



Identifying Intensive Care Unit Discharge Planning Tools: Protocol for a Scoping Review

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Identifying Intensive Care Unit Discharge Planning Tools: Protocol for a Scoping Review

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ABSTRACT

Background: Transitions of care between providers are vulnerable periods in health care delivery that expose patients to preventable errors and adverse events. Patient discharge from the intensive care unit (ICU) to a medical or surgical hospital ward is one of the most challenging and high risk transitions of care. Approximately one in twelve patients discharged will be readmitted to ICU or die before leaving hospital. Many more patients are exposed to unnecessary health care, adverse events and/or are disappointed with the quality of their care. Our objective is to conduct a scoping review by systematically searching the literature to identify ICU discharge planning tools and their supporting evidence-base including barriers and facilitators to their use.

Methods and analysis: Systematic searching of the published health literature will be conducted to identify existing ICU discharge planning tools and supporting evidence. Literature (research and non-research) reporting on tools used to facilitate decision making and/or communication at ICU discharge, with patients of any age will be included. Outcomes will include adverse events and provider and patient/family reported outcomes. Two investigators will independently review the abstracts (Screen 1) to identify those meeting inclusion criteria and then independently assess the full text articles (Screen 2) to determine if they meet inclusion criteria. Data collection will include information on citations and identified tools. A quality assessment will be performed on original research studies. A descriptive summary will be developed for each tool.

Ethics and dissemination: Our scoping review will synthesize the literature for ICU discharge planning tools and identify opportunities for knowledge to action and gaps in evidence where primary evidence is necessary. This will serve as the foundational element in a multi-step

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research program to standardize and improve the quality of care provided to patients during ICU discharge. Ethics approval is not required for this study.

For peer review only

BACKGROUND

The transfer of responsibility for patient care (synonyms include transition of care, handoff, sign over etc.) is a common practice in acute-care hospitals.[1] During transfers of patient care, crucial information on patient conditions, tests undertaken, and treatments received is transferred between providers, so that care plans can be effectively continued by receiving providers. A handoff between health care providers is not only a process to provide accurate and vital information regarding a patients' care, but is also a transfer of accountability and responsibility for the patient.[2-7] Healthcare organizations recognize the importance of transitions of care and have proposed organizational practices to improve the effectiveness and coordination of communication among providers and recipients of care across the care continuum.[8-10]

Unfortunately, the practice of provider handoff is often suboptimal due to communication barriers[6, 11-13] and is a major contributor to medical errors and adverse events.[2, 7, 14-20] In 2006, the Joint Commission for Accreditation of Health Care Organization (JCAHO) reported that 63% of deaths related to medical error in its sentinel events database involved a breakdown in communication.[21] Most research on handoffs for in-hospital patient transfers has focused on patient transfers from the perspective of a single discipline, such as physician end-of-shift[1, 6, 12, 19, 22] or end-of-service[2, 17, 18, 23] handoffs. In contrast, relatively little is known about handoffs between non-physician providers.[11, 24] Multidisciplinary handoffs though are required to optimally transition care and likely face relatively greater communication hurdles due to cultural differences, work load challenges, and differences in clinical focus between specialties and disciplines, and thus may lead to greater potential for medical errors and adverse events.[11, 13, 24]

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6 Numerous types of patient transfers and provider handoffs occur every day.[4, 6] A transition of
7
8 care occurs each time a patient is referred to a specialist by their family doctor, assigned a new
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10 nurse during hospital shift change or discharged from hospital. Among these, patient transfers
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12 from the Intensive Care Unit (ICU) to a medical or surgical hospital ward are likely of
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14 particularly high risk due to the number, complexity and acuity of the medical conditions that
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16 characterize this patient group;[25-28] the large “voltage” drop in available resources when
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18 patients move from the ICU, where medical care is intensive and resources are rich, to ward
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20 environments, where patients typically receive much less intensive monitoring and patient
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22 care;[25] the multitude of communication barriers that providers often face during inter-specialty
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24 and multidisciplinary handoffs;[29] the lack of standardization in patient transfer processes
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26 overall; and in particular the lack of standardized written and/or electronic tools to facilitate an
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28 optimal transfer process.[27]
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36 Patients admitted to the ICU are of the highest acuity requiring management with life support
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38 technologies and aggressive interventions to sustain life and progress towards a clinically
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40 stabilized condition.[27] Approximately one in ten patients admitted to an acute care facility are
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42 admitted to an ICU.[30] Transition of care is extremely common with 90% of ICU patients being
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44 eventually discharged to medical or surgical hospital wards.[31] With millions of
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46 hospitalizations in acute care facilities in most countries each year,[30] hundreds of thousands of
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48 patients will be admitted to ICU and experience challenging and high risk transfers to hospital
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50 wards.
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3 ICU discharge represents a large drop in the intensity of care with patients transitioning from a
4 high acuity unit to a general care unit. ICUs are specially staffed, self-contained hospital units,
5 dedicated to the management and continuous monitoring of patients with life-threatening
6 illnesses.[32] The medical support available to patients in the ICU includes multidisciplinary
7 teams of healthcare providers (i.e. physicians, nurses, pharmacists, therapists) that typically see
8 each patient multiple times a day.[33, 34] In general there is a nurse for every one or two patients
9 and a physician for every eight to ten patients.[35, 36] In contrast, general medical and surgical
10 care units have fewer resources with a nurse for every four to eight patients[37] and physicians
11 responsible for up to as many as 65 patients during regular working hours and 400 patients
12 outside of regular working hours.[38] Other health care providers are often less available.
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29 When a patient is transferred from ICU to a general care unit typically there is a complete
30 transition in healthcare providers, most patients being assigned new teams of physicians, nurses,
31 pharmacists, therapists etc. However, communication between providers discharging patients
32 from the ICU and providers admitting these patients to general care units has been documented
33 to be infrequent, incomplete and of poor quality.[29, 39] An observational study done by our
34 research team in preparation for this protocol found direct verbal communication between ICU
35 discharging physicians and ward admitting physicians to occur in only 15-25% of the ICU
36 discharges.[29] Optimal transfers of care require effective communication between discharging
37 and admitting physicians that includes direct communication (in person or via telephone);
38 concise, accurate, up-to-date discharge summaries; and physician notification at the time of
39 transfer.[3, 29] However, communication during transfer is challenged by provider workloads,
40 available resources, and variations in clinical focus between specialties.[11, 13, 24]
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6 Communication between physicians and patients/families at the time of ICU discharge is also
7
8 frequently suboptimal with the same local observational study finding 68% of patient/families
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10 reporting a desire for increased opportunities to ask questions about the transfer.[29] This lack of
11
12 information about the ICU transfer process can act as a catalyst for stress and anxiety for patients
13
14 and families.[40-42] Effective communication between providers and patients/families to
15
16 provide early notification of an upcoming transfer,[29] and present information on current
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18 medical conditions and future plans prior to transfer would likely better manage expectations and
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20 reduce anxiety.
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27 Standardizing the process of patient discharge from ICU could improve the safety, quality and
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29 efficiency of care. Multiple interventions to improve ICU discharge have been developed (e.g.
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31 transitional care units, ICU outreach, nursing liaison, etc.),[27, 43-46] but there is no consensus
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33 on an ideal ICU discharge model to optimize the quality of patient care[27] and few
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35 organizations have implemented standardized guidelines or procedures for transitions of
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37 care.[44, 47] Government agencies,[48] specialty groups[3, 49, 50] and the Institute for
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39 Healthcare Improvement[51] have all advocated standardizing ICU discharge structure and
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41 processes to improve continuity of care, patient safety, patient and provider satisfaction, and
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43 resource use.[45, 52]
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51 The challenges of ICU discharge are well recognized.[27, 53] Very little is known about the
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53 quality of patient care during ICU discharge. A comprehensive review of ICU discharge
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55 planning tools has not been previously completed. The scope and magnitude of tools to facilitate
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3 patient discharge from ICU has not previously been defined. For tools already developed, it is
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5 unclear how effectively these have been implemented and how they may have affected patient
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7 clinical outcomes and/or patient and family satisfaction with care. In response to these
8
9 challenges, we will conduct a scoping review to identify ICU discharge planning tools and the
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11 supporting evidence base for these tools including barriers and facilitators to their use.
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17 METHODS AND ANALYSIS

19 Conceptual model

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21 Our scoping review will adopt the model of system theory first introduced in 1966 by Avedis
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23 Donabedian.[54, 55] In Donabedian's framework, the three components of healthcare quality are
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25 *structure*, *process* and *outcome*. The *structure* is the environment in which health care is
26
27 provided and includes material and health resources, operational factors, and organizational
28
29 characteristics of the healthcare facility. The *process* is the method by which healthcare is
30
31 provided and includes the giving and receiving of care by the providers and healthcare system.
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33 The *outcome* is the consequence of healthcare and includes the health status of patients. We will
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35 examine *structural* devices (tools) used to facilitate ICU discharge and evaluate their association
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37 with *processes* and *outcomes* of care for patients discharged from ICU (Figure 1).
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46 In addition, we will incorporate the Institute of Medicine's (IOM) six aims for the 21st Century
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48 Health Care System into our research. ICU discharge tools should foster safe, effective, efficient,
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50 timely, equitable, and patient-centered discharge from ICU. We have developed a conceptual
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52 model for our scoping review that merges the Donabedian model and the IOM's six aims (Table
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1). We recognize that our conceptual model is a relatively basic and simple representation of

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3 ICU discharge, but no other simple validated framework exists and we have successfully used a
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5 variation of this model to develop quality indicators for injury care.[56-59]
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10 **Objectives**

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12 This is a protocol for a scoping review to identify ICU discharge planning tools and the
13 supporting evidence base for these tools including barriers and facilitators to their use. Methods
14 for inclusion and analysis of articles and reporting of their results will be performed as
15 recommended by Arksey and O'Malley[60] and refined by Levac and colleagues.[61]
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24 We define an ICU as a distinct hospital ward that is staffed by specialized healthcare
25 professionals and where immediate and continuous life sustaining treatment (e.g. invasive
26 monitoring, vasoactive medications, invasive mechanical ventilation) is administered to
27 hospitalized patients suffering from life-threatening conditions (e.g. severe respiratory
28 failure).[35] Patient discharge from ICU is defined as the transfer of accountability and
29 responsibility for patient care from the ICU to a hospital ward. Tools are defined as structural
30 devices (e.g. protocols, reminders, order sets, bundles, checklists, forms, decision-aids) designed
31 to aid health care providers or patients/families with decision making and/or communication.[62]
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46 The specific objectives of the scoping review are:

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48 1. To complete a systematic search of the literature to identify existing ICU discharge planning
49 tools and evaluate the evidence base in support of the tools.
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53 2. To map the ICU discharge tools and supporting evidence to our conceptual framework to
54 identify gaps in the evidence where primary evidence or systematic reviews are required.
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3. To evaluate the tools according to their relevance to knowledge users (importance, feasibility, usability, scientific acceptability).
4. To describe barriers and facilitators to implementation and utilization of ICU discharge planning tools.

Eligibility Criteria

Research studies (no methodological restrictions – case series, cohort, cross-sectional, nonrandomized controlled, consensus method, case-control, randomized controlled) and non-research study designs (editorial, guideline, letter to the editor, narrative review) are eligible. We will include studies with all human patients discharged from any ICU regardless of subspecialty (e.g. medical, neuroscience, etc.). There is no restriction on age as tools identified for neonatal and pediatric patients may provide relevant information for the discharge of adult patients.

Eligible studies must include any electronic or paper tool (including guidelines, protocols, questionnaires, checklist, etc.) intended to facilitate discharge from ICU by aiding healthcare providers and/or patients/families with decision making and/or communication. A comparison group is not required as we will be looking for studies that describe the implementation or evaluation of a tool. If evaluation studies are identified, details on the comparison group will be assessed including patients and type of ICU (e.g. medical, neuroscience etc.). Outcome measures include (1) any severe adverse events post-ICU discharge (e.g. ICU readmission, hospital mortality), (2) any provider reported outcomes (e.g. quality of communication, satisfaction), or (3) any patient/family reported outcomes (e.g. quality of information, engagement, satisfaction).

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3 Studies will be excluded if they include patient discharges predominantly from coronary care
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5 units, high dependency units, and step-down units.
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10 **Search Strategy**

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12 We will search the following electronic databases: Medline (OVID interface, 1946 onwards),
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14 EMBASE (OVID interface, 1947 onwards), CINAHL (EBSCO interface, 1981 onwards) and the
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16 Cochrane Library (current issue). Bibliographies of retrieved articles will be searched for
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18 additional relevant articles. We will also search conference proceedings from the past five years,
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20 including the Canadian Critical Care Conference, Society of Critical Care Medicine, Australian
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22 and New Zealand Intensive Care Society Conference, European Society of Intensive Care
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24 Medicine Conference, American Thoracic Society Conference, and International Symposium on
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26 Intensive Care and Emergency Medicine. Experts in the field, identified from the references of
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28 included studies, will be contacted to determine whether they are aware of any additional studies.
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36 An experienced information specialist (LP) will conduct the literature searches. They will be
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38 performed with no year or language restrictions and will use combinations and synonyms of the
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40 following search terms: intensive care, critical care, discharge plan, patient transfer and patient
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42 discharge. Appropriate wildcards will be used to account for plurals and variations in spelling. A
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44 draft literature search is available in Additional File 1.
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50 **Study selection process**

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52 Two investigators will independently review the retrieved abstracts (Screen 1) to identify those
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54 that meet the inclusion criteria. The full text of those articles deemed relevant by either reviewer
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3 will be obtained. Two investigators will independently assess the full text articles (Screen 2) to
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5 determine if they meet the inclusion criteria. Two investigators will discuss disagreements on
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7 inclusion and a third investigator will resolve disagreements if needed. Bibliographic details will
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9 be downloaded to EndNote.[63] The study selection process will be pilot tested using 50
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11 citations from the literature search. The inclusion and exclusion criteria will be serially clarified
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13 and reviewer training sequentially revised until reliable study selection can be demonstrated
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15 (estimated $\kappa \geq 0.6$).[64]
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22 **Data items and data collection process**

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24 The data collection instruments will include information on both citations and identified tools.
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26 We will document the type of citation (e.g. original research), country, setting (e.g. subspecialty
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28 of unit), study design, study population, recruitment and sampling, diagnostic criteria, reference
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30 standard, blinding, statistical methods and outcomes. For each tool we will document the name,
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32 purpose (e.g. risk stratification), components (single component vs. multi-component), how it is
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34 applied (e.g. electronic) and the timing of activation (e.g. discharge planning vs. discharge
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36 execution). If available, we will record any measurement properties documented
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38 (sensitivity/specificity), reported impact on processes and outcomes of care for patients, families
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40 and providers and barriers and facilitators identified to use of the tool. The data collection
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42 instrument and reviewer training will be sequentially revised until reliable data abstraction can
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44 be demonstrated (estimated $\kappa \geq 0.8$).[64] Differences in coding between the two reviewers will
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46 be resolved by discussion and a third reviewer consulted if an agreement cannot be reached.
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49 Original research studies will have the quality of their methodology assessed using the
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51 framework of Caldwell et al.[65] for evaluating both quantitative and qualitative study designs.
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3 Two clinical decision-makers (Zygun, Boiteau, Zuege) will independently judge the relevance of
4 each tool for decision-making according to four dimensions derived from the Strategic
5 Framework Board in the United States:[66] 1) targets important improvements in continuity of
6 patient care, 2) feasible to implement, 3) easy to use, 4) strength of scientific evidence (using the
7 GRADE criteria).[67]

17 **Analysis**

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19 Quantitative and qualitative analyses will be performed. The articles and tools will be
20 categorized according to their respective criteria. Agreement on data abstraction and article
21 classification will be assessed with Cohen κ reliability coefficients.[64] A comprehensive list of
22 the tools will be developed and summarized using simple numerical counts. We will present the
23 distribution of tools according to the cells of our conceptual model along with binomial 95%
24 confidence intervals as well as detailed tabulations by type of article (original research, non-
25 research) and study design. We will examine the purpose and components of the tools from each
26 study as well as reported measurement properties (e.g. sensitivity/specificity of risk stratification
27 tools) and reported processes (e.g. hospital length of stay) and outcomes (e.g. readmission to
28 ICU) of care. A descriptive summary will be developed of each tool's purpose, components,
29 conceptual model classification, measurement properties and relevance to knowledge users.

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48 Qualitative studies will be evaluated by identifying the key outcomes and themes presented by
49 each study (e.g. reported barriers and facilitators to discharge tool utilization), preserving the
50 meaning from their original source, and tabulating them within the review. Translation of key
51 concepts from all studies will be performed to identify novel concepts not explored by individual
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3 studies. Analysis will focus on identifying the overlap of key concepts between studies. Finally,
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5 the translated concepts will be synthesized and refined to identify core themes.[68]
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10 Using the above categorization scheme, we will be able to provide a scoping review of what
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12 research is available in the area of ICU discharge planning tools and the evidence base
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14 supporting available tools. From this we will identify where there is a need for a systematic
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16 review of the literature (e.g. there may be sufficient literature on validated risk stratification
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18 techniques) and where gaps in the literature exist and primary prospective studies are needed.
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24 **ETHICS AND DISSEMINATION**

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27 This scoping review is the first step in a major empiric work to measure and improve ICU
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29 discharge processes (focused on adult patients). It will identify the fundamental information
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31 needed to implement an ICU discharge planning tool. This review will identify existing tools to
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33 facilitate ICU discharge, the supporting evidence base as well as facilitators and barriers to
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35 implementation. All data will be obtained from publicly available materials, and therefore this
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37 study will not require ethics approval.
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43 Our knowledge translation strategy will involve, among other approaches, a workshop to be held
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45 in conjunction with the annual January Canadian Critical Care Trials Group meeting that will
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47 bring together key target audiences across disciplines for our research. By engaging
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49 multidisciplinary stakeholders we will enhance linkages necessary for dissemination of our
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51 results. We will engage stakeholders in a discussion of the results and develop and prioritize a
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53 research agenda for implementation of a standardized ICU discharge planning tool. We will
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3 publish in health services research and discipline-based journals. In addition, we will encourage
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5 presentation of findings at health services research conferences at national and international
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7 meetings including the annual meetings of the Canadian Critical Care Trials Group, and
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9 International Symposium of Intensive Care and Emergency Medicine amongst others.
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15 Our scoping review results have the potential to influence the care of many patients. We will
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17 synthesize the literature for ICU discharge planning tools and identify opportunities for
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19 knowledge to action and gaps in evidence where primary evidence is necessary. ICUs are
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21 specialized units that have been widely implemented around the world to care for the sickest
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23 patients in the health care system.[53] Discharge from ICU is a high risk process because
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25 vulnerable patients, move from a resource rich environment to a relatively resource poor
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27 environment using a process that is non-standardized, inefficient and characterized by poor
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29 communication and frequent adverse events.[28, 29, 39, 43, 44, 69, 70] To improve patient care
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31 we need evidence-based tools to standardize and improve the quality of care provided to patients
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33 during ICU discharge. Our results will help implement an evidence-based ICU discharge
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35 planning tool to ensure that discharge from the ICU is safe, effective, efficient, timely, equitable
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37 and patient-centered so that the *right patient* is discharged at the *right time* using a *process* that
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39 improves patient care and reduces the risk of adverse events and hospital mortality while
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41 facilitating patients' care journey.
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References

1. Horwitz LI, Krumholz HM, Green ML, et al. Transfers of patient care between house staff on internal medicine wards: a national survey. *Arch Intern Med* 2006;**166**(11):1173-7.
2. Petersen LA, Brennan TA, O'Neil AC, et al. Does housestaff discontinuity of care increase the risk for preventable adverse events? *Ann Intern Med* 1994;**121**(11):866-72.
3. CCHSA patient/client safety goals and required organizational goals: evaluation of implementation and evidence of compliance. Version of 2.1 for use with 2007 standard. [<http://www.docstoc.com/docs/73078735/Organizational-Agreement>]
4. Coleman EA, Berenson RA. Lost in transition: challenges and opportunities for improving the quality of transitional care. *Ann Intern Med* 2004;**141**(7):533-6.
5. Patterson ES, Roth EM, Woods DD, et al. Handoff strategies in settings with high consequences for failure: lessons for health care operations. *Int J Qual Health Care* 2004;**16**(2):125-32.
6. Solet DJ, Norvell JM, Rutan GH, et al. Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs. *Acad Med* 2005;**80**(12):1094-9.
7. Arora V, Johnson J, Lovinger D, et al. Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis. *Qual Saf Health Care* 2005;**14**(6):401-7.
8. National Patient Safety Goals [http://www.jointcommission.org/standards_information/npsgs.aspx]
9. Required Organizational Practices [<http://www.accreditation.ca/knowledge-exchange/patient-safety/required-organizational-practices/>]
10. IHI Improvement Map: Patient Transitions & Handoffs [<http://app.ihi.org/imap/tool/#Process=21e273fb-81fc-4dd2-b89b-883c10afc4bc>]
11. Apker J, Mallak LA, Gibson SC. Communicating in the "gray zone": perceptions about emergency physician hospitalist handoffs and patient safety. *Acad Emerg Med* 2007;**14**(10):884-94.
12. Shojania KG, Fletcher KE, Saint S. Graduate medical education and patient safety: a busy--and occasionally hazardous--intersection. *Ann Intern Med* 2006;**145**(8):592-8.
13. Riesenber LA, Leitzsch J, Massucci JL, et al. Residents' and attending physicians' handoffs: a systematic review of the literature. *Acad Med* 2009;**84**(12):1775-87.
14. Andrews C, Millar S. Don't fumble the handoff. Inpatient providers, specialists, and the primary care physician: a medical care delivery system with benefits and complex risks. *J Med Assoc Ga* 2007;**96**(3):23-4.
15. Gandhi TK. Fumbled handoffs: one dropped ball after another. *Ann Intern Med* 2005;**142**(5):352-8.

16. Horwitz LI, Moin T, Krumholz HM, et al. Consequences of inadequate sign-out for patient care. *Arch Intern Med* 2008;**168**(16):1755-60.
17. Horwitz LI, Moin T, Krumholz HM, et al. What are covering doctors told about their patients? Analysis of sign-out among internal medicine house staff. *Qual Saf Health Care* 2009;**18**(4):248-55.
18. Kitch BT, Cooper JB, Zapol WM, et al. Handoffs causing patient harm: a survey of medical and surgical house staff. *Jt Comm J Qual Patient Saf* 2008;**34**(10):563-70.
19. Singh H, Thomas EJ, Petersen LA, et al. Medical errors involving trainees: a study of closed malpractice claims from 5 insurers. *Arch Intern Med* 2007;**167**(19):2030-6.
20. Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. *Acad Med* 2004;**79**(2):186-94.
21. Joint Commission on Accreditation of Healthcare Organizations. Using medication reconciliation to prevent errors. *Sentinel Event Alert* 2006;(35):1-4.
22. Fletcher KE, Saint S, Mangrulkar RS. Balancing continuity of care with residents' limited work hours: defining the implications. *Acad Med* 2005;**80**(1):39-43.
23. Landucci D, Gipe BT. The art and science of the handoff: how hospitalists share data. *Hospitalist* 1999;**3**(1):4.
24. Horwitz LI, Meredith T, Schuur JD, et al. Dropping the baton: a qualitative analysis of failures during the transition from emergency department to inpatient care. *Ann Emerg Med* 2009;**53**(6):701-10, e4.
25. Cullen DJ, Sweitzer BJ, Bates DW, et al. Preventable adverse drug events in hospitalized patients: a comparative study of intensive care and general care units. *Crit Care Med* 1997;**25**(8):1289-97.
26. Voigt LP, Pastores SM, Raoof ND, Thaler HT, Halpern NA: Review of a large clinical series: intrahospital transport of critically ill patients: outcomes, timing, and patterns. *Journal of intensive care medicine* 2009, 24(2):108-15.
27. Watts R, Pierson J, Gardner H. Coordination of the discharge process planning in critical care. *J Clin Nurs* 2005;**21**:39-46.
28. Rosenberg AL, Watts C. Patients readmitted to ICUs* : a systematic review of risk factors and outcomes. *Chest* 2000;**118**(2):492-502.
29. Li P, Stelfox HT, Ghali WA. A prospective observational study of physician handoff for intensive-care-unit-to-ward patient transfers. *Am J Med* 2011;**124**(9):860-7.
30. Leeb K, Jokovic A, Sandhu M, et al. CIHI survey: intensive care in Canada. *Healthc Q* 2006;**9**(1):32-3.

- 1
- 2
- 3
- 4
- 5 31. Russell S. Reducing readmissions to the intensive care unit. *Heart Lung* 1999;**28**(5):365-72.
- 6
- 7 32. Minimum Standards for Intensive Care Units [<http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf>]
- 8
- 9
- 10
- 11 33. Dutton RP, Cooper C, Jones A, et al. Daily multidisciplinary rounds shorten length of stay for
- 12 trauma patients. *J Trauma* 2003;**55**(5):913-9.
- 13
- 14 34. Vazirani S, Hays RD, Shapiro MF, et al. Effect of a multidisciplinary intervention on
- 15 communication and collaboration among physicians and nurses. *Am J Crit Care* 2005;**14**(1):71-7.
- 16
- 17 35. Practicing CCM
- 18 [http://www.sccm.org/AboutSCCM/Public%20Relations/Media_Kit/Pages/Practicing_CCM.aspx]
- 19
- 20
- 21 36. Ward NS, Read R, Afessa B, et al. Perceived effects of attending physician workload in academic
- 22 medical intensive care units: a national survey of training program directors. *Crit Care Med*
- 23 2012;**40**(2):400-5.
- 24
- 25 37. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse
- 26 burnout, and job dissatisfaction. *JAMA* 2002;**288**(16):1987-93.
- 27
- 28 38. Goddard AF, Hodgson H, Newbery N. Impact of EWTD on patient:doctor ratios and working
- 29 practices for junior doctors in England and Wales 2009. *Clin Med* 2010;**10**(4):330-5.
- 30
- 31 39. Lin F, Chaboyer W, Wallis M. A literature review of organizational, individual, and teamwork
- 32 factors contributing to the ICU discharge process. *Aust Crit Care* 2009;**22**:29-43.
- 33
- 34 40. Leith BA. Patients' and family members' perceptions of transfer from intensive care. *Heart Lung*
- 35 1990;**28**(3):210-8.
- 36
- 37 41. Saarmann L. Transfer out of critical care: freedom or fear? *Crit Care Nurs Q* 1993;**16**(1):78-85.
- 38
- 39 42. Odell M. The patient's thoughts and feelings about their transfer from intensive care to the
- 40 general ward. *J Adv Nurs* 2000;**31**(2):322-9.
- 41
- 42 43. Kripalani S, Jackson AT, Schnipper JL, et al. Promoting effective transitions of care at hospital
- 43 discharge: a review of key issues for hospitalists. *J Hosp Med* 2007;**2**(5):314-23.
- 44
- 45 44. Heidegger C, Treggiari M, Romand J, et al. A nationwide survey of intensive care discharge
- 46 practice. *Intensive Care Med* 2005;**31**:1676-82.
- 47
- 48 45. Kripalani S, LeFevre F, Phillips C, et al. Deficits in Communication and Information Transfer
- 49 Between Hospital-Based and Primary Care Physicians. *JAMA* 2006;**297**(8):831-41.
- 50
- 51 46. Watts R, Pierson J, Gardner H. How do critical care nurses define the discharge process.
- 52 *Intensive Crit Care Nurs* 2004;**21**:39-46.
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2
3
4
5 47. Levin P, Worner T, Sviri S, et al. Intensive care outflow limitation -- frequency, etiology, and
6 impact. *J Crit Care* 2003;**18**(4):206-11.
7
8 48. Wachter RM. Making healthcare safer: a critical analysis of patient safety practices. In: Evidence
9 Report No 43. Edited by Agency for Healthcare Quality Research, AHRQ publication 01-E058
10 edn: Rockville, Md; 2001.
11
12 49. Critical access hospital: 2012 national patient safety goals
13 [http://www.jointcommission.org/assets/1/6/NPSG_Chapter_Jan2012_CAH.pdf]
14
15 50. Safe practices for better healthcare: A Consensus Report
16 [<http://www.ahrq.gov/qual/nqfpract.pdf>]
17
18 51. Berwick DM, Calkins DR, McCannon CJ, et al. The 100,000 lives campaign: setting a goal and a
19 deadline for improving health care quality. *JAMA* 2006;**295**(3):324-7.
20
21 52. Boutilier S. Leaving critical care: facilitating a smooth transition. *Dimens Crit Care Nurs*
22 2007;**24**(4):137-42.
23
24 53. Wunsch H, Angus DC, Harrison DA, et al. Variation in critical care services across North America
25 and Western Europe. *Crit Care Med* 2008;**36**(10):2787-93e2781-2789.
26
27 54. Donabedian A. The Definition of Quality and Approaches to Its Assessment. Ann Arbor, Michigan:
28 Health Administration Press 1980.
29
30 55. Donabedian A. Evaluating the quality of medical care. *Milbank Q* 2005;**83**(4):691-729.
31
32 56. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. Quality indicators for evaluating trauma care:
33 a scoping review. *Arch Surg* 2010;**145**(3):286-95.
34
35 57. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. A systematic review of quality indicators for
36 evaluating pediatric trauma care. *Crit Care Med* 2010;**38**(4):1187-96.
37
38 58. Stelfox HT, Nathens AB, Straus SE, et al. Assessing care of patients with major traumatic injuries
39 (Funding Reference #200803PH E-188220-PH M-CBBA-587 44). University of Calgary: Canadian
40 Institutes of Health Research; 2008-10-01 to 2011-09-30.
41
42 59. Stelfox HT, Straus SE, Flemons WW, et al. Quality indicators in trauma care (Funding Reference
43 #KRS-91770). University of Calgary: Canadian Institutes of Health Research; 2008-10-01 to 2009-
44 09-30.
45
46 60. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res*
47 *Methodol* 2005;**8**:19-32.
48
49 61. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*
50 2010;**5**:69.
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54
55
56
57
58
59
60
62. AHRQ tools and resources for better health care
[\[http://www.ahrq.gov/qual/tools/toolsria.htm#assessment\]](http://www.ahrq.gov/qual/tools/toolsria.htm#assessment)
63. EndNote X5. In. New York, NY: Thomson Reuter 2012.
64. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977;**33**(1):159-74.
65. Caldwell K, Henshaw L, Taylor G. Developing a framework for critiquing health research: An early evaluation. *Nurs Educ Today* 2011;**31**(8):e1-7.
66. McGlynn EA. Selecting common measures of quality and system performance. *Med Care* 2003;**41**(Suppl 1):I39-47.
67. Fan E, Laupacis A, Pronovost PJ, et al. How to use an article about quality improvement. *JAMA* 2010;**304**(20):2279-87.
68. Strauss A, Corbin J. Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, 2nd edn. Thousand Oaks, CA: Sage Publication 1998.
69. Hoyt DB, Hollingsworth-Fridlund P, Fortlage D, et al. An evaluation of provider-related and disease-related morbidity in a level I university trauma service: directions for quality improvement. *J Trauma* 1992;**33**(4):586-601.
70. Davis JW, Hoyt DB, McArdle MS, et al. The significance of critical care errors in causing preventable death in trauma patients in a trauma system. *J Trauma* 1991;**31**(6):813-8; discussion 818-9.

List of Abbreviations

Intensive Care Unit, ICU

Institute of Medicine, IOM

Authors' Contributions

Study concept: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege

Study design: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege

Obtained funding: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege

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3 Drafted protocol: Stelfox
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5 Edited protocol: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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8 Registered protocol: Stelfox
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10 All authors read and approved the final protocol.
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12

13 14 15 **Competing Interests** 16

17 The authors declare they have no competing interests.
18
19

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Table 1. Conceptual model of ICU discharge*

IOM Aims	Structure (Discharge Tool)	Process	Outcome
Safe	Risk stratification	Patient to right ward	↓ ICU readmission
Effective	Medication reconciliation	Right medications	↓ adverse event
Efficient	Information for providers	Providers informed	↓ duplication of tests
Timely	Risk stratification	Discharged when ready	↓ length of stay
Patient-Centered	Information for patients	Patients engaged	↑ Patient satisfaction
Equitable	Checklist	Equal access	↓ inequalities

*Table populated with sample tool components and consequent processes and outcomes

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3 **Figure legends**

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5 Figure 1. Conceptual evidence-based ICU discharge planning tool
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10 **Additional Files**

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12 File name: Additional File 1

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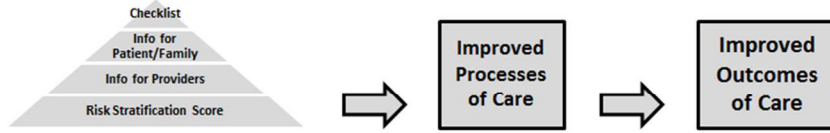
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Figure 1. Conceptual evidence-based ICU discharge planning tool



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Additional File 1. Draft Search Strategy for Medline:

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Identifying Intensive Care Unit Discharge Planning Tools: Protocol for a Scoping Review

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Identifying Intensive Care Unit Discharge Planning Tools: Protocol for a Scoping Review

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ABSTRACT

Background: Transitions of care between providers are vulnerable periods in health care delivery that expose patients to preventable errors and adverse events. Patient discharge from the intensive care unit (ICU) to a medical or surgical hospital ward is one of the most challenging and high risk transitions of care. Approximately one in twelve patients discharged will be readmitted to ICU or die before leaving hospital. Many more patients are exposed to unnecessary health care, adverse events and/or are disappointed with the quality of their care. Our objective is to conduct a scoping review by systematically searching the literature to identify ICU discharge planning tools and their supporting evidence-base including barriers and facilitators to their use.

Methods and analysis: Systematic searching of the published health literature will be conducted to identify existing ICU discharge planning tools and supporting evidence. Literature (research and non-research) reporting on tools used to facilitate decision making and/or communication at ICU discharge, with patients of any age will be included. Outcomes will include adverse events and provider and patient/family reported outcomes. Two investigators will independently review the abstracts (Screen 1) to identify those meeting inclusion criteria and then independently assess the full text articles (Screen 2) to determine if they meet inclusion criteria. Data collection will include information on citations and identified tools. A quality assessment will be performed on original research studies. A descriptive summary will be developed for each tool.

Ethics and dissemination: Our scoping review will synthesize the literature for ICU discharge planning tools and identify opportunities for knowledge to action and gaps in evidence where primary evidence is necessary. This will serve as the foundational element in a multi-step

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55 research program to standardize and improve the quality of care provided to patients during ICU
56 discharge. Ethics approval is not required for this study.

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58 BACKGROUND

59 The transfer of responsibility for patient care (synonyms include transition of care, handoff, sign
60 over etc.) is a common practice in acute-care hospitals.[1] During transfers of patient care,
61 crucial information on patient conditions, tests undertaken, and treatments received is transferred
62 between providers, so that care plans can be effectively continued by receiving providers. A
63 handoff between health care providers is not only a process to provide accurate and vital
64 information regarding a patients' care, but is also a transfer of accountability and responsibility
65 for patient care.[2-7] Healthcare organizations recognize the importance of transitions of care
66 and have proposed organizational practices to improve the effectiveness and coordination of
67 communication among providers and recipients of care across the care continuum.[3, 8, 9]

68
69 Unfortunately, the practice of provider handoff is often suboptimal due to communication
70 barriers[6, 10-12] and is a major contributor to medical errors and adverse events.[2, 7, 13-19]
71 The Harvard Medical Practice Study[20] found that adverse events occur in approximately 4% of
72 patients discharged from hospital, with three quarters of these adverse events resulting in patient
73 disability (ranging from less than one month duration to permanent) . A similar Australian study
74 reported adverse events resulting in disability or increased length of stay for 17% of patients
75 admitted to hospital.[21] In 2006, the Joint Commission for Accreditation of Health Care
76 Organization (JCAHO) reported that 63% of deaths related to medical error in its sentinel events
77 database involved a breakdown in communication.[22] Most research on handoffs for in-hospital
78 patient transfers has focused on patient transfers from the perspective of a single discipline, such
79 as physician end-of-shift[1, 6, 11, 18, 23] or end-of-service[2, 16, 17, 24] handoffs. In contrast,
80 relatively little is known about handoffs between non-physician providers.[10, 25]

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3 81 Multidisciplinary handoffs though are required to optimally transition care and likely face
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5 82 relatively greater communication hurdles due to cultural differences, work load challenges, and
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7 83 differences in clinical focus between specialties and disciplines, and thus may lead to greater
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10 84 potential for medical errors and adverse events.[10, 12, 25]
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15 86 Numerous types of patient transfers and provider handoffs occur every day.[4, 6] A transition of
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17 87 care occurs each time a patient is referred to a specialist by their family doctor, assigned a new
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19 88 nurse during hospital shift change or discharged from hospital. Among these, patient transfers
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21 89 from the Intensive Care Unit (ICU) to a medical or surgical hospital ward are likely of
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23 90 particularly high risk due to the number, complexity and acuity of the medical conditions that
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25 91 characterize this patient group;[26-29] the large “voltage” drop in available resources when
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27 92 patients move from the ICU, where medical care is intensive and resources are rich, to ward
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29 93 environments, where patients typically receive much less intensive monitoring and patient
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31 94 care;[26] the multitude of communication barriers that providers often face during inter-specialty
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33 95 and multidisciplinary handoffs;[30] the lack of standardization in patient transfer processes
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35 96 overall; and in particular the lack of standardized written and/or electronic tools to facilitate an
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37 97 optimal transfer process.[28]
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46 99 Patients admitted to the ICU are of the highest acuity requiring management with life support
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48 100 technologies and aggressive interventions to sustain life and progress towards a clinically
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50 101 stabilized condition.[28] Approximately one in ten patients admitted to an acute care facility are
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52 102 admitted to an ICU.[31] Transition of care is extremely common with 90% of ICU patients being
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54 103 eventually discharged to medical or surgical hospital wards.[32] With millions of
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3 104 hospitalizations in acute care facilities in most countries each year,[31] hundreds of thousands of
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5 105 patients will be admitted to ICU and experience challenging and high risk transfers to hospital
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13 108 ICU discharge represents a large drop in the intensity of care with patients transitioning from a
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15 109 high acuity unit to a general care unit. ICUs are specially staffed, self-contained hospital units,
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17 110 dedicated to the management and continuous monitoring of patients with life-threatening
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19 111 illnesses.[33] The medical support available to patients in the ICU includes multidisciplinary
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21 112 teams of healthcare providers (i.e. physicians, nurses, pharmacists, therapists) that typically see
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23 113 each patient multiple times a day.[34, 35] In general there is a nurse for every one or two patients
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25 114 and a physician for every eight to ten patients.[36, 37] In contrast, general medical and surgical
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27 115 care units have fewer resources with a nurse for every four to eight patients[38] and physicians
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29 116 responsible for up to as many as 65 patients during regular working hours and 400 patients
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31 117 outside of regular working hours.[39] Other health care providers are often less available.
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39 119 When a patient is transferred from ICU to a general care unit typically there is a complete
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41 120 transition in healthcare providers, most patients being assigned new teams of physicians, nurses,
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43 121 pharmacists, therapists etc. However, communication between providers discharging patients
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45 122 from the ICU and providers admitting these patients to general care units has been documented
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47 123 to be infrequent, incomplete and of poor quality.[30, 40] An observational study done by our
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49 124 research team in preparation for this protocol found direct verbal communication between ICU
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51 125 discharging physicians and ward admitting physicians to occur in only 15-25% of the ICU
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53 126 discharges.[30] Optimal transfers of care require effective communication between discharging
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3 127 and admitting physicians that includes direct communication (in person or via telephone);
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6 128 concise, accurate, up-to-date discharge summaries; and physician notification at the time of
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8 129 transfer.[3, 30] However, communication during transfer is challenged by provider workloads,
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11 130 available resources, and variations in clinical focus between specialties.[10, 12, 25]
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15 132 Communication between physicians and patients/families at the time of ICU discharge is also
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17 133 frequently suboptimal with the same local observational study finding 68% of patient/families
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20 134 reporting a desire for increased opportunities to ask questions about the transfer.[30] This lack of
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22 135 information about the ICU transfer process appears to be associated with patient and family
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24 136 anxiety.[41-44]Effective communication between providers and patients/families to provide
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27 137 early notification of an upcoming transfer,[30] and present information on current medical
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29 138 conditions and future plans prior to transfer would likely better manage expectations and reduce
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32 139 anxiety.
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36 141 Standardizing the process of patient discharge from ICU could improve the safety, quality and
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38 142 efficiency of care. Multiple interventions to improve ICU discharge have been developed (e.g.
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40 143 transitional care units, ICU outreach, nursing liaison, etc.),[28, 45-48] but there is no consensus
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43 144 on an ideal ICU discharge model to optimize the quality of patient care[28] and few
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46 145 organizations have implemented standardized guidelines or procedures for transitions of
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48 146 care.[46, 49] Government agencies,[50] specialty groups[3, 51, 52] and the Institute for
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51 147 Healthcare Improvement[53] have all advocated standardizing ICU discharge structure and
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53 148 processes to improve continuity of care, patient safety, patient and provider satisfaction, and
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55 149 resource use.[47, 54]
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6 151 The challenges of ICU discharge are well recognized.[28, 55] Very little is known about the
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8 152 quality of patient care during ICU discharge. A comprehensive review of ICU discharge
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10 153 planning tools has not been previously completed. The scope and magnitude of tools to facilitate
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12 154 patient discharge from ICU has not previously been defined. For tools already developed, it is
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14 155 unclear how effectively these have been implemented and how they may have affected patient
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16 156 clinical outcomes and/or patient and family satisfaction with care. In response to these
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18 157 challenges, we will conduct a scoping review to identify ICU discharge planning tools and the
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20 158 supporting evidence base for these tools including barriers and facilitators to their use.
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27 160 **METHODS AND ANALYSIS**

28 29 161 **Conceptual model**

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31 162 Our scoping review will adopt the model of system theory first introduced in 1966 by Avedis
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33 163 Donabedian.[56, 57] In Donabedian's framework, the three components of healthcare quality are
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35 164 *structure, process* and *outcome*. The *structure* is the environment in which health care is
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37 165 provided and includes material and health resources, operational factors, and organizational
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39 166 characteristics of the healthcare facility. The *process* is the method by which healthcare is
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41 167 provided and includes the giving and receiving of care by the providers and healthcare system.
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43 168 The *outcome* is the consequence of healthcare and includes the health status of patients. We will
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45 169 examine *structural* devices (tools) used to facilitate ICU discharge and evaluate their association
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47 170 with *processes* and *outcomes* of care for patients discharged from ICU (Figure 1).
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3 172 In addition, we will incorporate the Institute of Medicine's (IOM) six aims for the 21st Century
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5 173 Health Care System into our research. ICU discharge tools should foster safe, effective, efficient,
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8 174 timely, equitable, and patient-centered discharge from ICU. We have developed a conceptual
9
10 175 model for our scoping review that merges the Donabedian model and the IOM's six aims (Table
11
12 176 1). We recognize that our conceptual model is a relatively basic and simple representation of
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15 177 ICU discharge, but no other simple validated framework exists and we have successfully used a
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17 178 variation of this model to develop quality indicators for injury care.[58-61]
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21 22 180 **Objectives**

23
24 181 This is a protocol for a scoping review to identify ICU discharge planning tools and the
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27 182 supporting evidence base for these tools including barriers and facilitators to their use. Methods
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29 183 for inclusion and analysis of articles and reporting of their results will be performed as
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31 184 recommended by Arksey and O'Malley[62] and refined by Levac and colleagues.[63]
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36 186 We define an ICU as a distinct hospital ward that is staffed by specialized healthcare
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38 187 professionals and where immediate and continuous life sustaining treatment (e.g. invasive
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40 188 monitoring, vasoactive medications, invasive mechanical ventilation) is administered to
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43 189 hospitalized patients suffering from life-threatening conditions (e.g. severe respiratory
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45 190 failure).[36] Patient discharge from ICU is defined as the transfer of accountability and
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48 191 responsibility for patient care from the ICU to a hospital ward. Tools are defined as structural
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50 192 devices (e.g. protocols, reminders, order sets, bundles, checklists, forms, decision-aids) designed
51
52 193 to aid health care providers or patients/families with decision making and/or communication.[64]
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3 195 The specific objectives of the scoping review are:
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6 196 1. To complete a systematic search of the literature to identify existing ICU discharge planning
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8 197 tools and evaluate the evidence base in support of the tools (including impact on patient
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10 198 outcomes).

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13 199 2. To map the ICU discharge tools and supporting evidence to our conceptual framework to
14
15 200 identify gaps in the evidence where primary evidence or systematic reviews are required.

16
17 201 3. To evaluate the tools according to their relevance to knowledge users (importance, feasibility,
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19 202 usability, scientific acceptability).

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21 203 4. To describe barriers and facilitators to implementation and utilization of ICU discharge
22
23 204 planning tools.
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28 29 206 **Eligibility Criteria**

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31 207 Research studies (no methodological restrictions – case series, cohort, cross-sectional,
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33 208 nonrandomized controlled, consensus method, case-control, randomized controlled) and non-
34
35 209 research study designs (editorial, guideline, letter to the editor, narrative review) are eligible. We
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37 210 will include studies with all human patients discharged from any ICU regardless of subspecialty
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39 211 (e.g. medical, neuroscience, etc.). There is no restriction on age as tools identified for neonatal
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41 212 and pediatric patients may provide relevant information for the discharge of adult patients (and
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43 213 vice versa).
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50 215 Eligible studies must include an electronic or paper tool (including guidelines, protocols,
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53 216 questionnaires, checklist, etc.) intended to facilitate discharge from ICU (regardless of discharge
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55 217 destination) either by providing decision-support for healthcare providers and/or
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3 218 patients/families to determine readiness for discharge or aid in guiding the process of patient
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5 219 discharge. A comparison group is not required as we will be looking for studies that describe the
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8 220 development, implementation or evaluation of a tool. If evaluation studies are identified, details
9
10 221 on the comparison group will be assessed including patients, type of ICU (e.g. medical,
11
12 222 neuroscience etc.) and discharge destination (e.g. high dependency step down unit, hospital ward
13
14 223 etc.). Outcome measures will include (1) any severe adverse events post-ICU discharge (e.g. ICU
15
16 224 readmission, hospital mortality), (2) any provider reported outcomes (e.g. quality of
17
18 225 communication, satisfaction), or (3) any patient/family reported outcomes (e.g. quality of
19
20 226 information, engagement, satisfaction).
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27 228 Studies will be excluded if they include patient discharges predominantly from coronary care
28
29 229 units, high dependency units, and step-down units.
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33 34 231 **Search Strategy**

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36 232 We will search the following electronic databases: Medline (OVID interface, 1946 onwards),
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38 233 EMBASE (OVID interface, 1947 onwards), CINAHL (EBSCO interface, 1981 onwards) and the
39
40 234 Cochrane Library (current issue). Bibliographies of retrieved articles will be searched for
41
42 235 additional relevant articles. We will also search conference proceedings from the past five years,
43
44 236 including the Canadian Critical Care Conference, Society of Critical Care Medicine, Australian
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46 237 and New Zealand Intensive Care Society Conference, European Society of Intensive Care
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48 238 Medicine Conference, American Thoracic Society Conference, and International Symposium on
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50 239 Intensive Care and Emergency Medicine. Experts in the field, identified from the references of
51
52 240 included studies, will be contacted to determine whether they are aware of any additional studies.
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6 242 An experienced information specialist (LP) will conduct the literature searches. They will be
7
8 243 performed with no year or language restrictions and will use combinations and synonyms of the
9
10 244 following search terms: intensive care, critical care, discharge plan, patient transfer and patient
11
12 245 discharge. Appropriate wildcards will be used to account for plurals and variations in spelling. A
13
14 246 draft literature search is available in Additional File 1.
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20 248 **Study selection process**

21
22 249 Two investigators will independently review the retrieved abstracts (Screen 1) to identify those
23
24 250 that meet the inclusion criteria. The full text of those articles deemed relevant by either reviewer
25
26 251 will be obtained. Two investigators will independently assess the full text articles (Screen 2) to
27
28 252 determine if they meet the inclusion criteria. Two investigators will discuss disagreements on
29
30 253 inclusion and a third investigator will resolve disagreements if needed. Bibliographic details will
31
32 254 be downloaded to EndNote.[65] The study selection process will be pilot tested using 50
33
34 255 citations from the literature search. The inclusion and exclusion criteria will be serially clarified
35
36 256 and reviewer training sequentially revised until reliable study selection can be demonstrated
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39 257 (estimated $\kappa \geq 0.6$).[66]
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46 259 **Data items and data collection process**

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48 260 The data collection instruments will include information on both citations and identified tools.
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50 261 We will document the type of citation (e.g. original research), country, setting (e.g. subspecialty
51
52 262 of unit), study design, study population, recruitment and sampling, diagnostic criteria, reference
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54 263 standard, blinding, statistical methods and outcomes. For each tool we will document the name,
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3 264 purpose (e.g. patient evaluation for discharge, planning patient discharge etc.), components
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6 265 (single component vs. multi-component), how it is applied (e.g. electronic) and the timing of
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8 266 activation (e.g. discharge planning vs. discharge execution). If available, we will record any
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11 267 measurement properties documented (sensitivity/specificity), reported impact on processes (e.g.
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13 268 medication reconciliation) and outcomes (e.g. patient readmission to ICU) of care for patients,
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15 269 families and providers and barriers and facilitators identified to use of the tool (e.g.
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18 270 organizational culture). The data collection instrument and reviewer training will be sequentially
19
20 271 revised until reliable data abstraction can be demonstrated (estimated $\kappa \geq 0.8$).[66] Differences in
21
22 272 coding between the two reviewers will be resolved by discussion and a third reviewer consulted
23
24
25 273 if an agreement cannot be reached. Original research studies will have the quality of their
26
27 274 methodology assessed using the framework of Caldwell et al.[67] for evaluating both
28
29 275 quantitative and qualitative study designs. Two clinical decision-makers (Zygun, Boiteau,
30
31 276 Zuege) will independently judge the relevance of each tool for decision-making according to
32
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34 277 four dimensions derived from the Strategic Framework Board in the United States:[68] 1) targets
35
36 278 important improvements in continuity of patient care, 2) feasible to implement, 3) easy to use, 4)
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39 279 strength of scientific evidence (using the GRADE criteria).[69]
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44 281 **Analysis**

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46 282 Quantitative and qualitative analyses will be performed. The articles and tools will be
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48 283 categorized according to their respective criteria. Agreement on data abstraction and article
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51 284 classification will be assessed with Cohen κ reliability coefficients.[66] A comprehensive list of
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53 285 the tools will be developed and summarized using simple numerical counts. We will present the
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56 286 distribution of tools according to the cells of our conceptual model along with binomial 95%
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3 287 confidence intervals as well as detailed tabulations by type of article (original research, non-
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6 288 research) and study design. We will examine the purpose and components of the tools from each
7
8 289 study as well as reported measurement properties (e.g. sensitivity/specificity of risk stratification
9
10
11 290 tools) and reported processes (e.g. hospital length of stay) and outcomes (e.g. readmission to
12
13 291 ICU) of care. A descriptive summary will be developed of each tool's purpose, components,
14
15 292 conceptual model classification, measurement properties and relevance to knowledge users.
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20 294 Qualitative studies will be evaluated by identifying the key outcomes and themes presented by
21
22 295 each study (e.g. reported barriers and facilitators to discharge tool utilization), preserving the
23
24 296 meaning from their original source, and tabulating them within the review. Translation of key
25
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27 297 concepts from all studies will be performed to identify novel concepts not explored by individual
28
29 298 studies. Analysis will focus on identifying the overlap of key concepts between studies. Finally,
30
31 299 the translated concepts will be synthesized and refined to identify core themes.[70]
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36 301 Using the above categorization scheme, we will be able to provide a scoping review of what
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38 302 research is available in the area of ICU discharge planning tools and the evidence base
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41 303 supporting available tools. From this we will identify where there is a need for a systematic
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43 304 review of the literature (e.g. there may be sufficient literature on validated risk stratification
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45 305 techniques) and where gaps in the literature exist and primary prospective studies are needed.
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50 307 **ETHICS AND DISSEMINATION**

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53 308 This scoping review is the first step in a major empiric work to measure and improve ICU
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55 309 discharge processes (focused on adult patients). It will identify the fundamental information
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3 310 needed to implement an ICU discharge planning tool. This review will identify existing tools to
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5 311 facilitate ICU discharge, the supporting evidence base as well as facilitators and barriers to
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7 312 implementation. All data will be obtained from publicly available materials, and therefore this
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9 313 study will not require ethics approval.
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15 315 Our knowledge translation strategy will involve, among other approaches, a workshop to be held
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17 316 in conjunction with the annual January Canadian Critical Care Trials Group meeting that will
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19 317 bring together key target audiences across disciplines for our research. By engaging
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21 318 multidisciplinary stakeholders we will enhance linkages necessary for dissemination of our
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23 319 results. We will engage stakeholders in a discussion of the results and develop and prioritize a
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25 320 research agenda for implementation of a standardized ICU discharge planning tool. We will
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27 321 publish in health services research and discipline-based journals. In addition, we will encourage
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29 322 presentation of findings at health services research conferences at national and international
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31 323 meetings including the annual meetings of the Canadian Critical Care Trials Group, and
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33 324 International Symposium of Intensive Care and Emergency Medicine amongst others.
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41 326 Our scoping review results have the potential to influence the care of many patients. We will
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43 327 synthesize the literature for ICU discharge planning tools and identify opportunities for
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45 328 knowledge to action and gaps in evidence where primary evidence is necessary. ICUs are
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47 329 specialized units that have been widely implemented around the world to care for the sickest
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49 330 patients in the health care system.[55] Discharge from ICU is a high risk process because
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51 331 vulnerable patients, move from a resource rich environment to a relatively resource poor
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53 332 environment using a process that is non-standardized, inefficient and characterized by poor
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3 333 communication and frequent adverse events.[29, 30, 40, 45, 46, 71, 72] To improve patient care
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6 334 we need evidence-based tools to standardize and improve the quality of care provided to patients
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8 335 during ICU discharge. Our results will help implement an evidence-based ICU discharge
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10 336 planning tool to ensure that discharge from the ICU is safe, effective, efficient, timely, equitable
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12 337 and patient-centered so that the *right patient* is discharged at the *right time* using a *process* that
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14 338 improves patient care and reduces the risk of adverse events and hospital mortality while
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17 339 facilitating patients' care journeys.
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References

1. Horwitz LI, Krumholz HM, Green ML, et al: **Transfers of patient care between house staff on internal medicine wards: a national survey.** *Archives of internal medicine* 2006, **166**(11):1173-1177.
2. Petersen LA, Brennan TA, O'Neil AC, et al. Does housestaff discontinuity of care increase the risk for preventable adverse events? *Ann Intern Med* 1994;**121**(11):866-72.
3. Canadian Council on Health Service Accreditation. CCHSA patient/client safety goals and required organizational goals: evaluation of implementation and evidence of compliance. Version of 2.1 for use with 2007 standard. <http://www.accreditation.ca/uploadedFiles/CHAR-2012-en.pdf>. Accessed March 12, 2012.
4. Coleman EA, Berenson RA. Lost in transition: challenges and opportunities for improving the quality of transitional care. *Ann Intern Med* 2004;**141**(7):533-6.
5. Patterson ES, Roth EM, Woods DD, et al. Handoff strategies in settings with high consequences for failure: lessons for health care operations. *Int J Qual Health Care* 2004;**16**(2):125-32.
6. Solet DJ, Norvell JM, Rutan GH, et al. Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs. *Acad Med* 2005;**80**(12):1094-9.
7. Arora V, Johnson J, Lovinger D, et al. Communication failures in patient sign-out and suggestions for improvement: a critical incident analysis. *Qual Saf Health Care* 2005;**14**(6):401-7.
8. The Joint Commission of Accreditation of Healthcare Organizations. National Patient Safety Goals. http://www.jointcommission.org/standards_information/npsgs.aspx. Accessed February 28, 2012.
9. Intitute of Health Improvement. IHI Improvement Map: Patient Transitions & Handoffs. <http://app.ihl.org/imap/tool/#Process=21e273fb-81fc-4dd2-b89b-883c10afc4bc>. Accessed February 28, 2012.
10. Apker J, Mallak LA, Gibson SC. Communicating in the "gray zone": perceptions about emergency physician hospitalist handoffs and patient safety. *Acad Emerg Med* 2007;**14**(10):884-94.
11. Shojania KG, Fletcher KE, Saint S. Graduate medical education and patient safety: a busy--and occasionally hazardous--intersection. *Ann Intern Med* 2006;**145**(8):592-8.
12. Riesenber LA, Leitzsch J, Massucci JL, et al. Residents' and attending physicians' handoffs: a systematic review of the literature. *Acad Med* 2009;**84**(12):1775-87.
13. Andrews C, Millar S. Don't fumble the handoff. Inpatient providers, specialists, and the primary care physician: a medical care delivery system with benefits and complex risks. *J Med Assoc Ga* 2007;**96**(3):23-4.

- 1
2
3 387 14. Gandhi TK. Fumbled handoffs: one dropped ball after another. *Ann Intern Med* 2005;**142**(5):352-
4 388 8.
5 389
6
7 390 15. Horwitz LI, Moin T, Krumholz HM, et al. Consequences of inadequate sign-out for patient care.
8 391 *Arch Intern Med* 2008;**168**(16):1755-60.
9 392
10 393 16. Horwitz LI, Moin T, Krumholz HM, et al. What are covering doctors told about their patients?
11 394 Analysis of sign-out among internal medicine house staff. *Qual Saf Health Care* 2009;**18**(4):248-
12 395 55.
13 396
14 397 17. Kitch BT, Cooper JB, Zapol WM, et al. Handoffs causing patient harm: a survey of medical and
15 398 surgical house staff. *Jt Comm J Qual Patient Saf* 2008;**34**(10):563-70.
16 399
17 400 18. Singh H, Thomas EJ, Petersen LA, et al. Medical errors involving trainees: a study of closed
18 401 malpractice claims from 5 insurers. *Arch Intern Med* 2007;**167**(19):2030-6.
19 402
20 403 19. Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to
21 404 medical mishaps. *Acad Med* 2004;**79**(2):186-94.
22 405
23 406 20. Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized
24 407 patients. *N Engl J Med* 1991;**324**:370-6.
25 408
26 409 21. Wilson RM, Runciman WB, Gibberd RW, et al. The quality in Australian health care study. *Med J*
27 410 *Aust* 1995;**163**(9):458-71.
28 411
29 412 22. Joint Commission on Accreditation of Healthcare Organizations. Using medication reconciliation
30 413 to prevent errors. *Sentinel Event Alert* 2006;(35):1-4.
31 414
32 415 23. Fletcher KE, Saint S, Mangrulkar RS. Balancing continuity of care with residents' limited work
33 416 hours: defining the implications. *Acad Med* 2005;**80**(1):39-43.
34 417
35 418 24. Landucci D, Gipe BT. The art and science of the handoff: how hospitalists share data. *Hospitalist*
36 419 1999;**3**(1):4.
37 420
38 421 25. Horwitz LI, Meredith T, Schuur JD, et al. Dropping the baton: a qualitative analysis of failures
39 422 during the transition from emergency department to inpatient care. *Ann Emerg Med*
40 423 2009;**53**(6):701-10, e4.
41 424
42 425 26. Cullen DJ, Sweitzer BJ, Bates DW, et al. Preventable adverse drug events in hospitalized patients:
43 426 a comparative study of intensive care and general care units. *Crit Care Med* 1997;**25**(8):1289-97.
44 427
45 428 27. Voigt LP, Pastores SM, Raoof ND, et al: Review of a large clinical series: intrahospital transport of
46 429 critically ill patients: outcomes, timing, and patterns. *J Intensive Care Med* 2009;**24**(2):108-15.
47 430
48 431 28. Watts R, Pierson J, Gardner H. Coordination of the discharge process planning in critical care. *J*
49 432 *Clin Nurs* 2005;**21**:39-46.
50 433
51
52
53
54
55
56
57
58
59
60

- 1
2
3 434 29. Rosenberg AL, Watts C. Patients readmitted to ICUs* : a systematic review of risk factors and
4 435 outcomes. *Chest* 2000;**118**(2):492-502.
5 436
6
7 437 30. Li P, Stelfox HT, Ghali WA. A prospective observational study of physician handoff for intensive-
8 438 care-unit-to-ward patient transfers. *Am J Med* 2011;**124**(9):860-7.
9 439
10 440 31. Leeb K, Jokovic A, Sandhu M, et al. CIHI survey: intensive care in Canada. *Healthc Q* 2006;**9**(1):32-
11 441 3.
12 442
13 443 32. Russell S. Reducing readmissions to the intensive care unit. *Heart Lung* 1999;**28**(5):365-72.
14 444
15 445 33. College of Intensive Care Medicine. Minimum Standards for Intensive Care Units.
16 446 [http://www.cicm.org.au/cmsfiles/IC-](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf)
17 447 [01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf)
18 448 [%20Current%20September%202011.pdf](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf). Accessed February 28, 2012.
19 449
20 450 34. Dutton RP, Cooper C, Jones A, et al. Daily multidisciplinary rounds shorten length of stay for
21 451 trauma patients. *J Trauma* 2003;**55**(5):913-9.
22 452
23 453 35. Vazirani S, Hays RD, Shapiro MF, et al. Effect of a multidisciplinary intervention on
24 454 communication and collaboration among physicians and nurses. *Am J Crit Care* 2005;**14**(1):71-7.
25 455
26 456 36. Society for Critical Care Medicine. Practicing CCM.
27 457 http://www.sccm.org/AboutSCCM/Public%20Relations/Media_Kit/Pages/Practicing_CCM.aspx.
28 458 Accessed March 23, 2012.
29 459
30 460 37. Ward NS, Read R, Afessa B, et al. Perceived effects of attending physician workload in academic
31 461 medical intensive care units: a national survey of training program directors. *Crit Care Med*
32 462 2012;**40**(2):400-5.
33 463
34 464 38. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse
35 465 burnout, and job dissatisfaction. *JAMA* 2002;**288**(16):1987-93.
36 466
37 467 39. Goddard AF, Hodgson H, Newbery N. Impact of EWTD on patient:doctor ratios and working
38 468 practices for junior doctors in England and Wales 2009. *Clin Med* 2010;**10**(4):330-5.
39 469
40 470 40. Lin F, Chaboyer W, Wallis M. A literature review of organizational, individual, and teamwork
41 471 factors contributing to the ICU discharge process. *Aust Crit Care* 2009;**22**:29-43.
42 472
43 473 41. Gustad LT, Chaboyer W, Wallis M: ICU patient's transfer anxiety: a prospective cohort study.
44 474 *Aust Crit Care* 2008;**21**(4):181-9.
45 475
46 476 42. Mitchell ML, Courtney M: Reducing family members' anxiety and uncertainty in illness around
47 477 transfer from intensive care: an intervention study. *Intensive Crit Care Nurs* 2004;**20**(4):223-31.
48 478
49 479 43. Forseberg A, Lindgren E, Engström Å: Being transferred from an intensive care unit to a ward:
50 480 searching for the known in the unknown. *Int J Nurs Pract* 2011;**17**:110-6.
51 481
52
53
54
55
56
57
58
59
60

- 1
2
3 482 44. Strahan EH, Brown RJ: A qualitative study of the experiences of patients following transfer from
4 483 intensive care. *Intensive Crit Care Nurs* 2005;**21**(3):160-71.
5 484
6
7 485 45. Kripalani S, Jackson AT, Schnipper JL, et al. Promoting effective transitions of care at hospital
8 486 discharge: a review of key issues for hospitalists. *J Hosp Med* 2007;**2**(5):314-23.
9 487
10 488 46. Heidegger C, Treggiari M, Romand J, et al. A nationwide survey of intensive care discharge
11 489 practice. *Intensive Care Med* 2005;**31**:1676-82.
12 490
13 491 47. Kripalani S, LeFevre F, Phillips C, et al. Deficits in Communication and Information Transfer
14 492 Between Hospital-Based and Primary Care Physicians. *JAMA* 2006;**297**(8):831-41.
15 493
16 494 48. Watts R, Pierson J, Gardner H. How do critical care nurses define the discharge process.
17 495 *Intensive Crit Care Nurs* 2004;**21**:39-46.
18 496
19 497 49. Levin P, Worner T, Sviridov S, et al. Intensive care outflow limitation -- frequency, etiology, and
20 498 impact. *J Crit Care* 2003;**18**(4):206-11.
21 499
22 500 50. Wachter RM. Making healthcare safer: a critical analysis of patient safety practices. In: Evidence
23 501 Report No 43. Edited by Agency for Healthcare Quality Research, AHRQ publication 01-E058
24 502 edn: Rockville, Md; 2001.
25 503
26 504 51. The Joint Commission of Accreditation of Healthcare Organizations. Critical Access Hospital:
27 505 2012 National Patient Safety Goals.
28 506 http://www.jointcommission.org/assets/1/6/NPSG_Chapter_Jan2012_CAH.pdf. Accessed March
29 507 11, 2012.
30 508
31 509 52. The National Quality Forum. Safe Practices for Better Healthcare: A Consensus Report.
32 510 <http://www.ahrq.gov/qual/nqfpract.pdf>. Accessed March 12, 2012.
33 511
34 512 53. Berwick DM, Calkins DR, McCannon CJ, et al. The 100,000 lives campaign: setting a goal and a
35 513 deadline for improving health care quality. *JAMA* 2006;**295**(3):324-7.
36 514
37 515 54. Boutilier S. Leaving critical care: facilitating a smooth transition. *Dimens Crit Care Nurs*
38 516 2007;**24**(4):137-42.
39 517
40 518 55. Wunsch H, Angus DC, Harrison DA, et al. Variation in critical care services across North America
41 519 and Western Europe. *Crit Care Med* 2008;**36**(10):2787-93e2781-2789.
42 520
43 521 56. Donabedian A. The Definition of Quality and Approaches to Its Assessment. Ann Arbor, Michigan:
44 522 Health Administration Press 1980.
45 523
46 524 57. Donabedian A. Evaluating the quality of medical care. *Milbank Q* 2005;**83**(4):691-729.
47 525
48 526 58. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. Quality indicators for evaluating trauma care:
49 527 a scoping review. *Arch Surg* 2010;**145**(3):286-95.
50 528
51
52
53
54
55
56
57
58
59
60

- 1
2
3 529 59. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. A systematic review of quality indicators for
4 530 evaluating pediatric trauma care. *Criti Care Med* 2010;**38**(4):1187-96.
5 531
6
7 532 60. Stelfox HT, Nathens AB, Straus SE, et al. Assessing care of patients with major traumatic injuries
8 533 (Funding Reference #200803PH E-188220-PH M-CBBA-587 44). University of Calgary: Canadian
9 534 Institutes of Health Research; 2008-10-01 to 2011-09-30.
10 535
11 536 61. Stelfox HT, Straus SE, Flemons WW, et al. Quality indicators in trauma care (Funding Reference
12 537 #KRS-91770). University of Calgary: Canadian Institutes of Health Research; 2008-10-01 to 2009-
13 538 09-30.
14 539
15 540 62. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res*
16 541 *Methodol* 2005;**8**:19-32.
17 542
18 543 63. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*
19 544 2010;**5**:69.
20 545
21 546 64. Agency for Healthcare Research and Quality. AHRQ tools and resources for better health care.
22 547 *Research in Action, Issue 10* [<http://www.ahrq.gov/qual/tools/toolsria.htm#assessment>].
23 548 Accessed March 7, 2012.
24 549
25 550 65. EndNote X5. In. New York, NY: Thomson Reuter 2012.
26 551
27 552 66. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*
28 553 1977;**33**(1):159-74.
29 554
30 555 67. Caldwell K, Henshaw L, Taylor G. Developing a framework for critiquing health research: An early
31 556 evaluation. *Nurs Educ Today* 2011;**31**(8):e1-7.
32 557
33 558 68. McGlynn EA. Selecting common measures of quality and system performance. *Med Care*
34 559 2003;**41**(Suppl 1):I39-47.
35 560
36 561 69. Fan E, Laupacis A, Pronovost PJ, et al. How to use an article about quality improvement. *JAMA*
37 562 2010;**304**(20):2279-87.
38 563
39 564 70. Strauss A, Corbin J. Basics of Qualitative Research: Techniques and Procedures for Developing
40 565 Grounded Theory, 2nd edn. Thousand Oaks, CA: Sage Publication 1998.
41 566
42 567 71. Hoyt DB, Hollingsworth-Fridlund P, Fortlage D, et al. An evaluation of provider-related and
43 568 disease-related morbidity in a level I university trauma service: directions for quality
44 569 improvement. *J Trauma* 1992;**33**(4):586-601.
45 570
46 571 72. Davis JW, Hoyt DB, McArdle MS, et al. The significance of critical care errors in causing
47 572 preventable death in trauma patients in a trauma system. *J Trauma* 1991;**31**(6):813-8;
48 573 discussion 818-9.
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3 576 **List of Abbreviations**
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5 577 Intensive Care Unit, ICU
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8 578 Institute of Medicine, IOM
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13 580 **Authors' Contributions**
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15 581 Study concept: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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17 582 Study design: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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19
20 583 Obtained funding: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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22 584 Drafted protocol: Stelfox
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24 585 Edited protocol: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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27 586 All authors read and approved the final protocol.
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31
32 588 **Competing Interests**
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34 589 The authors declare they have no competing interests.
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40

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44

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599 Todd and Jamie Boyd for helping format our manuscript.
600

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601 **Table 1. Conceptual model of ICU discharge***

IOM Aims	Structure (Discharge Tool)	Process	Outcome
Safe	Risk stratification	Patient to right ward	↓ ICU readmission
Effective	Medication reconciliation	Right medications	↓ adverse event
Efficient	Information for providers	Providers informed	↓ duplication of tests
Timely	Risk stratification	Discharged when ready	↓ length of stay
Patient-Centered	Information for patients	Patients engaged	↑ Patient satisfaction
Equitable	Checklist	Equal access	↓ inequalities

602 *Table populated with sample tool components and consequent processes and outcomes

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604 **Figure legends**

605 Figure 1. Conceptual evidence-based ICU discharge planning tool

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607 **Additional Files**

608 File name: Additional File 1

609 File format: PDF

610 Title of data: Draft Search Strategy for Medline

611 Description of data: literature search strategy

612

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Identifying Intensive Care Unit Discharge Planning Tools: Protocol for a Scoping Review

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ABSTRACT

Background: Transitions of care between providers are vulnerable periods in health care delivery that expose patients to preventable errors and adverse events. Patient discharge from the intensive care unit (ICU) to a medical or surgical hospital ward is one of the most challenging and high risk transitions of care. Approximately one in twelve patients discharged will be readmitted to ICU or die before leaving hospital. Many more patients are exposed to unnecessary health care, adverse events and/or are disappointed with the quality of their care. Our objective is to conduct a scoping review by systematically searching the literature to identify ICU discharge planning tools and their supporting evidence-base including barriers and facilitators to their use.

Methods and analysis: Systematic searching of the published health literature will be conducted to identify existing ICU discharge planning tools and supporting evidence. Literature (research and non-research) reporting on tools used to facilitate decision making and/or communication at ICU discharge, with patients of any age will be included. Outcomes will include adverse events and provider and patient/family reported outcomes. Two investigators will independently review the abstracts (Screen 1) to identify those meeting inclusion criteria and then independently assess the full text articles (Screen 2) to determine if they meet inclusion criteria. Data collection will include information on citations and identified tools. A quality assessment will be performed on original research studies. A descriptive summary will be developed for each tool.

Ethics and dissemination: Our scoping review will synthesize the literature for ICU discharge planning tools and identify opportunities for knowledge to action and gaps in evidence where primary evidence is necessary. This will serve as the foundational element in a multi-step

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3 55 research program to standardize and improve the quality of care provided to patients during ICU
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6 56 discharge. Ethics approval is not required for this study.
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58 BACKGROUND

59 The transfer of responsibility for patient care (synonyms include transition of care, handoff, sign
60 over etc.) is a common practice in acute-care hospitals.[1] During transfers of patient care,
61 crucial information on patient conditions, tests undertaken, and treatments received is transferred
62 between providers, so that care plans can be effectively continued by receiving providers. A
63 handoff between health care providers is not only a process to provide accurate and vital
64 information regarding a patients' care, but is also a transfer of accountability and responsibility
65 for patient care.[2-7] Healthcare organizations recognize the importance of transitions of care
66 and have proposed organizational practices to improve the effectiveness and coordination of
67 communication among providers and recipients of care across the care continuum.[3, 8, 9]

68
69 Unfortunately, the practice of provider handoff is often suboptimal due to communication
70 barriers[6, 10-12] and is a major contributor to medical errors and adverse events.[2, 7, 13-19]
71 The Harvard Medical Practice Study[20] found that adverse events occur in approximately 4% of
72 patients discharged from hospital, with three quarters of these adverse events resulting in patient
73 disability (ranging from less than one month duration to permanent) . A similar Australian study
74 reported adverse events resulting in disability or increased length of stay for 17% of patients
75 admitted to hospital.[21] In 2006, the Joint Commission for Accreditation of Health Care
76 Organization (JCAHO) reported that 63% of deaths related to medical error in its sentinel events
77 database involved a breakdown in communication.[22] Most research on handoffs for in-hospital
78 patient transfers has focused on patient transfers from the perspective of a single discipline, such
79 as physician end-of-shift[1, 6, 11, 18, 23] or end-of-service[2, 16, 17, 24] handoffs. In contrast,
80 relatively little is known about handoffs between non-physician providers.[10, 25]

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3 81 Multidisciplinary handoffs though are required to optimally transition care and likely face
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5 82 relatively greater communication hurdles due to cultural differences, work load challenges, and
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7 83 differences in clinical focus between specialties and disciplines, and thus may lead to greater
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10 84 potential for medical errors and adverse events.[10, 12, 25]
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15 86 Numerous types of patient transfers and provider handoffs occur every day.[4, 6] A transition of
16
17 87 care occurs each time a patient is referred to a specialist by their family doctor, assigned a new
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19 88 nurse during hospital shift change or discharged from hospital. Among these, patient transfers
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21 89 from the Intensive Care Unit (ICU) to a medical or surgical hospital ward are likely of
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23 90 particularly high risk due to the number, complexity and acuity of the medical conditions that
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25 91 characterize this patient group;[26-29] the large “voltage” drop in available resources when
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27 92 patients move from the ICU, where medical care is intensive and resources are rich, to ward
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29 93 environments, where patients typically receive much less intensive monitoring and patient
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31 94 care;[26] the multitude of communication barriers that providers often face during inter-specialty
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33 95 and multidisciplinary handoffs;[30] the lack of standardization in patient transfer processes
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35 96 overall; and in particular the lack of standardized written and/or electronic tools to facilitate an
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37 97 optimal transfer process.[28]
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46 99 Patients admitted to the ICU are of the highest acuity requiring management with life support
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48 100 technologies and aggressive interventions to sustain life and progress towards a clinically
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50 101 stabilized condition.[28] Approximately one in ten patients admitted to an acute care facility are
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52 102 admitted to an ICU.[31] Transition of care is extremely common with 90% of ICU patients being
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54 103 eventually discharged to medical or surgical hospital wards.[32] With millions of
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3 104 hospitalizations in acute care facilities in most countries each year,[31] hundreds of thousands of
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5 105 patients will be admitted to ICU and experience challenging and high risk transfers to hospital
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8 106 wards.
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13 108 ICU discharge represents a large drop in the intensity of care with patients transitioning from a
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15 109 high acuity unit to a general care unit. ICUs are specially staffed, self-contained hospital units,
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17 110 dedicated to the management and continuous monitoring of patients with life-threatening
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20 111 illnesses.[33] The medical support available to patients in the ICU includes multidisciplinary
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22 112 teams of healthcare providers (i.e. physicians, nurses, pharmacists, therapists) that typically see
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24 113 each patient multiple times a day.[34, 35] In general there is a nurse for every one or two patients
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27 114 and a physician for every eight to ten patients.[36, 37] In contrast, general medical and surgical
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29 115 care units have fewer resources with a nurse for every four to eight patients[38] and physicians
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31 116 responsible for up to as many as 65 patients during regular working hours and 400 patients
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34 117 outside of regular working hours.[39] Other health care providers are often less available.
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39 119 When a patient is transferred from ICU to a general care unit typically there is a complete
40
41 120 transition in healthcare providers, most patients being assigned new teams of physicians, nurses,
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43 121 pharmacists, therapists etc. However, communication between providers discharging patients
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46 122 from the ICU and providers admitting these patients to general care units has been documented
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48 123 to be infrequent, incomplete and of poor quality.[30, 40] An observational study done by our
49
50 124 research team in preparation for this protocol found direct verbal communication between ICU
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53 125 discharging physicians and ward admitting physicians to occur in only 15-25% of the ICU
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55 126 discharges.[30] Optimal transfers of care require effective communication between discharging
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3 127 and admitting physicians that includes direct communication (in person or via telephone);
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6 128 concise, accurate, up-to-date discharge summaries; and physician notification at the time of
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8 129 transfer.[3, 30] However, communication during transfer is challenged by provider workloads,
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11 130 available resources, and variations in clinical focus between specialties.[10, 12, 25]
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15 132 Communication between physicians and patients/families at the time of ICU discharge is also
16
17 133 frequently suboptimal with the same local observational study finding 68% of patient/families
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19 134 reporting a desire for increased opportunities to ask questions about the transfer.[30] This lack of
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21 135 information about the ICU transfer process appears to be associated with patient and family
22
23 136 anxiety.[41-44] Effective communication between providers and patients/families to provide
24
25 137 early notification of an upcoming transfer,[30] and present information on current medical
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27 138 conditions and future plans prior to transfer would likely better manage expectations and reduce
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29 139 anxiety.
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36 141 Standardizing the process of patient discharge from ICU could improve the safety, quality and
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38 142 efficiency of care. Multiple interventions to improve ICU discharge have been developed (e.g.
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40 143 transitional care units, ICU outreach, nursing liaison, etc.),[28, 45-48] but there is no consensus
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42 144 on an ideal ICU discharge model to optimize the quality of patient care[28] and few
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44 145 organizations have implemented standardized guidelines or procedures for transitions of
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46 146 care.[46, 49] Government agencies,[50] specialty groups[3, 51, 52] and the Institute for
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48 147 Healthcare Improvement[53] have all advocated standardizing ICU discharge structure and
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50 148 processes to improve continuity of care, patient safety, patient and provider satisfaction, and
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52 149 resource use.[47, 54]
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6 151 The challenges of ICU discharge are well recognized.[28, 55] Very little is known about the
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8 152 quality of patient care during ICU discharge. A comprehensive review of ICU discharge
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10 153 planning tools has not been previously completed. The scope and magnitude of tools to facilitate
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12 154 patient discharge from ICU has not previously been defined. For tools already developed, it is
13
14 155 unclear how effectively these have been implemented and how they may have affected patient
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16 156 clinical outcomes and/or patient and family satisfaction with care. In response to these
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18 157 challenges, we will conduct a scoping review to identify ICU discharge planning tools and the
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20 158 supporting evidence base for these tools including barriers and facilitators to their use.
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26 27 160 **METHODS AND ANALYSIS**

28 29 161 **Conceptual model**

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31 162 Our scoping review will adopt the model of system theory first introduced in 1966 by Avedis
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33 163 Donabedian.[56, 57] In Donabedian's framework, the three components of healthcare quality are
34
35 164 *structure, process* and *outcome*. The *structure* is the environment in which health care is
36
37 165 provided and includes material and health resources, operational factors, and organizational
38
39 166 characteristics of the healthcare facility. The *process* is the method by which healthcare is
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41 167 provided and includes the giving and receiving of care by the providers and healthcare system.
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43 168 The *outcome* is the consequence of healthcare and includes the health status of patients. We will
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45 169 examine *structural* devices (tools) used to facilitate ICU discharge and evaluate their association
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47 170 with *processes* and *outcomes* of care for patients discharged from ICU (Figure 1).
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3 172 In addition, we will incorporate the Institute of Medicine's (IOM) six aims for the 21st Century
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6 173 Health Care System into our research. ICU discharge tools should foster safe, effective, efficient,
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8 174 timely, equitable, and patient-centered discharge from ICU. We have developed a conceptual
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10 175 model for our scoping review that merges the Donabedian model and the IOM's six aims (Table
11
12 176 1). We recognize that our conceptual model is a relatively basic and simple representation of
13
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15 177 ICU discharge, but no other simple validated framework exists and we have successfully used a
16
17 178 variation of this model to develop quality indicators for injury care.[58-61]
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21 22 180 **Objectives**

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24 181 This is a protocol for a scoping review to identify ICU discharge planning tools and the
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27 182 supporting evidence base for these tools including barriers and facilitators to their use. Methods
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29 183 for inclusion and analysis of articles and reporting of their results will be performed as
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31 184 recommended by Arksey and O'Malley[62] and refined by Levac and colleagues.[63]
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36 186 We define an ICU as a distinct hospital ward that is staffed by specialized healthcare
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38 187 professionals and where immediate and continuous life sustaining treatment (e.g. invasive
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40 188 monitoring, vasoactive medications, invasive mechanical ventilation) is administered to
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42 189 hospitalized patients suffering from life-threatening conditions (e.g. severe respiratory
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44 190 failure).[36] Patient discharge from ICU is defined as the transfer of accountability and
45
46 191 responsibility for patient care from the ICU to a hospital ward. Tools are defined as structural
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48 192 devices (e.g. protocols, reminders, order sets, bundles, checklists, forms, decision-aids) designed
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50 193 to aid health care providers or patients/families with decision making and/or communication.[64]
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3 195 The specific objectives of the scoping review are:
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6 196 1. To complete a systematic search of the literature to identify existing ICU discharge planning
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8 197 tools and evaluate the evidence base in support of the tools (including impact on patient
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10 198 outcomes).
11
12 199 2. To map the ICU discharge tools and supporting evidence to our conceptual framework to
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14 200 identify gaps in the evidence where primary evidence or systematic reviews are required.
15
16 201 3. To evaluate the tools according to their relevance to knowledge users (importance, feasibility,
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18 202 usability, scientific acceptability).
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20 203 4. To describe barriers and facilitators to implementation and utilization of ICU discharge
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22 204 planning tools.
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29 206 **Eligibility Criteria**

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31 207 Research studies (no methodological restrictions – case series, cohort, cross-sectional,
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33 208 nonrandomized controlled, consensus method, case-control, randomized controlled) and non-
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35 209 research study designs (editorial, guideline, letter to the editor, narrative review) are eligible. We
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37 210 will include studies with all human patients discharged from any ICU regardless of subspecialty
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39 211 (e.g. medical, neuroscience, etc.). There is no restriction on age as tools identified for neonatal
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41 212 and pediatric patients may provide relevant information for the discharge of adult patients (and
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43 213 vice versa).
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51 215 Eligible studies must include an electronic or paper tool (including guidelines, protocols,
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53 216 questionnaires, checklist, etc.) intended to facilitate discharge from ICU (regardless of discharge
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55 217 destination) either by providing decision-support for healthcare providers and/or
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3 218 patients/families to determine readiness for discharge or aid in guiding the process of patient
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6 219 discharge. A comparison group is not required as we will be looking for studies that describe the
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8 220 development, implementation or evaluation of a tool. If evaluation studies are identified, details
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10 221 on the comparison group will be assessed including patients, type of ICU (e.g. medical,
11
12 222 neuroscience etc.) and discharge destination (e.g. high dependency step down unit, hospital ward
13
14 223 etc.). Outcome measures will include (1) any severe adverse events post-ICU discharge (e.g. ICU
15
16 224 readmission, hospital mortality), (2) any provider reported outcomes (e.g. quality of
17
18 225 communication, satisfaction), or (3) any patient/family reported outcomes (e.g. quality of
19
20 226 information, engagement, satisfaction).
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27 228 Studies will be excluded if they include patient discharges predominantly from coronary care
28
29 229 units, high dependency units, and step-down units.
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33 34 231 **Search Strategy**

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36 232 We will search the following electronic databases: Medline (OVID interface, 1946 onwards),
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38 233 EMBASE (OVID interface, 1947 onwards), CINAHL (EBSCO interface, 1981 onwards) and the
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40 234 Cochrane Library (current issue). Bibliographies of retrieved articles will be searched for
41
42 235 additional relevant articles. We will also search conference proceedings from the past five years,
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44 236 including the Canadian Critical Care Conference, Society of Critical Care Medicine, Australian
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46 237 and New Zealand Intensive Care Society Conference, European Society of Intensive Care
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48 238 Medicine Conference, American Thoracic Society Conference, and International Symposium on
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50 239 Intensive Care and Emergency Medicine. Experts in the field, identified from the references of
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52 240 included studies, will be contacted to determine whether they are aware of any additional studies.
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6 242 An experienced information specialist (LP) will conduct the literature searches. They will be
7
8 243 performed with no year or language restrictions and will use combinations and synonyms of the
9
10 244 following search terms: intensive care, critical care, discharge plan, patient transfer and patient
11
12 245 discharge. Appropriate wildcards will be used to account for plurals and variations in spelling. A
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15 246 draft literature search is available in Additional File 1.
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20 248 **Study selection process**

21
22 249 Two investigators will independently review the retrieved abstracts (Screen 1) to identify those
23
24 250 that meet the inclusion criteria. The full text of those articles deemed relevant by either reviewer
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27 251 will be obtained. Two investigators will independently assess the full text articles (Screen 2) to
28
29 252 determine if they meet the inclusion criteria. Two investigators will discuss disagreements on
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31
32 253 inclusion and a third investigator will resolve disagreements if needed. Bibliographic details will
33
34 254 be downloaded to EndNote.[65] The study selection process will be pilot tested using 50
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36 255 citations from the literature search. The inclusion and exclusion criteria will be serially clarified
37
38
39 256 and reviewer training sequentially revised until reliable study selection can be demonstrated
40
41 257 (estimated $\kappa \geq 0.6$).[66]
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46 259 **Data items and data collection process**

47
48 260 The data collection instruments will include information on both citations and identified tools.
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50
51 261 We will document the type of citation (e.g. original research), country, setting (e.g. subspecialty
52
53 262 of unit), study design, study population, recruitment and sampling, diagnostic criteria, reference
54
55 263 standard, blinding, statistical methods and outcomes. For each tool we will document the name,
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3 264 purpose (e.g. patient evaluation for discharge, planning patient discharge etc.), components
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5
6 265 (single component vs. multi-component), how it is applied (e.g. electronic) and the timing of
7
8 266 activation (e.g. discharge planning vs. discharge execution). If available, we will record any
9
10 267 measurement properties documented (sensitivity/specificity), reported impact on processes (e.g.
11
12 268 medication reconciliation) and outcomes (e.g. patient readmission to ICU) of care for patients,
13
14 269 families and providers and barriers and facilitators identified to use of the tool (e.g.
15
16 270 organizational culture). The data collection instrument and reviewer training will be sequentially
17
18 271 revised until reliable data abstraction can be demonstrated (estimated $\kappa \geq 0.8$).[66] Differences in
19
20 272 coding between the two reviewers will be resolved by discussion and a third reviewer consulted
21
22 273 if an agreement cannot be reached. Original research studies will have the quality of their
23
24 274 methodology assessed using the framework of Caldwell et al.[67] for evaluating both
25
26 275 quantitative and qualitative study designs. Two clinical decision-makers (Zygun, Boiteau,
27
28 276 Zuege) will independently judge the relevance of each tool for decision-making according to
29
30 277 four dimensions derived from the Strategic Framework Board in the United States:[68] 1) targets
31
32 278 important improvements in continuity of patient care, 2) feasible to implement, 3) easy to use, 4)
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34 279 strength of scientific evidence (using the GRADE criteria).[69]
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281 Analysis

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44 282 Quantitative and qualitative analyses will be performed. The articles and tools will be
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46 283 categorized according to their respective criteria. Agreement on data abstraction and article
47
48 284 classification will be assessed with Cohen κ reliability coefficients.[66] A comprehensive list of
49
50 285 the tools will be developed and summarized using simple numerical counts. We will present the
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52 286 distribution of tools according to the cells of our conceptual model along with binomial 95%
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3 287 confidence intervals as well as detailed tabulations by type of article (original research, non-
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6 288 research) and study design. We will examine the purpose and components of the tools from each
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8 289 study as well as reported measurement properties (e.g. sensitivity/specificity of risk stratification
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11 290 tools) and reported processes (e.g. hospital length of stay) and outcomes (e.g. readmission to
12
13 291 ICU) of care. A descriptive summary will be developed of each tool's purpose, components,
14
15 292 conceptual model classification, measurement properties and relevance to knowledge users.
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20 294 Qualitative studies will be evaluated by identifying the key outcomes and themes presented by
21
22 295 each study (e.g. reported barriers and facilitators to discharge tool utilization), preserving the
23
24 296 meaning from their original source, and tabulating them within the review. Translation of key
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27 297 concepts from all studies will be performed to identify novel concepts not explored by individual
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29 298 studies. Analysis will focus on identifying the overlap of key concepts between studies. Finally,
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31 299 the translated concepts will be synthesized and refined to identify core themes.[70]
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36 301 Using the above categorization scheme, we will be able to provide a scoping review of what
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38 302 research is available in the area of ICU discharge planning tools and the evidence base
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41 303 supporting available tools. From this we will identify where there is a need for a systematic
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43 304 review of the literature (e.g. there may be sufficient literature on validated risk stratification
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45 305 techniques) and where gaps in the literature exist and primary prospective studies are needed.
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49 50 307 **ETHICS AND DISSEMINATION**

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53 308 This scoping review is the first step in a major empiric work to measure and improve ICU
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55 309 discharge processes (focused on adult patients). It will identify the fundamental information
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3 310 needed to implement an ICU discharge planning tool. This review will identify existing tools to
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5 311 facilitate ICU discharge, the supporting evidence base as well as facilitators and barriers to
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7 312 implementation. All data will be obtained from publicly available materials, and therefore this
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9 313 study will not require ethics approval.
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15 315 Our knowledge translation strategy will involve, among other approaches, a workshop to be held
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17 316 in conjunction with the annual January Canadian Critical Care Trials Group meeting that will
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19 317 bring together key target audiences across disciplines for our research. By engaging
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21 318 multidisciplinary stakeholders we will enhance linkages necessary for dissemination of our
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23 319 results. We will engage stakeholders in a discussion of the results and develop and prioritize a
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25 320 research agenda for implementation of a standardized ICU discharge planning tool. We will
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27 321 publish in health services research and discipline-based journals. In addition, we will encourage
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29 322 presentation of findings at health services research conferences at national and international
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31 323 meetings including the annual meetings of the Canadian Critical Care Trials Group, and
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33 324 International Symposium of Intensive Care and Emergency Medicine amongst others.
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41 326 Our scoping review results have the potential to influence the care of many patients. We will
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43 327 synthesize the literature for ICU discharge planning tools and identify opportunities for
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45 328 knowledge to action and gaps in evidence where primary evidence is necessary. ICUs are
46
47 329 specialized units that have been widely implemented around the world to care for the sickest
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49 330 patients in the health care system.[55] Discharge from ICU is a high risk process because
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51 331 vulnerable patients, move from a resource rich environment to a relatively resource poor
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53 332 environment using a process that is non-standardized, inefficient and characterized by poor
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3 333 communication and frequent adverse events.[29, 30, 40, 45, 46, 71, 72] To improve patient care
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6 334 we need evidence-based tools to standardize and improve the quality of care provided to patients
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8 335 during ICU discharge. Our results will help implement an evidence-based ICU discharge
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10 336 planning tool to ensure that discharge from the ICU is safe, effective, efficient, timely, equitable
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12 337 and patient-centered so that the *right patient* is discharged at the *right time* using a *process* that
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15 338 improves patient care and reduces the risk of adverse events and hospital mortality while
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17 339 facilitating patients' care journeys.
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References

- 1
2
3
4
5
6 342 1. Horwitz LI, Krumholz HM, Green ML, Huot SJ: **Transfers of patient care between house staff on**
7 343 **internal medicine wards: a national survey.** *Archives of internal medicine* 2006, **166**(11):1173-
8 344 1177.
- 9 345
10 346 2. Petersen LA, Brennan TA, O'Neil AC, et al. Does housestaff discontinuity of care increase the risk
11 347 for preventable adverse events? *Ann Intern Med* 1994;**121**(11):866-72.
12 348
- 13 349 3. Canadian Council on Health Service Accreditation. CCHSA patient/client safety goals and
14 350 required organizational goals: evaluation of implementation and evidence of compliance.
15 351 Version of 2.1 for use with 2007 standard. [http://www.accreditation.ca/uploadedFiles/CHAR-](http://www.accreditation.ca/uploadedFiles/CHAR-2012-en.pdf)
16 352 [2012-en.pdf](http://www.accreditation.ca/uploadedFiles/CHAR-2012-en.pdf). Accessed March 12, 2012.
17 353
- 18 354 4. Coleman EA, Berenson RA. Lost in transition: challenges and opportunities for improving the
19 355 quality of transitional care. *Ann Intern Med* 2004;**141**(7):533-6.
20 356
- 21 357 5. Patterson ES, Roth EM, Woods DD, et al. Handoff strategies in settings with high consequences
22 358 for failure: lessons for health care operations. *Int J Qual Health Care* 2004;**16**(2):125-32.
23 359
- 24 360 6. Solet DJ, Norvell JM, Rutan GH, et al. Lost in translation: challenges and opportunities in
25 361 physician-to-physician communication during patient handoffs. *Acad Med* 2005;**80**(12):1094-9.
26 362
- 27 363 7. Arora V, Johnson J, Lovinger D, et al. Communication failures in patient sign-out and suggestions
28 364 for improvement: a critical incident analysis. *Qual Saf Health Care* 2005;**14**(6):401-7.
29 365
- 30 366 8. The Joint Commission of Accreditation of Healthcare Organizations. National Patient Safety
31 367 Goals. http://www.jointcommission.org/standards_information/npsgs.aspx. Accessed February
32 368 28, 2012.
33 369
- 34 370 9. Intitute of Health Improvement. IHI Improvement Map: Patient Transitions & Handoffs.
35 371 <http://app.ihl.org/imap/tool/#Process=21e273fb-81fc-4dd2-b89b-883c10afc4bc>. Accessed
36 372 February 28, 2012.
37 373
- 38 374 10. Apker J, Mallak LA, Gibson SC. Communicating in the "gray zone": perceptions about emergency
39 375 physician hospitalist handoffs and patient safety. *Acad Emerg Med* 2007;**14**(10):884-94.
40 376
- 41 377 11. Shojania KG, Fletcher KE, Saint S. Graduate medical education and patient safety: a busy--and
42 378 occasionally hazardous--intersection. *Ann Intern Med* 2006;**145**(8):592-8.
43 379
- 44 380 12. Riesenber LA, Leitzsch J, Massucci JL, et al. Residents' and attending physicians' handoffs: a
45 381 systematic review of the literature. *Acad Med* 2009;**84**(12):1775-87.
46 382
- 47 383 13. Andrews C, Millar S. Don't fumble the handoff. Inpatient providers, specialists, and the primary
48 384 care physician: a medical care delivery system with benefits and complex risks. *J Med Assoc Ga*
49 385 2007;**96**(3):23-4.
50 386
51
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51
52
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55
56
57
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59
60

- 387 14. Gandhi TK. Fumbled handoffs: one dropped ball after another. *Ann Intern Med* 2005;**142**(5):352-8.
- 388
- 389
- 390 15. Horwitz LI, Moin T, Krumholz HM, et al. Consequences of inadequate sign-out for patient care. *Arch Intern Med* 2008;**168**(16):1755-60.
- 391
- 392
- 393 16. Horwitz LI, Moin T, Krumholz HM, et al. What are covering doctors told about their patients? Analysis of sign-out among internal medicine house staff. *Qual Saf Health Care* 2009;**18**(4):248-55.
- 394
- 395
- 396
- 397 17. Kitch BT, Cooper JB, Zapol WM, et al. Handoffs causing patient harm: a survey of medical and surgical house staff. *Jt Comm J Qual Patient Saf* 2008;**34**(10):563-70.
- 398
- 399
- 400 18. Singh H, Thomas EJ, Petersen LA, et al. Medical errors involving trainees: a study of closed malpractice claims from 5 insurers. *Arch Intern Med* 2007;**167**(19):2030-6.
- 401
- 402
- 403 19. Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. *Acad Med* 2004;**79**(2):186-94.
- 404
- 405
- 406 20. Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients. *N Engl J Med* 1991;**324**:370-6.
- 407
- 408
- 409 21. Wilson RM, Runciman WB, Gibberd RW, et al. The quality in Australian health care study. *Med J Aust* 1995;**163**(9):458-71.
- 410
- 411
- 412 22. Joint Commission on Accreditation of Healthcare Organizations. Using medication reconciliation to prevent errors. *Sentinel Event Alert* 2006;(35):1-4.
- 413
- 414
- 415 23. Fletcher KE, Saint S, Mangrulkar RS. Balancing continuity of care with residents' limited work hours: defining the implications. *Acad Med* 2005;**80**(1):39-43.
- 416
- 417
- 418 24. Landucci D, Gipe BT. The art and science of the handoff: how hospitalists share data. *Hospitalist* 1999;**3**(1):4.
- 419
- 420
- 421 25. Horwitz LI, Meredith T, Schuur JD, et al. Dropping the baton: a qualitative analysis of failures during the transition from emergency department to inpatient care. *Ann Emerg Med* 2009;**53**(6):701-10, e4.
- 422
- 423
- 424
- 425 26. Cullen DJ, Sweitzer BJ, Bates DW, et al. Preventable adverse drug events in hospitalized patients: a comparative study of intensive care and general care units. *Crit Care Med* 1997;**25**(8):1289-97.
- 426
- 427
- 428 27. Voigt LP, Pastores SM, Raoof ND, Thaler HT, Halpern NA: Review of a large clinical series: intrahospital transport of critically ill patients: outcomes, timing, and patterns. *J Intensive Care Med* 2009;**24**(2):108-15.
- 429
- 430
- 431
- 432 28. Watts R, Pierson J, Gardner H. Coordination of the discharge process planning in critical care. *J Clin Nurs* 2005;**21**:39-46.
- 433
- 434

- 1
2
3 435 29. Rosenberg AL, Watts C. Patients readmitted to ICUs* : a systematic review of risk factors and
4 436 outcomes. *Chest* 2000;**118**(2):492-502.
5 437
6
7 438 30. Li P, Stelfox HT, Ghali WA. A prospective observational study of physician handoff for intensive-
8 439 care-unit-to-ward patient transfers. *Am J Med* 2011;**124**(9):860-7.
9 440
10 441 31. Leeb K, Jokovic A, Sandhu M, et al. CIHI survey: intensive care in Canada. *Healthc Q* 2006;**9**(1):32-
11 442 3.
12 443
13 444 32. Russell S. Reducing readmissions to the intensive care unit. *Heart Lung* 1999;**28**(5):365-72.
14 445
15 446 33. College of Intensive Care Medicine. Minimum Standards for Intensive Care Units.
16 447 [http://www.cicm.org.au/cmsfiles/IC-](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf)
17 448 [01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf)
18 449 [%20Current%20September%202011.pdf](http://www.cicm.org.au/cmsfiles/IC-01%20Minimum%20Standards%20For%20Intensive%20Care%20Units%20-%20Current%20September%202011.pdf). Accessed February 28, 2012.
19 450
20 451 34. Dutton RP, Cooper C, Jones A, et al. Daily multidisciplinary rounds shorten length of stay for
21 452 trauma patients. *J Trauma* 2003;**55**(5):913-9.
22 453
23 454 35. Vazirani S, Hays RD, Shapiro MF, et al. Effect of a multidisciplinary intervention on
24 455 communication and collaboration among physicians and nurses. *Am J Crit Care* 2005;**14**(1):71-7.
25 456
26 457 36. Society for Critical Care Medicine. Practicing CCM.
27 458 http://www.sccm.org/AboutSCCM/Public%20Relations/Media_Kit/Pages/Practicing_CCM.aspx.
28 459 Accessed March 23, 2012.
29 460
30 461 37. Ward NS, Read R, Afessa B, et al. Perceived effects of attending physician workload in academic
31 462 medical intensive care units: a national survey of training program directors. *Crit Care Med*
32 463 2012;**40**(2):400-5.
33 464
34 465 38. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse
35 466 burnout, and job dissatisfaction. *JAMA* 2002;**288**(16):1987-93.
36 467
37 468 39. Goddard AF, Hodgson H, Newbery N. Impact of EWTD on patient:doctor ratios and working
38 469 practices for junior doctors in England and Wales 2009. *Clin Med* 2010;**10**(4):330-5.
39 470
40 471 40. Lin F, Chaboyer W, Wallis M. A literature review of organizational, individual, and teamwork
41 472 factors contributing to the ICU discharge process. *Aust Crit Care* 2009;**22**:29-43.
42 473
43 474 41. Gustad LT, Chaboyer W, Wallis M: ICU patient's transfer anxiety: a prospective cohort study.
44 475 *Aust Crit Care* 2008;**21**(4):181-9.
45 476
46 477 42. Mitchell ML, Courtney M: Reducing family members' anxiety and uncertainty in illness around
47 478 transfer from intensive care: an intervention study. *Intensive Crit Care Nurs* 2004;**20**(4):223-31.
48 479
49 480 43. Forseberg A, Lindgren E, Engström Å: Being transferred from an intensive care unit to a ward:
50 481 searching for the known in the unknown. *Int J Nurs Pract* 2011;**17**:110-6.
51 482
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54
55
56
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58
59
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2
3 483 44. Strahan EH, Brown RJ: A qualitative study of the experiences of patients following transfer from
4 484 intensive care. *Intensive Crit Care Nurs* 2005;**21**(3):160-71.
5 485
6
7 486 45. Kripalani S, Jackson AT, Schnipper JL, et al. Promoting effective transitions of care at hospital
8 487 discharge: a review of key issues for hospitalists. *J Hosp Med* 2007;**2**(5):314-23.
9 488
10 489 46. Heidegger C, Treggiari M, Romand J, et al. A nationwide survey of intensive care discharge
11 490 practice. *Intensive Care Med* 2005;**31**:1676-82.
12 491
13 492 47. Kripalani S, LeFevre F, Phillips C, et al. Deficits in Communication and Information Transfer
14 493 Between Hospital-Based and Primary Care Physicians. *JAMA* 2006;**297**(8):831-41.
15 494
16 495 48. Watts R, Pierson J, Gardner H. How do critical care nurses define the discharge process.
17 496 *Intensive Crit Care Nurs* 2004;**21**:39-46.
18 497
19 498 49. Levin P, Worner T, Sviridov S, et al. Intensive care outflow limitation -- frequency, etiology, and
20 499 impact. *J Crit Care* 2003;**18**(4):206-11.
21 500
22 501 50. Wachter RM. Making healthcare safer: a critical analysis of patient safety practices. In: Evidence
23 502 Report No 43. Edited by Agency for Healthcare Quality Research, AHRQ publication 01-E058
24 503 edn: Rockville, Md; 2001.
25 504
26 505 51. The Joint Commission of Accreditation of Healthcare Organizations. Critical Access Hospital:
27 506 2012 National Patient Safety Goals.
28 507 http://www.jointcommission.org/assets/1/6/NPSG_Chapter_Jan2012_CAH.pdf. Accessed March
29 508 11, 2012.
30 509
31 510 52. The National Quality Forum. Safe Practices for Better Healthcare: A Consensus Report.
32 511 <http://www.ahrq.gov/qual/nqfpract.pdf>. Accessed March 12, 2012.
33 512
34 513 53. Berwick DM, Calkins DR, McCannon CJ, et al. The 100,000 lives campaign: setting a goal and a
35 514 deadline for improving health care quality. *JAMA* 2006;**295**(3):324-7.
36 515
37 516 54. Boutilier S. Leaving critical care: facilitating a smooth transition. *Dimens Crit Care Nurs*
38 517 2007;**24**(4):137-42.
39 518
40 519 55. Wunsch H, Angus DC, Harrison DA, et al. Variation in critical care services across North America
41 520 and Western Europe. *Crit Care Med* 2008;**36**(10):2787-93e2781-2789.
42 521
43 522 56. Donabedian A. The Definition of Quality and Approaches to Its Assessment. Ann Arbor, Michigan:
44 523 Health Administration Press 1980.
45 524
46 525 57. Donabedian A. Evaluating the quality of medical care. *Milbank Q* 2005;**83**(4):691-729.
47 526
48 527 58. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. Quality indicators for evaluating trauma care:
49 528 a scoping review. *Arch Surg* 2010;**145**(3):286-95.
50 529
51
52
53
54
55
56
57
58
59
60

- 1
2
3 530 59. Stelfox HT, Bobranska-Artiuch B, Nathens A, et al. A systematic review of quality indicators for
4 531 evaluating pediatric trauma care. *Criti Care Med* 2010;**38**(4):1187-96.
5 532
6
7 533 60. Stelfox HT, Nathens AB, Straus SE, et al. Assessing care of patients with major traumatic injuries
8 534 (Funding Reference #200803PH E-188220-PH M-CBBA-587 44). University of Calgary: Canadian
9 535 Institutes of Health Research; 2008-10-01 to 2011-09-30.
10 536
11 537 61. Stelfox HT, Straus SE, Flemons WW, et al. Quality indicators in trauma care (Funding Reference
12 538 #KRS-91770). University of Calgary: Canadian Institutes of Health Research; 2008-10-01 to 2009-
13 539 09-30.
14 540
15 541 62. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res*
16 542 *Methodol* 2005;**8**:19-32.
17 543
18 544 63. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*
19 545 2010;**5**:69.
20 546
21 547 64. Agency for Healthcare Research and Quality. AHRQ tools and resources for better health care.
22 548 *Research in Action, Issue 10* [<http://www.ahrq.gov/qual/tools/toolsria.htm#assessment>].
23 549 Accessed March 7, 2012.
24 550
25 551 65. EndNote X5. In. New York, NY: Thomson Reuter 2012.
26 552
27 553 66. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*
28 554 1977;**33**(1):159-74.
29 555
30 556 67. Caldwell K, Henshaw L, Taylor G. Developing a framework for critiquing health research: An early
31 557 evaluation. *Nurs Educ Today* 2011;**31**(8):e1-7.
32 558
33 559 68. McGlynn EA. Selecting common measures of quality and system performance. *Med Care*
34 560 2003;41(Suppl 1):I39-47.
35 561
36 562 69. Fan E, Laupacis A, Pronovost PJ, et al. How to use an article about quality improvement. *JAMA*
37 563 2010;**304**(20):2279-87.
38 564
39 565 70. Strauss A, Corbin J. Basics of Qualitative Research: Techniques and Procedures for Developing
40 566 Grounded Theory, 2nd edn. Thousand Oaks, CA: Sage Publication 1998.
41 567
42 568 71. Hoyt DB, Hollingsworth-Fridlund P, Fortlage D, et al. An evaluation of provider-related and
43 569 disease-related morbidity in a level I university trauma service: directions for quality
44 570 improvement. *J Trauma* 1992;**33**(4):586-601.
45 571
46 572 72. Davis JW, Hoyt DB, McArdle MS, et al. The significance of critical care errors in causing
47 573 preventable death in trauma patients in a trauma system. *J Trauma* 1991;**31**(6):813-8;
48 574 discussion 818-9.
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3 577 **List of Abbreviations**
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5 578 Intensive Care Unit, ICU
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8 579 Institute of Medicine, IOM
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13 581 **Authors' Contributions**
14

15 582 Study concept: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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17 583 Study design: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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19
20 584 Obtained funding: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
21

22 585 Drafted protocol: Stelfox
23

24 586 Edited protocol: Stelfox, Perrier, Straus, Ghali, Zygun, Boiteau, Zuege
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27 587 All authors read and approved the final protocol.
28

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32 589 **Competing Interests**
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34 590 The authors declare they have no competing interests.
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4
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For peer review only

602 **Table 1. Conceptual model of ICU discharge***

IOM Aims	Structure (Discharge Tool)	Process	Outcome
Safe	Risk stratification	Patient to right ward	↓ ICU readmission
Effective	Medication reconciliation	Right medications	↓ adverse event
Efficient	Information for providers	Providers informed	↓ duplication of tests
Timely	Risk stratification	Discharged when ready	↓ length of stay
Patient-Centered	Information for patients	Patients engaged	↑ Patient satisfaction
Equitable	Checklist	Equal access	↓ inequalities

603 *Table populated with sample tool components and consequent processes and outcomes

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3 605 **Figure legends**
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5 606 Figure 1. Conceptual evidence-based ICU discharge planning tool
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10 608 **Additional Files**
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12 609 File name: Additional File 1
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14 610 File format: PDF
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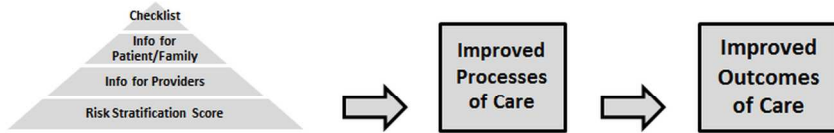
16 611 Title of data: Draft Search Strategy for Medline
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18 612 Description of data: literature search strategy
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Figure 1. Conceptual evidence-based ICU discharge planning tool



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Additional File 1. Draft Search Strategy for Medline:

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- 1 (critical adj care).tw.
 - 2 (critical\$ adj ill\$).tw.
 - 3 (intensive adj care).mp.
 - 4 ICU?.tw.
 - 5 (cardiovascular adj unit?).tw.
 - 6 (coronary adj care).tw.
 - 7 CCU?.tw.
 - 8 (step-down adj unit?).tw.
 - 9 (burn adj unit?).tw.
 - 10 "high dependency unit?".tw.
 - 11 (neurosurgical adj unit?).tw.
 - 12 (observation adj unit?).tw.
 - 13 exp Intensive Care Units/
14 exp Critical Care/
15 Critical Illness/
16 or/1-15
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 - 18 (discharg\$ adj1 process\$).tw.
 - 19 (discharg\$ adj1 protocol?).tw.
 - 20 (discharg\$ adj1 method\$).tw.
 - 21 (discharg\$ adj1 transition\$).tw.
 - 22 "discharg\$ of patient?".tw.
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 - 27 (transfer\$ adj1 plan\$).tw.
 - 28 (transfer\$ adj3 ward\$).tw.
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31 Patient Transfer/
32 or/17-31
33 16 and 32
 - 34 Animals/ not (Animals/ and Humans)
35 33 not 34