion	Not a PSP
	Off-label device use	Expert suggestion	Not a PSP
	Hand hygiene devices	Expert suggestion	Not a PSP
	post-hospital discharge visits	Expert suggestion	Not a PSP
	Provide funding for a designated subset of health care systems to conduct routine postmortem examinations on a representative sample of patient deaths	Expert suggestion	Not a PSP
	High-reliability organization (HRO) paradigm to reduce diagnostic error (see https://pubmed.ncbi.nlm.nih.gov/33657891/)	Expert suggestion	Not a PSP
	Referral linkages and follow up in ambulatory setting	Expert suggestion	Not a PSP
	Elopement in impaired patients	Expert suggestion	Not a PSP
	As more complex surgeries moved to ambulatory settings (hip replacements, knee replacements, bariatric surgery), we need to be more mindful of patient selection, in terms of which patients can safely have surgery in a less supported environment (e.g., looking at Body mass index, American Society of Anesthesiology score, etc.).	Expert suggestion	Not a PSP
	Some topics seem very broad which may be intentional, so I assume that under interventions to improve transition are things like post discharge calls or e-referrals and e-consults to help reduce patients lost to follow-up	Expert suggestion	Not a PSP
	Pediatric safety practices -- nothing specific, but that seems missing (given some that are targeted to older adults, as another patient population with special needs)	Expert suggestion	Not a PSP
	Patient-reported diagnostic errors following emergency department discharge (Feasibility of patient-reported diagnostic errors following emergency department discharge: a pilot study - PubMed (nih.gov) and patient centered diagnosis (see https://pubmed.ncbi.nlm.nih.gov/29092826/ and Patient's Toolkit - Society to Improve Diagnosis in Medicine)	Expert suggestion	Not a PSP
	Airway lead network	Gray Literature	Not a PSP
	Drexel AJFlex face shields	Gray Literature	Not a PSP

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Convene diverse stakeholders to promote practices that drive quality of care at home and improve patient and family satisfaction	Gray Literature	Not a PSP
	Adoption of intelligent automation (IA) in revenue cycle management to streamline allocation of health care staffing and resources	Gray Literature	Not a PSP
	Use alert software to monitor action plans and response to device and supply recalls and hazards	Expert suggestion	Too similar to another item on this list
	Implement a systems approach to workforce safety	Expert suggestion	Too similar to another item on this list
	Develop, resource, and execute on priority programs that equitably foster workforce safety	Expert suggestion	Too similar to another item on this list
	Develop organizational understanding of the depth to which cognitive biases affect patient outcomes. Simply recognizing that the bias exists may help overcome it.	Expert suggestion	Too similar to another item on this list
	Incorporate critical thinking methodologies to increase clinician objectivity.	Expert suggestion	Too similar to another item on this list
	Limit patient descriptors, such as “frequent flyer” or “drug-seeking,” as well as other terms that may introduce bias into the clinician’s diagnostic process.	Expert suggestion	Too similar to another item on this list
	Implement mindful procedures to support clinicians in overcoming bias (e.g., reflection or diagnostic time-outs).	Expert suggestion	Too similar to another item on this list
	Consider components such as periodic evaluation of vaccination rates, community-based interventions and outreach, and patient engagement	Expert suggestion	Too similar to another item on this list
	Implement a comprehensive vaccination and vaccine promotion program for clinicians and staff	Expert suggestion	Too similar to another item on this list
	Examine protocols for vaccine administration, including: Full generic name, brand name, and the Centers for Disease Control and Prevention standard abbreviation, Indication and vaccine schedules for routine and catch-up vaccinations, Criteria for screening patients for contraindications, Directions for preparing and administering vaccines, including dose, vials to use, route of administration, and precautions, Details regarding what (e.g., lot number, expiration date), where (e.g., vaccination record, vaccine registries), and how to document administration	Expert suggestion	Too similar to another item on this list
	Institute emergency protocols to follow if adverse reactions occur	Expert suggestion	Too similar to another item on this list

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Store look-alike vaccines and doses on different shelves, and maintain proper temperatures	Expert suggestion	Too similar to another item on this list
	Keep vaccines with the earliest expiration dates in the front of storage units, and remove expired products	Expert suggestion	Too similar to another item on this list
	Structure treatment areas to accommodate one patient at a time	Expert suggestion	Too similar to another item on this list
	Utilize trained providers with demonstrated vaccination competencies, and train staff whenever vaccines are added or recommendations updated	Expert suggestion	Too similar to another item on this list
	Include a pharmacist on the immunization team	Expert suggestion	Too similar to another item on this list
	Give patients vaccine information in their preferred language	Expert suggestion	Too similar to another item on this list
	Develop provider competencies to address the pathogenesis of pneumonia and prevention strategies.	Expert suggestion	Too similar to another item on this list
	Identify nurse and physician champions to lead efforts to promote prevention bundles included oral care.	Expert suggestion	Too similar to another item on this list
	Create structures and processes to improve and support effective handoffs and discharge planning for those identified as being at high risk for NV-HAP.	Expert suggestion	Too similar to another item on this list
	Request documentation/data from vendors that support their claims of usability, flexibility, and effectiveness	Expert suggestion	Too similar to another item on this list
	Address potential functional (ex, visual, cognitive, hearing) knowledge (ex, comfort with using technology), and access limitations of end users (ex, socioeconomic disparities)	Expert suggestion	Too similar to another item on this list
	Facilitate a failure mode and effects analysis or use a systems engineering framework as proactive risk assessments prior to implementation	Expert suggestion	Too similar to another item on this list
	Use a phased implementation approach with small pilot/beta tests from a diverse pool of end users	Expert suggestion	Too similar to another item on this list

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Train staff and patients in system usage and common troubleshooting	Expert suggestion	Too similar to another item on this list
	Plan for routine quality improvement activities and sustainability	Expert suggestion	Too similar to another item on this list
	Staffing issues, especially related to travelers, shortage of primary care providers, training locations	Expert suggestion	Too similar to another item on this list
	Non-ventilator-associated pneumonias	Expert suggestion	Too similar to another item on this list
	Supply chain interruptions	Expert suggestion	Too similar to another item on this list
	Accident investigation best practices - reactive (Root Cause Analysis)	Expert suggestion	Too similar to another item on this list
	Burnout	Expert suggestion	Too similar to another item on this list
	Appropriate staffing ratios	Expert suggestion	Too similar to another item on this list
	Floating staff, i.e., working in an unfamiliar area due to staff shortages (may be covered under nurse staffing [cross-cutting])	Expert suggestion	Too similar to another item on this list
	Endoscope reprocessing and related topics of single-use endoscopes and duodenoscopes with single-use endcaps (strongly recommended by FDA at this point: Use Duodenoscopes with Innovative Designs to Enhance Safety: FDA Safety Communication)	Expert suggestion	Too similar to another item on this list
	Lack of recall management systems; lack of problem reporting systems	Expert suggestion	Too similar to another item on this list
	Impact of communication and resolution programs on improvement efforts/safety	Expert suggestion	Too similar to another item on this list
	Routine masks on units to prevent airborne nosocomial infections	Expert suggestion	Too similar to another item on this list

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Fire safety presurgery timeouts	Expert suggestion	Too similar to another item on this list
	Creating a culture of reporting where incidents are immediately reported so recurrence is minimized	Expert suggestion	Too similar to another item on this list
	Implementation of Just Culture Policies and Procedures	Expert suggestion	Too similar to another item on this list
	Burnout and Staffing Issues	Expert suggestion	Too similar to another item on this list
	Use of telemedicine during and beyond the COVID-19 pandemic (cross-cutting: health information technology)	Expert suggestion	Too similar to another item on this list
	Telemedicine as a patient safety tool	Expert suggestion	Too similar to another item on this list
	Process of evaluating quality and safety data by REaL - race, ethnicity, and language preference, to prevent worsening of disparities when implementing PSPs or any quality improvement intervention	Expert suggestion	Too similar to another item on this list
	Test result follow up in ambulatory setting - standardized practices for reviewing and communicating lab results	Expert suggestion	Too similar to another item on this list
	Family-centered rounds	Expert suggestion	Too similar to another item on this list
	Responding when things go wrong -- Just Culture	Expert suggestion	Too similar to another item on this list
	Safety event common cause analysis	Expert suggestion	Too similar to another item on this list
	Supply chain substitutions due to supply chain interruptions-- patient safety implications	Expert suggestion	Too similar to another item on this list
	Patient and family involvement in safety event investigation and improvement	Expert suggestion	Too similar to another item on this list

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Medication barcode scanning at point of care	Expert suggestion	Too similar to another item on this list
	Monitoring for opioid-induced ventilatory impairment/depression (could fit into 2.1. Patient Monitoring Systems)	Expert suggestion	Too similar to another item on this list
	Use of translator services (in person and/or virtual) for patients with limited English proficiency (could fit into 17.4. Cultural Competency)	Expert suggestion	Too similar to another item on this list
	Recommendations for targeting the three key contributors to surgical fires (oxidizer, ignition source, fuel)	Gray Literature	Too similar to another item on this list
	Waveform capnography	Gray Literature	Too similar to another item on this list
	PPE for COVID transmission prevention	Gray Literature	Too similar to another item on this list
	Medication reconciliation strategies	Gray Literature	Too similar to another item on this list
	Structured handover interventions between nurses	Gray Literature	Too similar to another item on this list
	Expanded reliance on travel nurses to address nursing shortages due to the COVID-19 pandemic	Gray Literature	Too similar to another item on this list
	Mobilizing the National Guard to address health care staffing shortages due to the COVID-19 pandemic	Gray Literature	Too similar to another item on this list
	Recognize that racism and implicit biases may be present in your organization.	Expert suggestion	Too similar to one from MHS I-II-III
	Train leaders on health equity and cultural competence, addressing topics that include health disparities, cultural competence, health outcomes among minorities, and other related issues.	Expert suggestion	Too similar to one from MHS I-II-III
	Work with community partners to promote health professions among people of color and other disadvantaged populations, and increase efforts to recruit diverse clinicians and staff.	Expert suggestion	Too similar to one from MHS I-II-III
	Perform health equity and cultural competence assessments. Repeat such assessments after implementing improvement initiatives and periodically thereafter.	Expert suggestion	Too similar to one from MHS I-II-III
	Launch ongoing educational programs designed to develop healthcare providers' cultural competence and cultural humility and to mitigate implicit bias.	Expert suggestion	Too similar to one from MHS I-II-III

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Establish policies designed to meet patients' cultural and linguistic needs from admission to discharge. Utilize resources from organizations such as Joint Commission and the U.S. Department of Health and Human Services.	Expert suggestion	Too similar to one from MHS I-II-III
	Establish competencies for all health care professionals for the engagement of patients, families, and care partners	Expert suggestion	Too similar to one from MHS I-II-III
	Engage patients, families, and care partners in the co-production of care	Expert suggestion	Too similar to one from MHS I-II-III
	Include patients, families, and care partners in leadership, governance, and safety and improvement efforts	Expert suggestion	Too similar to one from MHS I-II-III
	Ensure equitable engagement for all patients, families, and care partners	Expert suggestion	Too similar to one from MHS I-II-III
	Promote a culture of trust and respect for patients, families, and care partners	Expert suggestion	Too similar to one from MHS I-II-III
	ADEs: harms due to anticoagulants: Cardiac arrhythmia over-diagnosis, leading to overuse of anticoagulants	Expert suggestion	Too similar to one from MHS I-II-III
	Care transitions: Early discharge protocols and remote patient education	Expert suggestion	Too similar to one from MHS I-II-III
	Wrong-site surgery (may be the same as prevention of misidentifications, which is already on the list)	Expert suggestion	Too similar to one from MHS I-II-III
	Count surgical sponges to prevent items left inside patients	Expert suggestion	Too similar to one from MHS I-II-III
	Use detection technologies (e.g., ultrasound) to prevent items left inside patients	Expert suggestion	Too similar to one from MHS I-II-III
	TeamSteps (not sure if you need to reference specifically since you call out teamwork but other specific tools are mentioned)	Expert suggestion	Too similar to one from MHS I-II-III
	Universal protocol	Expert suggestion	Too similar to one from MHS I-II-III
	Addiction medicine consult teams and/or algorithms for opiate withdrawal and medication-assisted treatment	Expert suggestion	Too similar to one from MHS I-II-III
	Nurse-driven heparin protocols and adjustments in hospitals; anticoagulation management clinics or inpatient consultation teams	Expert suggestion	Too similar to one from MHS I-II-III
	Follow-up phone calls after discharge	Expert suggestion	Too similar to one from MHS I-II-III
	Structured interdisciplinary bedside rounds, which can be related to patient and family engagement	Expert suggestion	Too similar to one from MHS I-II-III
	Medication review and reconciliation - specifically in ambulatory setting	Expert suggestion	Too similar to one from MHS I-II-III
	Develop an inclusive, culturally competent workforce	Expert suggestion	Too similar to one from MHS I-II-III
	Teamwork and communication training interventions	Gray Literature	Too similar to one from MHS I-II-III

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Involving the patient in patient safety efforts	Gray Literature	Too similar to one from MHS I-II-III
	Rapid response teams	Gray Literature	Too similar to one from MHS I-II-III
	Implementing structured process changes and redesigning workflows to improve efficiencies with infusion pump use	Gray Literature	Too similar to one from MHS I-II-III
	Investing in initial and ongoing staff training on the correct use, maintenance, and monitoring of infusion pumps	Gray Literature	Too similar to one from MHS I-II-III
	Simulation training for acute care nurses	Gray Literature	Too similar to one from MHS I-II-III
	Training in patient safety during residency program	Gray Literature	Too similar to one from MHS I-II-III
	Before a procedure, label medicines that are not labeled. For example, medicines in syringes, cups and basins. Do this in the area where medicines and supplies are set up.	Gray Literature	Too similar to one from MHS I-II-III
	hand cleaning guidelines from the Centers for Disease Control and Prevention or the World Health Organization	Gray Literature	Too similar to one from MHS I-II-III
	Mark the correct place on the patient's body where the surgery is to be done	Gray Literature	Too similar to one from MHS I-II-III
	Pause before the surgery to make sure that a mistake is not being made	Gray Literature	Too similar to one from MHS I-II-III
	Give the resident written information about the medicines they need to take	Gray Literature	Too similar to one from MHS I-II-III
	Improve medication safety through person-centered approaches that address health literacy and numeracy	Gray Literature	Too similar to one from MHS I-II-III
	Post-mortem ultrasonography	Gray Literature	Other (important- but need to be more specific)
	Disposable COVID box	Gray Literature	Other (important- but need to be more specific)
	Workplace safety/violence -- physical and psychological	Expert suggestion	Other (important- but need to be more specific)
	Develop career progression pathways to promote growth of clinical leaders within the organization	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Evaluate factors that lower departmental turnover rates	Expert suggestion	Other (Patient safety is an indirect outcome of this action)

Category	PSP	Source	Reason for Exclusion in Refinement Phase
	Foster an organizational understanding that the effects of the COVID-19 pandemic are long-lasting and varied—like those of any disaster. Understand that frontline workers—by nature of their position—are vulnerable, and that long-term effects will manifest differently for each person	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Charge organization leaders with recognizing the reality and effects of burnout	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Use organizational data to identify areas of concern and their causes, and create effective wellness solutions in concert with frontline staff	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Provide wellness programming and resources, recognizing the interconnections among job-related burnout, stress, psychological capital, and social support	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Engage professional development specialists who offer mindfulness practices to clinicians and staff	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Barriers to telehealth adoption	Expert suggestion	Other (Patient safety is an indirect outcome of this action)
	Infection control related to staff attire (e.g., scrubs worn outside hospital, artificial nails, etc.)	Expert suggestion	Other (should be covered under hand hygiene and SSI prevention)
	New technology, e.g., AI (diagnostic errors through over-reliance on it); robots that interact with patients; more robotic tools for surgery; drones to deliver medications	Expert suggestion	Other (too broad)
	Use a proper escalation notification system to ensure a prompt response.	Expert suggestion	Other (too vague)
	Adverse event reporting - cascade of awareness	Expert suggestion	Other (too vague)
	Hospital-onset bacteremia and fungemia	Expert suggestion	Other (too vague)
	Patient education (reducing refusals)	Expert suggestion	Other (too vague)
	Pictograms/ pictographic instructions - preventing liquid medication dosing errors	Expert suggestion	Other (too vague)
	Eye tracking	Gray Literature	Other (too vague)
	Second opinions in hematopathology	Gray Literature	Other (too vague)
	Stimulate shared learning to address preventable maternal mortality in the postpartum period.	Gray Literature	Other (too vague)

ADC = Automated dispensing cabinet; EHR = electronic health record; EUA = Emergency Use Authorization; FDA = Food and Drug Administration; FMEA = Failure Mode and Effects Analysis; NMBs = Neuromuscular blocking agents; NV-HAP = Non-ventilator healthcare-associated pneumonia; PPE = Personal protective equipment; PATH = Post=Anesthesia Team Handover

Table A-2. Counts of article types for 31 searched PSPs

Patient Safety Practice	RCTs	Controlled NRS	Uncontrolled NRS	SRs/MAs	Guidelines	Relevant, but design unclear	Relevance unclear
T01 Engaging family caregivers with structured communication for safe care transitions	3	0	6	1	0	2	0
T02 Perform robust retrospective risk analysis (e.g., RCA2, human factor analysis).	0	1	7	7	0	4	0
T03 Incorporate diverse populations in retrospective risk analysis (e.g., root cause analysis2, human factor analysis)	0	0	7	1	0	0	0
T04 Proactive Systems Improvement - Failure Mode and Effects Analysis (FMEA)	1	3	11	3	7	9	2
T05 Single use of endoscopes (includes bronchoscopes, GI endoscopes, laryngoscopes, cystoscopes) to prevent infections	6	2	20	8	4	0	9
T06 Adopt "high reliability" principles: Training, Implementation	0	2	11	2	0	0	8
T07 Implement protocols/pathways for distribution and equitable access of EUA pharmaceuticals	0	1	9	0	8	0	16
T08 Implement implicit bias training to recognize differential risks of patient safety events in marginalized groups	1	7	5	0	0	0	7
T09 Conduct a cyber security risk assessment and adopt appropriate security measures to prevent disruptions to clinical workflow technologies	0	6	15	3	0	0	10
T10 Screening and/or interventions to prevent non ventilator associated pneumonia for hospitalized patients	4	26	24	2	0	0	1
T11 Establishing a respiratory protection program in the Long-Term Care setting	0	0	1	1	0	0	0
T12 Maintain accurate inventory of PPE	0	0	9	0	1	1	5
T13 Use of concierge medication safety program in hospital (i.e., HomeMeds Medication Safety Program)	0	0	2	1	0	0	5
T14 Use of liquid medication dosing tools, such as oral syringes instead of cups to reduce liquid medication errors	0	3	1	1	0	0	0
T15 Weigh patients to prevent medication dosage errors	0	0	0	0	1	5	0
T16 Measure and document patient weights in metric units only when on weight-based drugs (e.g., vasopressors, dopamine, insulin, chemotherapeutics)	0	0	0	0	0	1	0
T17 Segregate, sequester, and differentiate all neuromuscular blocking agents from other medications, wherever they are stored in the organization.	0	0	1	0	0	0	0
T18 Implement protocols/pathways for rescue drugs that ensure availability of, and permit the emergency administration of, all appropriate antidotes, reversal agents, and rescue agents used in the facility	0	0	0	0	0	1	0
T19 Maximize the use of barcode verification prior to medication and vaccine administration by expanding use beyond inpatient care areas.	0	9	3	1	0	0	0

Patient Safety Practice	RCTs	Controlled NRS	Uncontrolled NRS	SRs/MAs	Guidelines	Relevant, but design unclear	Relevance unclear
T20 Develop flexible action plans to deliver safe patient care during staff shortages, including closing units or diverting patients	0	0	0	1	1	2	1
T21 use of human factors engineering principles in alarm design to increase the informativeness and decrease cognitive load associated with alarms	2	5	8	3	3	0	6
T22 Novel antimicrobial environmental surface coatings on high touch surfaces in healthcare settings to prevent health care-acquired infections	0	0	10	0	0	0	4
T23 Protocol for handling notification and follow up of incidental findings in radiology	0	3	5	0	1	0	0
T24 Implement communication and response program involving patient/family when patient harm occurs (i.e., Communication and Optimal Resolution)	1	0	12	2	1	0	6
T25 Use capnography to catch opioid induced respiratory depression in patients at risk for opioid oversedation	3	4	8	1	1	0	6
T26 Identify and monitor critical supplies and drugs for which your facility would be most vulnerable and already at risk for drug shortage if a supply chain disruption were to occur. Identify alternatives for each supply; include both domestic and international alternatives when possible.	0	10	17	4	4	2	19
T27 Preoperative surgical fire risk assessment for high-risk procedures (above xiphoid process)	0	0	0	0	1	0	0
T28 Use of structured handoff protocols for intrahospital and interhospital transitions (e.g., PATH)	2	32	12	8	0	0	26
T29 Telemonitoring for fall risk, elopement risk and suicide risk	3	4	3	0	0	1	1
T30 Operating Room Black Box, a novel monitoring technology that integrates continuous monitoring of intraoperative data with video and audio recording of operative procedures	0	0	16	1	0	0	1
T31 Use at least two ways to identify patients. For example, use the patient's name and date of birth. This is done to make sure that each patient gets the correct medicine and treatment.	0	0	3	1	0	0	0

EUA = Emergency Use Authorization; FMEA = Failure Mode & Effects Analysis; PATH = Post-Anesthesia Team Handover; PPE = Personal Protective Equipment; RCA2 = Root Cause Analysis squared

Table A-3. Domain ratings for 26 prioritized PSPs

Category	PSP	Importance: Likelihood To Harm	Importance: Scope	Impact: Current Use	Impact: Certainty of Evidence of Effectiveness	# of Top 10 Lists (out of 4 ECRI-Penn experts)	Duplication	Feasibility
High priority	T02 Perform robust retrospective risk analysis (e.g., RCA2, human factor analysis).	High	Widespread	Widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
	T04 Proactive Systems Improvement - Failure Mode and Effects Analysis (FMEA)	Moderate	Pattern	Widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
	T08 Implement implicit bias training to recognize differential risks of patient safety events in marginalized groups	High	Pattern	Less than widespread adoption	Less than high certainty of effectiveness	3	Not duplicative	Feasible
	T10 Screening and/or interventions to prevent non ventilator associated pneumonia for hospitalized patients	Moderate	Pattern	Less than widespread adoption	Less than high certainty of effectiveness	3	Not duplicative	Feasible
	T18 Implement protocols/pathways for rescue drugs that ensure availability of, and permit the emergency administration of, all appropriate antidotes, reversal agents, and rescue agents used in the facility	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	3	Not duplicative	Feasible
	T20 Develop flexible action plans to deliver safe patient care during staff shortages, including closing units or diverting patients	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	3	Not duplicative	Feasible
	T26 Identify and monitor critical supplies and drugs for which your facility would be most vulnerable and already at risk for drug shortage if a supply chain disruption were to occur. Identify alternatives for each supply; include both domestic and international alternatives when possible.	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	3	Not duplicative	Feasible

Category	PSP	Importance: Likelihood To Harm	Importance: Scope	Impact: Current Use	Impact: Certainty of Evidence of Effectiveness	# of Top 10 Lists (out of 4 ECRI-Penn experts)	Duplication	Feasibility
Moderate priority	T01 Engaging family caregivers with structured communication for safe care transitions	Moderate	Pattern	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T03 Incorporate diverse populations in retrospective risk analysis (e.g., RCA2, human factor analysis)	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
	T05 Single use of endoscopes (includes bronchoscopes, GI endoscopes, laryngoscopes, cystoscopes) to prevent infections	Moderate	Limited	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T06 Adopt "high reliability" principles: Training, Implementation	Moderate	Pattern	Widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
	T09 Conduct a cyber security risk assessment and adopt appropriate security measures to prevent disruptions to clinical workflow technologies	High	Limited	Widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T15 Weigh patients to prevent medication dosage errors	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T19 Maximize the use of barcode verification prior to medication and vaccine administration by expanding use beyond inpatient care areas.	Moderate	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T22 Novel antimicrobial environmental surface coatings on high touch surfaces in healthcare settings to prevent health care-acquired infections	Low	Limited	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T24 Implement communication and response program involving patient/family when patient harm occurs)	Moderate	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible

Category	PSP	Importance: Likelihood To Harm	Importance: Scope	Impact: Current Use	Impact: Certainty of Evidence of Effectiveness	# of Top 10 Lists (out of 4 ECRI-Penn experts)	Duplication	Feasibility
	T25 Use capnography to catch opioid induced respiratory depression in patients at risk for opioid oversedation	Moderate	Pattern	Less than widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
	T28 Use of structured handoff protocols for intrahospital and interhospital transitions (e.g., PATH)	High	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	1	Not duplicative	Feasible
	T31 Use at least two ways to identify patients. For example, use the patient's name and date of birth. This is done to make sure that each patient gets the correct medicine and treatment.	High	Widespread	Widespread adoption	Less than high certainty of effectiveness	2	Not duplicative	Feasible
Low priority	T07 Implement protocols/pathways for distribution and equitable access of EUA pharmaceuticals	Low	Limited	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible
	T12 Maintain accurate inventory of PPE	Moderate	Pattern	Widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible
	T13 Use of concierge medication safety program in hospital (i.e., HomeMeds Medication Safety Program)	Moderate	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible
	T21 Use of human factors engineering principles in alarm design to increase the informativeness and decrease cognitive load associated with alarms	Low	Limited	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible
	T23 Protocol for handling notification and follow up of incidental findings in radiology	Low	Pattern	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible
	T29 Telemonitoring for fall risk, elopement risk and suicide risk	Low	Limited	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible

Category	PSP	Importance: Likelihood To Harm	Importance: Scope	Impact: Current Use	Impact: Certainty of Evidence of Effectiveness	# of Top 10 Lists (out of 4 ECRI-Penn experts)	Duplication	Feasibility
	T30 Operating Room Black Box, a novel monitoring technology that integrates continuous monitoring of intraoperative data with video and audio recording of operative procedures	Low	Widespread	Less than widespread adoption	Less than high certainty of effectiveness	0	Not duplicative	Feasible

EUA = Emergency Use Authorization; FMEA = Failure Mode & Effects Analysis; PATH = Post-Anesthesia Team Handover; PPE = Personal Protective Equipment; RCA2 = Root Cause Analysis squared

Appendix B. Making Healthcare Safer IV Technical Expert Panel

Table B-1. List of Technical Experts

Technical Expert Panel	Organization
Alyce Adams, Ph.D. Stanford Medicine Innovation Professor, Professor of Epidemiology and Population Health and of Medicine	Stanford Cancer Institute
David Atkins, M.D., M.P.H. Director of Health Services Research and Development	U.S. Department of Veterans Affairs
David Bates, M.D., M.Sc. Medical Director of Clinical and Quality Analysis, Information Systems	Partners HealthCare System, Inc.
Grace Chai, PharmD., M.P.H. Associate Director for Special Initiatives	Center for Drug Evaluation and Research, Food and Drug Administration
Carol Cronin Executive Director and founder	Informed Patient Institute
Missy Danforth, B.A. Vice President of Health Care Ratings	The Leapfrog Group
Mary Dixon-Woods, Ph.D. Director of The Healthcare Improvement Studies Institute, Department of Public Health & Primary Care	University of Cambridge
Heidi B. King, M.S., FACHE, CPPS, PCC Chief, Patient Safety Program,	Defense Health Agency
Clifford Y. Ko, M.D., M.S., M.S.H.S., FACS, FASCRS Director of the Division of Research and Optimal Patient Care	American College of Surgeons
Christina Michalek B.Sc. Pharm., R.Ph., FASHP Director of Membership and Patient Safety Organization	Institute for Safe Medication Practices
Peter Pronovost, M.D., Ph.D. Chief Quality & Clinical Transformation Officer	University Hospitals Cleveland Medical Center
Nasia Safdar, M.D., Ph.D. Professor, Division of Infectious Disease	Madison Veterans Affairs Patient Safety Center of Inquiry University of Wisconsin School of Medicine and Public Health
Melinda Sawyer, Dr.Ph., M.S.N., R.N. Vice President of Clinical Quality and Patient Safety	UnitedHealth Group
Hardeep Singh, M.D., M.P.H. Chief, Health Policy, Quality & Informatics Program, Center for Innovations in Quality, Effectiveness and Safety	Michael E. DeBakey Veteran Affairs Medical Center
Arjun Srinivasan, M.D. Associate Director for Healthcare-Associated Infection Prevention Programs	Centers for Disease Control and Prevention

Appendix C. Preliminary List of Patient Safety Practices

Table C-1. High importance patient safety practice (PSP) ratings - all PSPs included in this table were rated as appropriate and as high for importance of the targeted harm

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Adverse Drug Events (ADEs)	Automated medication dispensing devices and dose drug distribution systems	I	Drug storage devices or cabinets that electronically dispense medications in a controlled fashion and track medication use in hospitals. Medication dispensed in a package that is ready to administer to the patient in hospitals	Limited	Widespread	Less than high certainty	Not duplicative	No	Too few new studies to review.
	Smart pumps and other protocols for infusion pumps	II	Manufacturers have added technology to recent models of pumps specifically designed to prevent medication errors" – includes software for dosing, bar coding for patient ID	Limited	Widespread	Less than high certainty	Not duplicative	Yes	Recent articles cover smart pump and electronic health record integration, and use of Dose Error Reduction Systems
	Deprescribing	III	Reducing inappropriate prescriptions- protocols, algorithms, and clinical decision support systems, consumer education interventions, medication review	Limited	Widespread	Less than high certainty	Not duplicative	Yes	At least one new large trial, and several smaller studies.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Diagnostic Error	Result notification systems	III	Automated alert notification systems to ensure timely communication of clinically significant treatment results	Widespread	Less than widespread	Less than high certainty	Not duplicative	No	This PSP is related to diagnostic error but focuses more on ensuring timely response to warning alerts and does not necessarily involve diagnostic errors. Too few new studies to review.
Drug Management	Opioid stewardship	III	Often multicomponent programs, may include: Conduct of an individualized assessment of risks and benefits of opioids, and the appropriateness of tapering (tapering slowly to minimize withdrawal symptoms).	Widespread	Widespread	High certainty	Not duplicative	Yes	Many recent changes and developments in this PSP and many new studies.
	Standardized insulin protocols	III	Use of Standardized Insulin Protocols to Reduce Risk of Serious Hypoglycemia in Hospitals Due to Administration Errors	Pattern	Widespread	Less than high certainty	Not duplicative	No	Some recent changes but not too significant and not that many new studies. This PSP is of lower importance with evolution of new medications for drug management.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Failure To Rescue	Sepsis prediction, recognition, and intervention	III	A combination of three previous sepsis interventions: screening, monitoring, and multicomponent interventions	Pattern	Widespread	High certainty	Not duplicative	Yes	Fair number of studies without good recent systematic review, and controversy about effectiveness that new studies help address
	Rapid response systems	II, III	Rapid Response Systems /Rapid Response Teams includes a multidisciplinary team, most frequently consisting of intensive care unit trained personnel who are available 24 hours per day, 7 days per week to evaluate patients not in the intensive care unit who develop signs or symptoms of clinical deterioration.	Widespread	Widespread	High certainty	Not duplicative	Yes	MHS III conducted a limited review and there are no recent systematic reviews. There are new developments with automated alerts.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Health Information Technology	Clinical decision support	III	Providing "clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and healthcare. Clinical decision support encompasses a variety of tools to enhance decision making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information, among other tools."	Limited	Widespread	Less than high certainty	Partly duplicative	Yes	Clinical decision support is a broad topic, and the certainty of evidence for different applications may vary. Numerous systematic reviews of different aspects or applications of clinical decision support, but no reviews are integrative.
Infection Control	Prevention of central line-associated bloodstream infections	II	Use of maximum barrier precautions, catheters coated with antibacterial or antiseptic agents, and use of chlorhexidine gluconate at the insertion site	Pattern	Widespread	High certainty	Duplicative	Yes	Three recent, high quality systematic reviews
	Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infections	I, II	Focused on 2 areas: (1) protocols and interventions to decrease unnecessary placement of urinary catheters, and (2) interventions that prompt removal of unnecessary urinary catheters	Limited	Widespread	Less than high certainty	Partly duplicative	No	Recent systematic review on implementation. Too few new studies to review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
	Antimicrobial stewardship	III	Programs "intended to limit and optimize antimicrobial prescribing, reduce the evolution of antibiotic-resistant bacteria, and improve patient outcomes"	Limited	Widespread	Less than high certainty	Partly duplicative	Yes	Lots of evolution of this one including in outpatient setting and new types of interventions
Patient and Family Engagement	Person and family engagement	II, III	MHS II: Effectiveness of interventions intended primarily to elicit patient or family involvement in reducing the incidence of adverse patient safety events. In addition, patient/family engagement was examined as part of the implementation of selected patient safety practices with other primary goals (Hand hygiene, rapid response team, falls, surgical checklists, care transitions) MHS III: Direct care occurs when healthcare providers partner with the patient and/or family in the processes of shared decision making. An organizational engagement can be in the form of quality and safety improvement initiatives or advisory councils that contain patient and/or families/caregivers as members	Limited	Widespread	Less than high certainty	Not duplicative	No	Too few new studies to review. Only one effectiveness study identified in screening with patient-relevant outcomes, consistent with prior reviews.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Other Interventions To Prevent Specific Harms	Interventions To prevent contrast-induced acute kidney injury	I, II	MHS I: Specific interventions: Use of high versus low osmolar iodinated contrast media, hydration protocols, and medications MHS II: Specific interventions: Volume expansion with intravenous sodium bicarbonate • Administration of n-acetylcysteine • Use of iso-osmolar (instead of low- or high-osmolar) contrast media • Prophylactic renal replacement therapy (dialysis) • Administration of 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase inhibitors (“statins”)	Limited	Widespread	High certainty	Not duplicative	No	Too few new studies to review, and many prior systematic reviews with conclusions unlikely to change with a new review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
	Identifying patients at risk for suicide	II	Programs to reduce suicide risk for inpatients, including: (1) Suicide risk assessment at admission, repeated especially during times of risk elevation such as personal crises, along with careful and consistent chart documentation of these assessments. (2) Treating psychiatric disorders that placed patients at risk and addressing continuity and follow-up issues to maintain the patient in treatment after discharge. (3) Removing risk factors in the physical environment. (4) Staff training in risk assessment and communication. (5) Use of staff to observe high-risk patients, and (6) Defining hospital policies in these areas, including those for collecting statistics about suicide attempts and completions	Widespread	Widespread	Less than high certainty	Not duplicative	No	Too few new studies; some validation of new screening tools and some quality improvement projects.
	Prevention of clinically significant gastro-intestinal bleeding in intensive care unit patients	I, II	Treat at- risk patients prophylactically with appropriate therapy to prevent stress-related gastrointestinal ulceration and bleeding	Limited	Less than widespread	High certainty that the PSP is not effective	Not duplicative	No	Evidence that risks of this practice now outweigh benefits and generally no longer recommended.

MHS = Making Healthcare Safer, PSP = patient safety practice

Table C-2. Moderate importance patient safety practice (PSP) ratings – all PSPs included in this table were rated as appropriate and as moderate for importance of the targeted harm

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
Adverse Drug Events	Protocols for high-risk drugs: reducing adverse drug events related to anticoagulants	I	All types of anticoagulant programs - inpatient and outpatient	Pattern	Widespread	Less than high certainty	Not duplicative	No	
Care Transitions	Care transition interventions	II, III	Care Transition Interventions in General. Subsumes BOOST, CTI, TCM, and other interventions designed to improve discharge and other care transition processes.	Pattern	Widespread	Less than high certainty	Duplicative	Yes	Studies are similar to prior literature, and do not add much. Numerous systematic reviews often on specific sub-populations.
Delirium	Delirium screening and assessment and nonpharmacologic intervention programs	III	Multicomponent and single, including mobility, environmental, cognitive, and therapeutic; performance properties of screening and assessment tests for delirium	Pattern	Less than widespread	High certainty	Partly duplicative	Yes	Recent systematic reviews on specific delirium interventions such as antipsychotics for the prevention and treatment of delirium
Diagnostic Error	Performance review and feedback	III	Audit and feedback methods provide information to clinicians and others about performance to motivate and measure change and are broadly defined as “any summary of clinical performance over a specified period of time.”	Widespread	Less than widespread	Less than high certainty	Not duplicative	No	Too few new studies to review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
Failure to Rescue	Patient monitoring systems	III	Electronic systems that scan patient data (e.g., vital signs and other variables) for signs of deterioration and alert a clinician if certain criteria are met.	Widespread	Less than widespread	Less than high certainty	Not duplicative	No	Too few new studies to review.
Infection Control	Communication of MDRO status	III	Timely and accurate dissemination of MDRO status to all clinicians, visitors, and others in the facility who interact with those patients: intra-facility, inter-facility.	Limited	Less than widespread	High certainty	Not duplicative	No	Well established practice with little new research. Too few new studies to review.
	Interventions To allow the reuse of single-use devices	II	Reprocessing protocols generally include cleaning and sterilization	Limited	Less than widespread	Less than high certainty	Partly duplicative	No	Few studies, but some on reuse of PPE during the COVID-19 pandemic. Recent guidance from CDC, FDA and Joint Commission. Too few new studies to review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
	Prevention of VAP	I, II	MHS I: Four interventions related to VAP: variation of position (semi-recumbent positioning and continuous oscillation), continuous subglottic suctioning, selective decontamination of the gastrointestinal tract and the use of sucralfate MHS II: Four interventions: elevation of the head of the bed, sedation vacations, oral care with chlorhexidine and subglottic suctioning	Pattern	Widespread	Less than high certainty but high certainty that several but not all components of VAP guidelines are effective	Duplicative	Yes	New SHEA/IDSA/APIC Practice Recommendations
	Hand hygiene	III	Subsumes old hand hygiene topics on MDRO and *Clostridioides difficile* Infection	Pattern	Widespread	High certainty	Not duplicative	No	Studies are similar to prior literature and do not add much new information.
	Surveillance and testing	III	Infection surveillance and testing. Subsumes old topics on MDRO and *Clostridioides difficile* Infection	Pattern	Widespread	Less than high certainty	Not duplicative	No	Studies are similar to prior literature and do not add much new information.
	Environmental cleaning & decontamination	III	Subsumes old topics on MDRO, and *Clostridioides difficile* Infection	Pattern	Widespread	High certainty	Not duplicative	No	Too few new studies to review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
	Transmission-based precautions	III	Subsumes old MDRO and *Clostridioides difficile* Infection topics	Pattern	Widespread	Less than high certainty	Not duplicative	No	Not much new since last report; however, many COVID-19 studies have been published but most appear to be low quality.
	Chlorhexidine bathing	III	Specific efficacy of chlorhexidine to prevent different infections (by organism, by type of infection), the mode and frequency of successful chlorhexidine bathing	Pattern	Widespread	High certainty that the PSP is not effective	Duplicative	No	A recent Cochrane meta-analysis in ICU patients; however, there is one new large trial in non-ICU patients (prior PSP was focused on ICU).
	Multicomponent prevention interventions	III	Multicomponent infection prevention interventions, any set of multiple (>1) interventions focused on reducing *Clostridioides difficile* infection in the inpatient setting.	Pattern	Widespread	Less than high certainty	Not duplicative	Yes	Not much new since last report, but there are likely enough studies to review.
	Minimize use of devices	III	Minimizing use of urinary catheters and central lines; Catheter innovations to reduce risk of infection such as impregnated catheters; Reducing ventilator-associated infections.	Widespread	Widespread	Less than high certainty	Not duplicative	Yes	New literature on strategies to discontinue use as soon as possible.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
Other Interventions To Prevent Specific Harms	Prevention of venous thromboembolism	I, II	MHS I: Mechanical and pharmacologic interventions MHS II: Pharmacologic and mechanical prophylactic interventions; decision support, interventions to improve adherence	Pattern	Widespread	High certainty	Duplicative	Yes	Several new studies, some international but likely applicable.
Safety Practices for Hospitalized or Institutionalized Elders	Prevention of pressure ulcers in older patients	I, II	MHS I: Use of specific beds or mattresses in inpatient and long-term care MHS II: Pressure ulcer prevention programs (defined very broadly) in acute and long-term care	Pattern	Widespread	Less than high certainty	Duplicative	No	Too few new studies to review, but at least four recent systematic reviews.
Safety Practices for Hospitalized or Institutionalized Elders	Prevention of falls in hospitalized and institutionalized older people	I, II	MHS I: Identification bracelets for high-risk patients, interventions that decrease the use of physical restraints, bed alarms, special hospital flooring materials to reduce injuries from patient falls, hip protectors to prevent hip fracture MHS II: In-facility fall prevention programs, generally multicomponent interventions	Pattern	Widespread	Less than high certainty	Not duplicative	No	Too few new studies to review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
Surgery, Anesthesia, and Perioperative Medicine	Use of report cards and outcome measurements to improve safety of surgical care	II	Use of report cards and outcome measurements to improve safety of surgical care; collects prospective, clinical data that are used to provide risk-adjusted assessments of outcomes that are fed back to the hospitals and surgeons for comparative purposes, with the ultimate goal of quality improvement	Pattern	Widespread	High certainty	Not duplicative	Yes	Several new studies, some international but likely applicable.
	Prevention of surgical site infections	I	Prophylactic antibiotics, perioperative normothermia, supplemental perioperative oxygen, perioperative glucose control	Pattern	Widespread	Less than high certainty	Duplicative	Yes	Several organizations now synthesize the literature and issue guidelines. Negative pressure wound therapy is one strategy not included in prior MHS reports.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty about Effectiveness of PSP	Duplication	Feasibility	Notes
Workforce Issues	Hours of service, fatigue & sleepiness	I, II	MHS 1: Fatigue, sleepiness, and medical errors. The literature on problem sleepiness among medical personnel, its impact on performance, and interventions to address sleep deprivation: limiting work hours, changes in shift scheduling, napping, and pharmaceutical aids. MHS II: Limiting individual providers' hours of service. Effect of limiting individual providers' hours of service on patient safety outcomes.	Pattern	Less than widespread	Less than high certainty	Not duplicative	Yes	There are a fair number of studies on a range of specific tactics (schedules, peer support).

APIC = Association for Professionals in Infection Control and Epidemiology; BOOST = Better Outcomes for Older Adults Through Safe Transitions; CDC = Centers for Disease Control and Prevention; COVID-19 = Coronavirus Disease 2019; CTI = Care Transition Intervention; FDA = Food and Drug Administration; ICU = intensive care unit; IDSA = Infectious Diseases Society of America; MHS = Making Healthcare Safer; MDRO = multi-drug resistant organisms; PPE = personal protective equipment; PSP = patient safety practice; SHEA = Society for Healthcare Epidemiology of America; TCM = Transitional Care Model; VAP = ventilator-associated pneumonia

Table C-3. Low-importance patient safety practice (PSP) ratings – all PSPs included in this table were rated as appropriate and as low for importance of the targeted harm

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Adverse Drug Events	Medication reconciliation and handoffs for anticoagulation management	III	Anticoagulant management services in the ambulatory setting	Limited	Less than widespread	Less than high certainty	Not duplicative	No	Not much new research since this was covered in MHS III.
	Nomogram guided dosing	III	Protocols and nomograms in inpatient and outpatient settings for NOACs	Pattern	Less than widespread	Less than high certainty	Not duplicative	No	Very few studies were included in the prior review. This may no longer be a major concern in patient care
Critical Care	Safety during transport of critically ill patients	I	Intra- and inter-hospital transfers, including specialized teams	Pattern	Less than widespread	Less than high certainty	Not duplicative	No	Too few new studies to review. This is from MHS I.

Cross-Cutting	Human factors solutions for device related harms	I, II	MHS I: Human factors as a safety practice in the design of medical devices and their evaluation both prior to and after institutional purchase; medical device alarms and the contribution of HFE to alarm improvements; use of preoperative checklist procedures to reduce anesthesia device failures MHS II: "Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well-being and overall system performance ";(1) usability of medical devices and health information technology, (2) focus on human error and its role in patient safety, (3) role of health care worker performance in patient safety, (4)	Pattern	Less than widespread	Less than high certainty	Not duplicative	Yes	This is a very broad topic. Considered in other PSPs for high-risk devices (i.e., infusion pumps, clinical decision support). It may be helpful to focus this in EHR usability as there has been quite a bit of recent high-quality work there.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
			system resilience and its role in patient safety, and (5) HFE systems approaches to patient safety						
Patient and Family Engagement	Ensuring documentation of patients' preferences for life-sustaining treatment	III	Ensure that written documentation of the patient's preferences for life-sustaining treatments is prominently displayed in his or her chart… Organization policies, consistent with applicable law and regulation, should be in place and address patient preferences for life-sustaining treatment and withholding resuscitation…. The definition of life-sustaining treatment may include, but is not limited to, mechanical ventilation, renal dialysis, chemotherapy, antibiotics, and artificial nutrition and hydration.	Pattern	Widespread	High certainty	Duplicative	Yes	There are numerous studies here, but also many recent systematic reviews.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Radiological	Preventing patient death or serious injury associated with radiation exposure from fluoroscopy and computed tomography	II	ALARA (As Low As Reasonably Achievable): to reduce both patient and technician exposure to ionizing radiation without compromising diagnostic or therapeutic efficacy: technical measures, appropriate utilization, education and training, algorithms and protocols	Limited	Widespread	Less than high certainty	Not duplicative	No	Too few new studies to include in review.
	Reducing errors in the interpretation of imaging	I	Practices to reduce the higher rate of misinterpretations made by non-radiologists	Limited	Less than widespread	Less than high certainty	Not duplicative	No	Old topic from MHS I, not as relevant currently with electronic imaging.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Surgery, Anesthesia, and Perioperative Medicine	Pre-anesthesia checklists to improve patient safety	I, II	MHS I: Checklist system as part of routine pre-anesthesia care MHS II: 4 types of checklists including WHO Surgical Safety Checklist; SURPASS Checklist (covers all from admission to surgery to discharge); Checklists specifically intended to prevent wrong-site surgery (e.g., Joint Commission); Checklists specifically intended to check anesthesia equipment (based on American Society of Anesthesiologists guidelines)	Limited	Widespread	High certainty	Partly duplicative	Yes	Old topic from MHS I and II. High utilization in United States and worldwide since WHO. At least one recent systematic review.
	Prevention of misidentifications	I	Bar coding and strategies to avoid wrong-site surgery, implementation protocols and checklists, site-marking, use of verification protocols and forms	Limited	Widespread	High certainty	Not duplicative	No	Old topic from MHS I. Too few new studies to include in review.

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
	Prevention of surgical items being left Inside patient	I, II	MHS I: Safety practices to reduce the incidence of retained sponges and instruments MHS II: Interventions to improve counts of surgical items	Limited	Less than widespread	Less than high certainty	Not duplicative	Yes	MHS I and II included studies about methods primarily.
	Ultrasound guidance of central vein catheterization	I, II	Utilizing portable, real-time ultrasonography to guide the insertion of CVCs	Limited	Widespread	High certainty	Partly duplicative	Yes	Several new studies including large international trials which are likely relevant. At least two recent systematic reviews.
Workforce Issues	Nurse staffing, models of care delivery, and interventions	I, II	MHS I: Nurse staffing, specific organization of nursing care delivery, nursing models of care, or organizational culture; specific inpatient nursing interventions - education, training, or retraining, providing audit data, and capturing nurse assessment of patient outcomes MHS II: Registered nurse–to–patient staffing ratios	Pattern	Widespread	Less than high certainty	Not duplicative	Yes	Increasing number of articles on the effects of staffing ratios and use of temporary staff on safety. Important topic, few studies that actually examined staffing ratios and with any outcomes

CVCs = central vein catheters; HER = electronic health record; HFE = human factors engineering; MHS = Making Healthcare Safer; NOACs = newer oral anticoagulants; PSP = patient safety practice; WHO = World Health Organization

Table C-4. Unclear importance patient safety practice (PSP) ratings – all PSPs included in this table were rated as appropriate and as unclear for importance of the targeted harm

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
Critical Care	"Closed" intensive care units and other models of care for critically ill patients	I	An ICU in which patients admitted to the ICU are transferred to the care of an intensivist assigned to the ICU on a full-time basis (as opposed to a non-intensivist physician with or without intensivist involvement)	Unclear	Widespread	High certainty	Not duplicative	No	Old topic from MHS I, standard of care in the United States. No articles to include in review.
Cross-Cutting	Promoting a culture of patient safety	I, II, III	MHS I and II: safety-oriented interventions that were designed to promote a culture of patient safety, conducted in an inpatient hospital; many were multicomponent interventions MHS III: Leadership walk rounds, team training, Comprehensive Unit-Based Program, Multicomponent	Unclear	Less than widespread	High certainty	Not duplicative	Yes	While feasible to review, there may not really be new evidence - studies are consistent with evidence from MHS II which had a complete review.
Diagnostic Error	Clinical decision support (diagnosis)	III	Provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and healthcare. Clinical decision support encompasses a variety	Unclear	Widespread	High certainty	Partly duplicative	Yes	There are several new studies, mostly on the use of machine learning to support diagnostic process in different settings. A recent

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
			of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information drug ordering and adverse drug events, prevention of deep vein thrombosis, antibiotic prescribing/stewardship, blood glucose control, reducing uninformative alerts (reducing alert fatigue), and other potential patient-safety effects of CDS						systematic review on multiple strategies to promote diagnostic safety, including clinical decision support.
Education and Training	Teamwork and team training	II, III	MHS II: constellation of content (i.e., the specific knowledge, skills, and attitudes that underlie targeted teamwork competencies), tools (i.e., team task analysis, performance measures), and delivery methods (i.e., information,	Unclear	Widespread	Less than high certainty	Partly duplicative	Yes	There are numerous studies, though many are low quality training evaluations. There are several recent relevant systematic reviews on

Category	PSP	MHS I–III	Description in the Prior Reports	Importance – Scope	Impact – Current Use of PSP	Impact – Certainty About Effectiveness of PSP	Duplication	Feasibility	Notes
			demonstration, and practice based learning methods) that together form an instructional strategy MHS III: Team training programs, team simulation, briefings, handoff protocol, checklists						different types of team training interventions.

ICU, intensive care unit; MHS, Making Healthcare Safer; PSP, patient safety practice

Appendix D. Final List of Patient Safety Practices

Table D-1. Patient safety practices identified by the 15-member Technical Expert Panel as high priority for a Rapid Response, Rapid Review, or systematic review by the Making Healthcare Safer Team

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Antimicrobial stewardship	Programs intended to limit and optimize antimicrobial prescribing, reduce the evolution of antibiotic-resistant bacteria, and improve patient outcomes	MHS III	80%	100% (consensus without re-voting)	**Recommendation**: Systematic review (size of review would depend on whether focusing on the outpatient setting or new types of interventions; a rapid response report could be used to determine the best way to limit the scope of a systematic review)	**Changes in definition**: None. **Feasibility**: Large amount of new literature with expansion into the outpatient setting as well as new types of interventions. **Duplication:** No recent high-quality systematic review
Opioid stewardship	Often multicomponent programs, may include: conduct of an individualized assessment of risks and benefits of opioids, and the appropriateness of tapering (tapering slowly to minimize withdrawal symptoms).	MHS III	73%	100% (consensus without re-voting)	**Recommendation**: Rapid review (relatively new PSP with developing definitions and large amount of new literature)	**Changes in definition**: None. **Feasibility**: Large amount of new literature. **Duplication:** No recent high-quality systematic review
Transmission-based precautions	Subsumes MHS III multidrug-resistant organism and *Clostridioides difficile* Infection topics	MHS III	27%	73%	**Recommendation**: Rapid review	**Changes in definition**: TEP recommended modifying the definition of the PSP to include aerosol and droplet transmission **Feasibility**: Many new studies addressing this modified definition of the PSP. **Duplication:** No recent high-quality systematic review.

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Sepsis prediction, recognition, and intervention	Different types of sepsis interventions: screening, monitoring, and multicomponent interventions	MHS III	80%	100% (consensus without re-voting)	**Recommendation:** Rapid review (some controversy about effectiveness that new studies help address)	**Changes in definition**: None. **Feasibility**: Fair number of new studies. **Duplication:** No recent high-quality systematic reviews.
Engaging family caregivers	Engaging family caregivers with structured communication for safe care transitions	Horizon scan	80%	100% (consensus without re-voting)	**Recommendation**: Rapid review	**Changes in definition**: May benefit from refinement of how structured communication is defined **Feasibility**: Moderate number of studies **Duplication:** No recent high-quality systematic review
Implicit bias training	Implement implicit bias training to recognize differential risks of patient safety events in marginalized groups	Horizon scan	67%	93%	**Recommendation**: Rapid review (note that the TEP felt that implicit bias and equity were important to consider when reviewing other PSPs; a separate systematic review may be needed)	**Changes in definition**: PSP was defined to focus on implicit bias training but the topic could be expanded to include the role of implicit bias in PSPs more generally **Feasibility**: Moderate number of studies **Duplication:** No recent high-quality systematic review
Handoff protocols	Use of structured handoff protocols for intrahospital transitions	Horizon scan	80%	100% (consensus without re-voting)	**Recommendation**: Rapid review	**Changes in definition**: None **Feasibility**: Moderate amount of evidence, feasible for rapid review of empirical studies with clinical safety outcomes (not just surrogate outcomes) **Duplication:** No recent high-quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Clinical decision support (CDS)	Providing clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and healthcare; CDS encompasses a variety of tools to enhance decision making in the clinical workflow.	MHS III	67%	100%	**Recommendation:** Rapid review, (focused on specific CDS safety targets or contexts of use.)	**Changes in definition:** Consider narrowing focus to specific safety targets or specific clinical contexts **Feasibility:** Numerous new studies. **Duplication:** Partially duplicative, in that there are many reviews of CDS, each focused on a specific application or context of use.
Rapid response systems	Rapid response systems or rapid response teams includes a multidisciplinary team, most frequently consisting of intensive care unit trained personnel who are available 24 hours per day, 7 days per week to evaluate patients not in the intensive care unit who develop signs or symptoms of clinical deterioration.	MHS II, III	60%	93%	**Recommendation:** Rapid review	**Changes in definition:** The TEP emphasized defining more broadly as 'systems' to allow focus on the newer work about early identification of at-risk individuals and implementation through 'systems' such as automated alerts for vital signs or daily huddles. **Feasibility:** Modified approaches have been implemented in numerous published effectiveness and implementation studies **Duplication:** This topic was addressed narrowly in MHS III without this broader systems definition; no other recent reviews identified.
Interventions to prevent non-ventilator associated pneumonia for inpatients	Screening and/or interventions to prevent non ventilator associated pneumonia for hospitalized patients	Horizon scan	33%	73%	**Recommendation:** Rapid review (assuming focus on intervention studies)	**Changes in definition:** None **Feasibility:** Moderate number of studies including studies of prediction models and barriers to implementation **Duplication:** 1 recent systematic review that focused on stroke patients with dysphagia, and 1 systematic review in 2018 that focused on a broader population

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Supply chain disruption	Identify and monitor critical supplies and drugs for which your facility would be most vulnerable and already at risk for drug shortage if a supply chain disruption were to occur; Identify alternatives for each supply; include both domestic and international alternatives when possible.	Horizon scan	40%	93%	**Recommendation**: Rapid review	**Changes in definition**: None. **Feasibility**: Moderate amount of studies **Duplication:** No recent high-quality systematic review
High reliability	Adopt "high reliability" principles: training, implementation	Horizon scan	67%	80%	**Recommendation**: Rapid review	**Changes in definition**: Consider heterogeneous definitions of high reliability organizations **Feasibility**: Small number of studies **Duplication:** No recent high-quality systematic review
Capnography	Use capnography to catch opioid induced respiratory depression in patients at risk for opioid oversedation	Horizon scan	33%	40%	**Recommendation:** Rapid review	**Changes in definition:** None. **Feasibility:** Moderate number of studies **Duplication:** No recent high quality systematic review
Patient monitoring systems	Electronic systems that scan patient data (e.g., vital signs and other variables) for signs of deterioration and alert a clinician if certain criteria are met.	MHS III	73%	100% (consensus without re-voting)	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Few recent articles but expect increasing number of articles about use of artificial intelligence in electronic monitoring systems **Duplication:** No recent high-quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Barcode verification	Maximize the use of barcode verification prior to medication and vaccine administration by expanding use beyond inpatient care areas	Horizon scan	60%	60%	**Recommendation**: Rapid response	**Changes in definition**: None. **Feasibility**: Small number of studies **Duplication:** No recent high-quality systematic review
Protocols for high-risk drugs: reducing adverse drug events related to anti-coagulants	MHS I: All types of anticoagulant programs - inpatient and outpatient	MHS I, II	60%	73%	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Likely few new studies **Duplication:** No recent high-quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Person and family engagement	MHS II: Effectiveness of interventions intended primarily to elicit patient or family involvement in reducing the incidence of adverse patient safety events; In addition, patient/family engagement was examined as part of the implementation of selected PSPs with other primary goals (hand hygiene, rapid response team, falls, surgical checklists, care transitions) MHS III: Direct care occurs when healthcare providers partner with the patient and/or family in the processes of shared decision making. An organizational engagement can be in the form of quality and safety improvement initiatives or advisory councils that contain patient and/or families/caregivers as members	MHS II, III	53%	93%	**Recommendation:** Rapid response (consider as a subtopic for relevant PSPs, such as was done in MHS II for rapid response systems)	**Changes in definition:** None **Feasibility:** Very broad topic with only one recent effectiveness study that had patient-relevant outcomes, consistent with prior reviews. **Duplication:** No recent high-quality systematic review
Use of report cards and outcome measurements to improve safety of surgical care	Use of report cards and outcome measurements to improve safety of surgical care; collects prospective, clinical data that are used to provide risk- adjusted assessments of outcomes that are fed back to the hospitals and surgeons for comparative purposes, with the ultimate goal of quality improvement	MHS II	53%	100%	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Several new studies, some international but likely applicable. **Duplication:** No recent high-quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Deprescribing	Reducing inappropriate prescriptions	MHS III	60%	87%	**Recommendation**: Rapid response	**Changes in definition:** None **Feasibility:** Few recent studies, but active research ongoing with some small quality improvement efforts. **Duplication:** No recent high-quality systematic review, but TEP reported that a research network may be publishing a review.
Hours of service, fatigue and sleepiness	MHS 1: Fatigue, sleepiness, and medical errors. The literature on problem sleepiness among medical personnel, its impact on performance, and interventions to address sleep deprivation: limiting work hours, changes in shift scheduling, napping, and pharmaceutical aids. MHS II: Limiting individual providers' hours of service; effect of limiting individual providers' hours of service on patient safety outcomes	MHS I, II	53%	60%	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Small number of studies on specific tactics (schedules, peer support) and may see more studies due to increasing staff shortages **Duplication:** No recent high-quality systematic review
Post-event communication program	Implement communication and response program involving patient/family when patient harm occurs	Horizon scan	60%	80%	**Recommendation**: Rapid response	**Changes in definition**: Consider refinement to determine what outcomes to prioritize and whether to include studies describing perceptions of stakeholders (e.g., patients or physicians) without assessing an intervention **Feasibility**: Small number of studies **Duplication:** No recent high-quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Test result notification systems	Automated alert notification systems to ensure timely communication of clinically significant treatment results	MHS III	67%	93%	**Recommendation:** Rapid response	**Changes in definition**: None. **Feasibility**: Few new studies. **Duplication:** No recent high-quality systematic review
Automated medication dispensing devices and dose drug distribution systems	Drug storage devices or cabinets that electronically dispense medications in a controlled fashion and track medication use in hospitals; Medication dispensed in a package that is ready to administer to the patient in hospitals.	MHS I	73%	100% (consensus without re-voting)	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Likely few articles to review now. **Duplication:** No recent high-quality systematic review
Staff shortage	Develop flexible action plans to deliver safe patient care during staff shortages, including closing units or diverting patients	Horizon scan	73%	100% (consensus without re-voting)	**Recommendation**: Rapid response	**Changes in definition**: None **Feasibility**: Small number of studies but might expect more studies due to recent increase in staffing shortages **Duplication:** No recent high-quality systematic review
Infection surveillance and testing	Subsumes MHS III surveillance and testing topics on MDRO and *Clostridioides difficile* Infection	MHS III	67%	47%	**Recommendation:** Rapid response	**Changes in definition:** None. **Feasibility:** Few new studies on the PSP, which are similar to prior studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP Before TEP Meeting	Source (prior MHS report or horizon scan)	Pre-meeting % of TEP Members Advising Inclusion for Review	Post-meeting % of TEP Members Advising Inclusion for Review	Recommendation* (for rapid response, rapid review, or systematic review)	Notes on Changing Definition/Scope, Feasibility (based on estimated number of studies), and Potential Duplication (based on existing reviews or guidelines)
Performance review and feedback focused on diagnostic errors	Audit and feedback methods provide information to clinicians and others about performance to motivate and measure change and are broadly defined as "any summary of clinical performance over a specified period of time."	MHS III	60%	40%	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Few studies published recently but TEP reported that some important work is underway **Duplication:** No recent high quality systematic review.
Prevention of pressure ulcers in older patients	MHS I: Use of specific beds or mattresses in inpatient and long-term care MHS II: Pressure ulcer prevention programs (defined very broadly)	MHS I, II	60%	40%	**Recommendation:** Rapid response	**Changes in definition:** None **Feasibility:** Few new studies **Duplication:** At least 4 recent systematic reviews.

MHS = Making Healthcare Safer, PSP = patient safety practice, TEP=technical expert panel

*Rapid responses present an answer based on the best available evidence but do not attempt to formally synthesize the evidence into conclusions. Rapid reviews involve a synthesis that provides an answer about the direction of evidence and possibly the strength of evidence. Systematic reviews provide a rigorous systematic synthesis of all relevant evidence (including direction and magnitude of effects) with an assessment of the strength of evidence including assessment of the risk of bias in studies. The MHS initiative previously produced three reports: MHS I in 2001, MHS II in 2013, and MHS III in 2020.

Table D-2. Patient safety practices (PSPs) identified as important topic for a new review by the Making Healthcare Safer (MHS) Team

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Multi-component infection prevention interventions for *Clostridioides difficile*	Multi-component infection prevention interventions, any set of multiple (>1) interventions focused on reducing *Clostridioides difficile* infection in the inpatient setting.	MHS III	60%	33%	**Changes in definition:** None. **Feasibility:** Some new studies but similar to prior studies **Duplication:** No recent high quality systematic review
Single use endoscopy	Single use of endoscopes (includes bronchoscopes, gastrointestinal endoscopes, laryngoscopes, cystoscopes) to prevent infections	Horizon scan	27%	33%	**Changes in definition:** None. **Feasibility:** Moderate number of studies **Duplication:** Recent high-quality review, but focused only on ERCP
Minimize use of devices	Minimizing use of urinary catheters and central lines; Catheter innovations to reduce risk of infection such as impregnated catheters; Reducing ventilator associated infections.	MHS III	27%	27%	**Changes in definition:** None **Feasibility:** Some new studies on strategies to discontinue use as soon as possible **Duplication:** No recent high quality systematic review
Weigh patients	Weigh patients to prevent medication dosage errors	Horizon scan	27%	27%	**Changes in definition:** None. **Feasibility:** Small number of studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Identification of patients at risk for suicide	Programs to reduce suicide risk for inpatients	MHS II	40%	13%	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** No recent high quality systematic review
Interventions to allow the reuse of single-use devices	Reprocessing protocols generally include cleaning and sterilization	MHS II	33%	13%	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** Recent guidance from CDC, FDA, and Joint Commission.
Prevention of clinically significant gastrointestinal bleeding in intensive care unit patients	Treat at risk patients prophylactically with appropriate therapy to prevent stress related gastrointestinal ulceration and bleeding	MHS I, II	20%	13%	**Changes in definition:** None. **Feasibility:** Recent studies focus on de-implementation of this practice because risks outweigh benefits for all but a small proportion of patients and no longer recommended as a PSP **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Chlorhexidine bathing	Specific efficacy of chlorhexidine to prevent different infections (by organism, by type of infection), the mode and frequency of successful chlorhexidine bathing	MHS III	27%	7%	**Changes in definition:** None **Feasibility:** One large study on expanding PSP to non-ICU settings, but it does not add new knowledge (PSP ineffective for non-ICU as well as ICU patients). **Duplication:** A recent Cochrane review is comprehensive and conclusive (PSP not effective).
Communication of multi-drug resistant organism (MDRO) status	Timely and accurate dissemination of MDRO status to all clinicians, visitors, and others in the facility who interact with those patients: intra-facility, inter-facility.	MHS III	27%	7%	**Changes in definition:** None. **Feasibility:** Few recent studies of this well-established PSP **Duplication:** No recent high quality systematic review
Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infections	Focused on 2 areas: 1) protocols and interventions to decrease unnecessary placement of urinary catheters, and 2) interventions that prompt removal of unnecessary urinary catheters	MHS I, II	53%	0%	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** One recent systematic review on implementation of programs to prevent catheter-associated urinary tract infections

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Care transition interventions in general	Includes BOOST, CTI, TCM, and other interventions designed to improve discharge and other care transition processes.	MHS II, III	47%	Not included in post-meeting voting	**Changes in definition:** None. **Feasibility:** Many recent studies which are similar to prior evidence **Duplication:** Multiple systematic reviews on specific sub-populations including one on engagement of family
Diverse populations in risk analysis	Incorporate diverse populations in retrospective risk analysis (e.g., RCA2, human factor analysis)	Horizon scan	47%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Little evidence about impact of this PSP on safety outcomes, but could consider diversity of the clinical population as part of the assessment of other PSPs related to risk analysis **Duplication:** No recent high quality systematic review
Environmental cleaning and decontamination	Subsumes MHS III topics on MDRO and *Clostridioides difficile* Infection	MHS III	47%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Few recent studies and similar to prior studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Prevention of contrast-induced acute kidney injury	MHS I: Specific interventions: Use of high versus low osmolar iodinated contrast media, hydration protocols, and medications MHS II: Specific interventions: Volume expansion with intravenous sodium bicarbonate • Administration of n-acetylcysteine • Use of iso-osmolar (instead of low- or high-osmolar) contrast media • Prophylactic renal replacement therapy (dialysis) • Administration of 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase inhibitors (statins)	MHS I, II	47%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Few recent articles **Duplication:** Several old systematic reviews that cover the literature well

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Retrospective risk analysis	Perform robust retrospective risk analysis (e.g., RCA2, human factor analysis	Horizon scan	47%	Not included in post-meeting voting	**Changes in definition:** Consider removing the word "robust," include any retrospective risk analysis, and discuss the quality of the analyses within the review **Feasibility:** Moderate number of studies **Duplication:** Two recent systematic reviews had search dates ending in 2018 and 2020, and included 10 studies and 21 studies, respectively
Standardized insulin protocols	Use of standardized insulin protocols to reduce risk of serious hypoglycemia in hospitals due to administration errors	MHS III	47%	Not included in post-meeting voting	**Changes in definition:** Consider implications of having new medications for management of diabetes mellitus **Feasibility:** Few recent studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Delirium screening and assessment and non-pharmacologic intervention programs	Multi-component and single, including mobility, environmental, cognitive, and therapeutic; performance properties of screening and assessment tests for delirium	MHS III	40%	Not included in post-meeting voting	**Changes in definition:** None. **Feasibility:** Fair number of recent studies. **Duplication:** Recent systematic reviews on specific delirium interventions.
Prevention of central line-associated bloodstream infections	Use of maximum barrier precautions, catheters coated with antibacterial or antiseptic agents, and use of chlorhexidine gluconate at the insertion site	MHS II	40%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Many studies **Duplication:** 3 recent high quality systematic reviews
Prevention of falls in hospitalized and institutionalized older people	MHS I: Identification bracelets for high-risk patients, interventions that decrease the use of physical restraints, bed alarms, special hospital flooring materials to reduce injuries from patient falls, hip protectors to prevent hip fracture MHS II: In-facility fall prevention programs, generally multicomponent interventions	MHS I, II	40%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Prevention of surgical site infections	Prophylactic antibiotics, Perioperative normothermia, supplemental perioperative oxygen, perioperative glucose control	MHS I	40%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Numerous recent studies, but most covered in existing guidelines **Duplication:** Several sources for ongoing evidence synthesis and guideline development
Prevention of venous thromboembolism	MHS I: Mechanical and pharmacologic interventions MHS II: Pharmacologic and mechanical prophylactic interventions; decision support, interventions to improve adherence	MHS I, III	40%	Not included in post-meeting voting	**Changes in definition:** None, but note this PSP covers a wide variety of interventions and clinical applications **Feasibility:** Several recent studies **Duplication:** High quality clinical guidelines supported by updated or living systematic reviews

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Prospective risk analysis	Proactive systems improvement - failure mode and effects analysis (FMEA)	Horizon scan	40%	Not included in post-meeting voting	**Changes in definition:** Consider combining with the PSPs on retrospective risk analysis and diverse populations. This one is prospective but the goals are similar. **Feasibility:** Moderate number of recent studies **Duplication:** 3 large recent systematic reviews but none mentioned impact on patient safety
Rescue drug availability	Implement protocols/pathways for rescue drugs that ensure availability of, and permit the emergency administration of, all appropriate antidotes, reversal agents, and rescue agents used in the facility	Horizon scan	40%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** No recent studies identified **Duplication:** No recent high quality systematic review
Smart pumps and other protocols for infusion pumps	Manufacturers have added technology to recent models of pumps specifically designed to prevent medication errors" – includes software for dosing, bar coding for patient identification	MHS II	40%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Limited number of recent studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Antimicrobial coatings	Antimicrobial coatings on high touch surfaces to prevent health care-acquired infections	Horizon scan	33%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Moderate number of recent studies, mostly single arm **Duplication:** No recent high quality systematic review
Cyber security risk assessment	Conduct a cyber security risk assessment and adopt appropriate security measures to prevent disruptions to clinical workflow technologies	Horizon scan	33%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Many studies on the topic but very little about the safety impact of conducting a cyber risk assessment **Duplication:** No high-quality systematic review
Hand hygiene	Subsumes hand hygiene topics on MDRO and *Clostridioides difficile* Infection	MHS III	33%	Not included in post-meeting voting	**Changes in definition:** None. **Feasibility:** Few recent studies and similar to prior studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Ventilator associated pneumonia	MHS I: Practices that carry the potential to reduce the incidence of ventilator associated pneumonia in patients receiving mechanical ventilation MHS II: Strategies to prevent ventilator associated pneumonia: elevation of the head of the bed, sedation vacations, oral care with chlorhexidine and subglottic suctioning	MHS I MHS II	33%	Not included in post-meeting voting	**Changes in definition:** None. **Feasibility:** Many recent studies **Duplication:** New evidence-based practice recommendations from SHEA/IDSA/APIC
Two methods of patient identification	Use at least two ways to identify patients. For example, use the patient's name and date of birth. This is done to make sure that each patient gets the correct medicine and treatment.	Horizon scan	27%	Not included in post-meeting voting	**Changes in definition:** None **Feasibility:** Recent articles on the topic but little evidence from controlled studies **Duplication:** One recent systematic review
Availability of EUA pharmaceuticals	Implement protocols/pathways for distribution and equitable access of EUA pharmaceuticals	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Recent articles on the topic but very little on safety outcomes of a related PSP **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Availability of PPE	Maintain accurate inventory of PPE	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Recent articles on the topic but little evidence from controlled studies **Duplication:** No recent high quality systematic review
Communication of incidental findings	Protocol for handling notification and follow up of incidental findings in radiology	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Moderate number of recent studies **Duplication:** No recent high quality systematic review
Concierge medication safety program	Use of concierge medication safety program in hospital (i.e., HomeMeds Medication Safety Program)	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Recent articles on the topic but little evidence from controlled studies **Duplication:** One recent systematic review
Operating room black box	Operating room black box, a novel monitoring technology that integrates continuous monitoring of intraoperative data with video and audio recording of operative procedures	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Recent articles on the topic but no evidence from controlled studies **Duplication:** One recent systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Optimize alarm design	Use of human factors engineering principles in alarm design to increase the informativeness and decrease cognitive load associated with alarm	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Moderate number of recent studies **Duplication:** Several recent systematic reviews
Telemonitoring	Telemonitoring for fall risk, elopement risk and suicide risk	Horizon scan	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Moderate number of recent studies **Duplication:** No recent high quality systematic review

Human factors solutions for device related harms	MHS I: Human factors as a safety practice in the design of medical devices and their evaluation both prior to and after institutional purchase; medical device alarms and the contribution of HFE to alarm improvements; use of preoperative checklist procedures to reduce anesthesia device failures MHS II: Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well-being and overall system performance;1) usability of medical devices and health information technology, 2) focus on human error and its role in patient safety, 3) role of health care worker performance in patient safety, 4) system resilience and its role in patient safety, and 5) HFE systems approaches to patient safety	MHS I, II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Broad literature with many diverse studies, which would be challenging to integrate. **Duplication:** No recent high quality systematic review
Nurse staffing, models of care delivery, and interventions	MHS I: Nurse staffing, specific organization of nursing care delivery, nursing models of care, or organizational culture; specific inpatient nursing	MHS I, II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Increasing number of studies on the effects of staffing ratios and

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
	interventions -education, training, or retraining, providing audit data, and capturing nurse assessment of patient outcomes MHS II: Registered nurse–to–patient staffing ratios				use of temporary staff on safety, but few studies that actually examined staffing ratios with any outcomes **Duplication:** No recent high quality systematic review
Pre-anesthesia checklists to improve patient safety	MHS I: Checklist system as part of routine pre-anesthesia care MHS II: 4 types of checklists including WHO Surgical Safety Checklist; SURPASS Checklist (covers all from admission to surgery to discharge); Checklists specifically intended to prevent wrong site surgery (e.g., Joint Commission); Checklists specifically intended to check anesthesia equipment (based on American Society of Anesthesiologists)	MHS I, II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Old topic from MHS I and II with high utilization of PSP in United States and worldwide **Duplication:** One recent systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Ultrasound guidance of central vein catheterization	Utilizing portable, real-time ultrasonography to guide the insertion of central venous catheters	MHS I, II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Several recent studies similar to prior studies **Duplication:** Two recent systematic reviews
Teamwork and team training	MHS II: constellation of content (i.e., the specific knowledge, skills, and attitudes that underlie targeted teamwork competencies), tools (i.e., team task analysis, performance measures), and delivery methods (i.e., information, demonstration, and practice-based learning methods) that together form an instructional strategy MHS III: Team training programs, team simulation, briefings, handoff protocol, checklists	MHS II, III	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Numerous studies, but many are low-quality training evaluations. **Duplication:** Several recent systematic reviews.

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Ensuring documentation of patients' preferences for life-sustaining treatment	Ensure that written documentation of the patient's preferences for life-sustaining treatments is prominently displayed in his or her chart. Organization policies, consistent with applicable law and regulation, should be in place and address patient preferences for life-sustaining treatment and withholding resuscitation. The definition of life-sustaining treatment may include, but is not limited to, mechanical ventilation, renal dialysis, chemotherapy, antibiotics, and artificial nutrition and hydration.	MHS III	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Several recent articles on the topic **Duplication:** Several recent systematic reviews available, none are high quality
Medication reconciliation and handoffs for anticoagulation management	Anticoagulant management services in the ambulatory setting	MHS III	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Nomogram guided dosing	Protocols and nomograms in inpatient and outpatient settings for NOACs	MHS III	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** No recent studies **Duplication:** No recent high quality systematic review
Preventing patient death or serious injury associated with radiation exposure from fluoroscopy and computed tomography	ALARA (As Low As Reasonably Achievable): to reduce both patient and technician exposure to ionizing radiation without compromising diagnostic or therapeutic efficacy: technical measures, appropriate utilization, education and training, algorithms and protocols	MHS II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** No recent studies **Duplication:** No recent high quality systematic review
Prevention of misidentifications	Barcoding and strategies to avoid wrong-site surgery, implementation protocols and checklists, site-marking, use of verification protocols and forms	MHS I	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** No recent studies **Duplication:** No recent high quality systematic review
Prevention of surgical items being left inside patient	MHS I: Safety practices to reduce the incidence of retained sponges and instruments MHS II: Interventions to improve counts of surgical items	MHS I, II	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Several recent articles on the topic, with majority non-randomized controlled studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Reducing errors in the interpretation of imaging	Practices to reduce the higher rate of misinterpretations made by non-radiologists	MHS I	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** No recent studies **Duplication:** No recent high quality systematic review
Safety during transport of critically ill patients	Intra- and inter-hospital transfers, including specialized teams	MHS I	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Few recent studies **Duplication:** No recent high quality systematic review
"Closed" intensive care units and other models of care for critically ill patients	An ICU in which patients admitted to the ICU are transferred to the care of an intensivist assigned to the ICU on a full-time basis (as opposed to a non-intensivist physician with or without intensivist involvement)	MHS I	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** No recent studies **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Promoting a culture of patient safety	MHS I and II: Safety-oriented interventions that were designed to promote a culture of patient safety, conducted in an inpatient hospital; many were multicomponent interventions MHS III: Leadership walk rounds, team training, Comprehensive Unit-Based Program, Multicomponent	MHS I, II, III	Not rated by TEP	Not rated by TE P	**Changes in definition:** None **Feasibility:** Several studies available but are consistent with evidence from MHS II which had a complete review. **Duplication:** No recent high quality systematic review

PSP	Definition of PSP before TEP meeting	Source (prior MHS report or Horizon scan)	Pre-meeting % of TEP members advising inclusion for review	Post-meeting % of TEP members advising inclusion for review	Notes on changing definition/scope, feasibility (based on estimated number of studies), and potential duplication (based on existing reviews or guidelines)
Clinical decision support (diagnosis)	Provides clinicians, staff, patients or other individuals with knowledge and person- specific information, intelligently filtered or presented at appropriate times, to enhance health and healthcare. Clinical decision support encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information drug ordering and adverse drug events, prevention of deep vein thrombosis, antibiotic prescribing/stewardship, blood glucose control, reducing uninformative alerts (reducing alert fatigue), and other potential patient-safety effects of CDS	MHS III	Not rated by TEP	Not rated by TEP	**Changes in definition:** None **Feasibility:** Several recent articles on the topic **Duplication:** One recent systematic review on multiple strategies including clinical decision support

ALARA = As Low As Reasonably Achievable; APIC = Association for Professionals in Infection Control and Epidemiology; BOOST = Better Outcomes for Older Adults through Safe Transitions; CDC = Centers for Disease Control and Prevention; CTI = critical time intervention; CVC = central vein catheterization; ERCP = endoscopic retrograde cholangiopancreatography; EUA = Emergency Use Authorization; FDA = Food and Drug Administration; FMEA = failure mode and effects analysis; GI = gastrointestinal; HFE =

human factors engineering; ICU = intensive care unit; IDSA = Infection Diseases Society of America; MDRO = multi-drug resistant organism; MHS = Making Healthcare Safer; NA = not available; NOAC = novel oral anti-coagulants; PPE = personal protective equipment; PSP = patient safety practice; RCA2 = Improving Root Cause Analyses and Actions to Prevent Harm; SHEA = Society for Healthcare Epidemiology; SURPASS = SURgical PAtient Safety System; TCM = transitional care management; TEP = technical expert panel; WHO = World Health Organization

Appendix E. Other Patient Safety Practices

Table E-1. Write-in comments from the Technical Expert Panel about other patient safety practices that could be considered

Write-in PSP for Consideration
"Access delays and perhaps time between treatment for time sensitive disease such as cancer. Some evidence that there is significant harm from both of these."
Approaches to designing and testing work systems."
"Home monitoring systems to detect deterioration."
"May consider the risk for patients with specific diseases that make them at risk, such as Parkinson's, SMI, or others. My sense is these patients have risks, it has not been well quantified and thus health systems lack interventions to mitigate these risks."
"Patient safety issues related to telehealth."

PSP = patient safety practices, SMI = serious mental illness