Transition of care from adult intensive care settings – implementing interventions to improve medication safety and patient outcomes

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On admission to an intensive care unit (ICU), patients' regular long-term medications may be withheld while they are being stabilised. Such medications are sometimes not restarted during the rest of their hospital stay, even when transferred to a lower acuity ward or discharged from hospital.[1] This puts patients discharged from an ICU at higher risk of unintentional medication discontinuation, which could lead to future exacerbation of chronic conditions. Additionally, ICU patients may have medications commenced in the acute stage of their ICU admission (eg, gastric acid secretion inhibitors) that might inadvertently be continued following transfer from the ICU.[2]

There is a growing body of evidence that care transitions, whether from inpatient to outpatient settings, or within a hospital stay between different specialties or departments, pose an elevated risk of patients experiencing negative outcomes such as medication errors or adverse events.[3 4] A systematic review suggests that across five studies, the median rate of medication errors following hospital discharge is 53% per adult discharged patient.[5] However, less is known about medication errors in adults transferred from ICU to general hospital wards; the limited research available suggests high levels of medication errors associated with this transition point with 46%–74% of patients experiencing a medication error.[6 7] Commonly occurring errors include continuation of medication indicated only in the ICU, untreated indications and medications without an indication.[6] There is a need to understand what interventions can be used to reduce medication errors, and the effectiveness of these interventions, when transitioning patients from the ICU setting.

MEDICATION-RELATED INTERVENTIONS TO IMPROVE OUTCOMES OF CARE TRANSITION FROM INTENSIVE CARE

In this issue of *BMJ Quality & Safety*, Bourne and colleagues' systematic review and meta-analysis is a welcome contribution to examine the impact of medication-related interventions on medication and patient outcomes for adult ICU patients transitioning to a hospital ward, as well as barriers and facilitators to their implementation.[8] Seventeen studies evaluating such interventions were retrieved in October 2020, of which nine were single component interventions (education of staff; medication review; guidelines; electronic transfer/hand-over checklist or letter; or medicines reconciliation) and eight were multicomponent interventions (mainly education of staff; guidelines; and medication review). Bourne and colleagues used ROB 2.0 (Risk of Bias) and ROBINS-I (Risk of Bias in Non-Randomized Studies - of Interventions) Cochrane tools to assess risk of bias for randomised controlled trials and non-randomised studies, respectively; the risk of bias was serious for most studies. The overall quality of the body of evidence in the systematic review was low,[8] as assessed by GRADE (Grading of Recommendations, Assessment, Development and Evaluations).[9]

Meta-analysis was undertaken for deprescribing interventions at ICU and hospital discharge points, revealing reductions in both the risk of inappropriate medication continuation at ICU discharge (odds ratio (OR)=0.45 (95%CI 0.31-0.63), n=9 studies) and hospital discharge (OR=0.39 (0.2-0.76), n=9 studies.[8] Multicomponent deprescribing interventions (education of staff combined with guideline implementation, n=6 studies) were most effective to reduce the risk of inappropriate medication continuation at hospital discharge compared with usual care (OR=0.26 (0.13 to 0.55)). The GRADE assessment for these interventions was moderate-quality evidence. This effect was not observed in studies assessing the impact at ICU discharge (OR=0.5 (0.22 to 1.11), n=4 studies, low-quality evidence using GRADE assessment). Single component deprescribing interventions (education of staff, medication reconciliation or medication review) were not found to have an impact at hospital discharge (OR=0.77 (0.16 to 3.74), n=3 studies, very low-quality evidence using GRADE assessment). However, single component interventions did reduce inappropriate medication continuation at ICU discharge (OR=0.42 (0.24 to 0.74), n=5 studies, low-quality evidence using GRADE assessment).

Notwithstanding the inherent risk of bias with the vast majority of these studies,[8] these findings highlight the complexity of implementing and assessing the impact of both single and multicomponent interventions that take place at one point during the hospital stay (for example, during an ICU admission or just prior to ICU discharge), on an outcome later in the patient journey (such as at hospital discharge). Following ICU discharge, other changes can occur to the patient's care journey (eg, input from other healthcare professionals, changes in the patient's status, changes to medications); and the further away the time point evaluating the effect of the intervention (eg, hospital discharge), the more likely it is that other factors may interfere with the effect of earlier interventions made in the ICU and induce bias in the intervention effect.

Bourne and colleagues report that eight studies reported comparisons of patient outcomes:[8] one study demonstrated a significant reduction of potential adverse drug events, with risk of bias assessed as moderate. No impact on mortality, ICU readmission or hospital length of stay was observed in the other studies, with moderate (n=5 studies) and serious (n=2 studies) risk of bias.[8] Does this mean that such interventions are of little value? Not necessarily, as the studies included in the systematic review did demonstrate positive effects on other outcomes such as reductions in drug-related problems, which in turn may reduce pill burden for the patient, reduce waste and reduce costs, all of which are important outcomes from such interventions.[8] Evaluating the impact of medication-related interventions on patient outcomes can be difficult and requires careful consideration. While strategies such as medication reconciliation, guidelines and medication review are widely endorsed by health systems, the data presented by Bourne and colleagues[8] suggest that we do not currently have sufficient high-quality evidence to confirm their impact on patient outcomes at ICU discharge.

IMPLEMENTATION ISSUES FOR INTERVENTIONS ON TRANSITION FROM INTENSIVE CARE

It is documented in the literature that implementation of evidence-based practices in the ICU setting is often suboptimal; the challenges include staffing, team structures, and workflow and time pressures associated with the care of a critically ill patient.[10] Implementation science advocates that successful integration of evidence-based interventions must be accompanied by knowledge of implementation.[11] To guide and support practitioners implementing interventions locally, Powell and colleagues have developed a compilation of 73 implementation strategies (the Expert Recommendations for Implementing Change strategies).[12] When deciding on which intervention(s) reviewed by Bourne and colleagues[8] should be implemented, the multidisciplinary team may consider how different intervention strategies can address the contextual needs of their intensive care setting. As part of this process, teams need to assess the factors affecting the implementation process and outcomes, including factors such as the characteristics of the innovation (eg, medicines reconciliation, deprescribing, education, etc), the characteristics of the setting, potential barriers and facilitators and the preferences of stakeholders.[13] From the different medication safety interventions and their outcomes in the ICU setting reviewed by Bourne and colleagues,[8] practitioners should select appropriate single or multiple interventions that map to their identified local deficits, for example, education and training to address knowledge and skill gaps, or recruiting trained staff, including pharmacists, if there is a workforce issue.[14]

The contextual barriers of the ICU setting need to be considered, how it differs from a general ward setting as well as within and between countries. Much of the research included in the systematic review was conducted in North America, mostly in the USA, with only three studies in Europe and one in Australia.[8] Healthcare systems, resources, delivery and practice vary not only between these countries but also between countries not represented in the review. In addition, local medication safety research is required to identify local medication safety improvement needs and assess relevant barriers in that context before implementing the findings of any research. Thus, when considering the generalisability of the findings of this systematic review by Bourne and colleagues, it is important to consider the ICU context of the study sites in relation to one's own ICU context.[12 15]

Bourne and colleagues reported that few studies explored the barriers to intervention implementation in the ICU context, with the most common being increased workload associated with the intervention itself.[8] Multiprofessional collaboration was reported as a barrier to intervention delivery when there is limited collaboration,[8] in which case increasing multiprofessional collaboration might be one of the interventions. Teamwork and communication are inherent to the safe and effective delivery of care to ICU patients and on their handover to other medical teams within the hospital setting.[16] Future research should, therefore, consider how multiple professions can be effectively targeted by medication safety interventions.

Engaging stakeholders in the design and implementation of interventions is vital as there may be many barriers that, unless considered, would delay the translation of evidence into practice.[10 17] Stakeholders include the many members of the multidisciplinary healthcare team who care for patients in the ICU and their transfer from the ICU, including clinicians, nursing staff and pharmacy staff. The European Association of Hospital Pharmacists has established a multiprofessional Special Interest Group for the Investigation of Medication Errors in Intensive Care Units; this group will be investigating the views and experiences of healthcare professionals working in the ICU regarding medication safety interventions. This work will support the development of recommendations for improving medication safety in the ICU setting across Europe.

Another important stakeholder group to consider is patients as well as their families and carers. The WHO Report on Medication Safety in Transitions of Care highlights the importance of engaging with, and empowering patients, families and caregivers so that they can be involved in 'preventing, identifying and taking early action to minimise harm associated with medication'.[18] It has been reported that patient involvement in care transitions is often lacking.[19] A qualitative study reporting on the patient perspective of the discharge process concluded that early patient involvement and communication were needed to support the needs of patients at discharge.[20] Bourne and colleagues also highlighted that patients and their family or carers were often not involved in the transition process from the ICU setting to other wards.[8] As patients in the ICU are often critically ill and may not be in a position to participate in the transition process, it is important that medication safety initiatives also consider engaging with families and caregivers; future research should consider all these stakeholders in co-designing effective ICU practices.[21] Action research has previously been used to address problems and challenges in ICU settings, involving healthcare professionals, mainly nurses, and patients and family.[22] The spiral process of 'planning, action, observation and reflection' where 'reflection' leads back to 'planning', starting a new cycle could similarly be used to develop interventions to prevent medication errors.[23]

CONCLUSIONS

Bourne and colleagues have highlighted that better-designed studies are necessary to evaluate which medication-related interventions, and in which combination, should be put in place to decrease the risk of negative clinical outcomes during care transitions from the ICU.[8] Future studies are also needed on how to implement such interventions in practice and overcome existing barriers.

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REFERENCES

1 Bell CM, Brener SS, Gunraj N, *et al*. Association of ICU or hospital admission with unintentional discontinuation of medications for chronic diseases. *JAMA* 2011;306:840–7.
2 Mohebbi L, Hesch K. Stress ulcer prophylaxis in the intensive care unit. *Proc (Bayl Univ Med Cent)* 2009;22:373–6.
3 Killin L, Hezam A, Anderson KK, *et al*. Advanced medication reconciliation: a systematic review of the impact on medication errors and adverse drug events associated with transitions of care. *Jt Comm J Qual Patient Saf* 2021;47:438–51.
4 Bristol AA, Schneider CE, Lin S-Y, *et al*. A systematic review of clinical outcomes associated with intrahospital transitions. *J Healthc Qual* 2020;42:175–87.
5 Alqenae FA, Steinke D, Keers RN. Prevalence and nature of medication errors and medication-related harm following discharge from hospital to community settings: a systematic review. *Drug Saf* 2020;43:517–37.
6 Tully AP, Hammond DA, Li C, *et al*. Evaluation of medication errors at the transition of care from an ICU to Non-ICU location. *Crit Care Med* 2019;47:543–9.
7 Bosma LBE, Hunfeld NGM, Quax RAM, *et al*. The effect of a medication reconciliation program in two intensive care units in the Netherlands: a prospective intervention study with a before and after design. *Ann Intensive Care* 2018;8:19–018.
8 Bourne RS, Jennings JK, Panagioti M, *et al*. Medication-Related interventions to improve medication safety and patient outcomes on transition from adult intensive care

settings: a systematic review and meta-analysis. *BMJ Qual Saf* 2022;31:609–72.
9 Langendam MW, Akl EA, Dahm P, *et al*. Assessing and presenting summaries of evidence in Cochrane reviews. *Syst Rev* 2013;2:81.
10 Lane-Fall MB, Christakos A, Russell GC, *et al*. Handoffs and transitions in critical care-understanding scalability: study protocol for a multicenter stepped wedge type 2 hybrid effectiveness-implementation trial. *Implement Sci* 2021;16:63.
11 McNett M, O'Mathúna D, Tucker S, *et al*. A scoping review of implementation science in adult critical care settings. *Crit Care Explor* 2020;2:e0301.
12 Powell BJ, Waltz TJ, Chinman MJ, *et al*. A refined compilation of implementation strategies: results from the expert recommendations for implementing change (ERIC) project. *Implement Sci* 2015;10:21–015.
13 Powell BJ, Beidas RS, Lewis CC, *et al*. Methods to improve the selection and tailoring of implementation strategies. *J Behav Health Serv Res* 2017;44:177–94.
14 Schnipper JL, Reyes Nieva H, Mallouk M, *et al*. Effects of a refined evidence-based toolkit and mentored implementation on medication reconciliation at 18 hospitals: results of the MARQUIS2 study. *BMJ Qual Saf* 2022;31:278–86.
15 Øvretveit J, Leviton L, Parry G. Increasing the generalisability of improvement research with an improvement replication programme. *BMJ Qual Saf* 2011;20 Suppl 1:i87–91.
16 Rak KJ, Kahn JM, Linstrum K, *et al*. Enhancing implementation of complex critical care interventions through interprofessional education. *ATS Sch* 2021;2:370–85.
17 Stelfox HT, Niven DJ, Clement FM, *et al*. Stakeholder engagement to identify priorities for improving the quality and value of critical care. *PLoS One* 2015;10:e0140141.
18 World Health Organization. Medication safety in transitions of care. Available: https://www.who.int/patientsafety/medication-safety/TransitionOfCare.pdf?ua=1 [Accessed 24 Mar 2022].
19 Grimes TC. Is it time for greater patient involvement to enhance transitional medication safety? *BMJ Qual Saf* 2022;31:247–50.
20 Rognan SE, Kälvemark Sporrong S, Bengtsson K, *et al*. Discharge processes and medicines communication from the patient perspective: a qualitative study at an internal medicines ward in Norway. *Health Expect* 2021;24:892–904.
21 Noergaard B, Johannessen H, Fenger-Gron J, *et al*. Participatory action research in the field of neonatal intensive care: developing an intervention to meet the fathers' needs. A case study. *J Public Health Res* 2016;5:744.
22 Soh KL, Davidson PM, Leslie G, *et al*. Action research studies in the intensive care setting: a systematic review. *Int J Nurs Stud* 2011;48:258–68.
23 Saramunee K. Applying action research in pharmacy practice. *Res Social Adm Pharm* 2022;18:2164–9.