

Reducing medication-round interruptions in an NHS adult ward: A literature review and proposal for “Do Not Disturb” aprons

Literature Review

Table of Contents

Introduction	1
Understanding the Problem.....	1
Evidence that a Problem Exists.....	2
Prior Attempts to Solve the Problem.....	3
Proposed Intervention	6
Conclusion.....	7
References	8

Introduction

Interruptions during the administration of medication create a persistent quality problem which could contribute to medication administration errors (Schroers, Ross & Moriarty, 2021). The World Health Organisation (WHO, 2023) has recognised that unsafe medication practices and errors are a leading preventable source of patient harm, with errors occurring both at the prescription and the administration stage. In the UK, a landmark study by Elliot et al. (2021) recognised that 236 million medication errors occurred every year, giving rise to a yearly cost of £98.5 million and an annual death count of 1,700. The NHS Patient Safety Strategy (NHS England, 2019) called for safer systems to be built, including a patient culture, to address and reduce preventable harm. A medication administration error (MAE) is defined as an error that occurs during administration, predominantly linked to violation of the five rights (right patient, right drug, right dosage, right route, right time) (Hanson & Haddad, 2023). The purpose of this review is to evaluate the existing evidence base on interruption-related MAE to understand the impact of the problem. Through this review, there is an effort to support the implementation of a ward-level solution to reduce nurse interruptions through a pragmatic and low-cost intervention. Specifically, the aim is to reduce non-essential interruptions during medication rounds in the ward by 30% within four weeks. The review will draw on international research evidence as well as the UK policy context to understand the most ideal solution to allow effective and sustainable practice change.

Understanding the Problem

Interruptions in wards occur when there is a need to stop a primary task before its completion to carry out an unexpected task and then resuming the primary task later. Nurses often experience primary task interruption due to external or internal demands (Kwon et al., 2021). According to Sasaki, Cucolo and Perroca (2019), a challenge of task interruption for nurses is

the need to reprioritise and reorient themselves. When they administer medication, if there is an interruption, most nurses recheck their actions. Despite this, due to the potential switch in cognitive costs, there is a higher risk of medication errors. Several studies categorise the nature of the interruption. For example, both Ali and Sherali (2019) and Schutijser et al. (2019) recognise that interruption by colleagues, including doctors and nurses, is the most common form of interruption. Meanwhile, Martyn, Paliadelis and Perry (2019) recognise that interruption due to staffing shortage could lead to nurses doing multiple roles at the same time. Sassaki et al. (2019) also contend that self-interruption (due to other tasks, use of mobile phones), information exchange and parallel conversation contribute to a loss of focus. Factors potentially contributing to distraction include alarms, paging, document prompts or other electronic alerts (Rafferty & Franklin, 2017).

Medication safety is recognised as central to patient safety frameworks. NHS England (2023) recognises that adverse medication-related incidents constitute 10% of all patient safety incidents. Therefore, medication administration-related interruptions need to be addressed. In their systematic review, Zhang et al. (2025) recognise that interruptions to workflow are caused by broader cultural and organisational issues like norms, staffing shortage and workflow demands. It is important to recognise potential interventions or solutions that can minimise the impact of these interruptions in terms of MAEs.

Evidence that a Problem Exists

International evidence has shown that interruptions can influence clinical errors. Eid, Machudo and Eid (2022) observed that 90% of all medication-related errors were attributed to interruptions. In a qualitative interview with nurses, Alteran et al. (2021) note that when nurses face interruptions, there is a delay in the timely administration of medication. There is also a potential safety issue, where the nurses may leave the medicines on the nightstand, which could

threaten patient safety. Alemu, Belachew and Yimam (2017) recognised that interruption created five times greater odds of medication error. Blignaut et al. (2017) similarly identified that when interrupted, the odds ratio of making a wrong dose error was 2.57. Lausten and Brahe (2018) concluded in their analysis that interruptions led to a loss of concentration and loss of workflow continuity, which can further heighten nurses' anxiety about making errors. Given the clinically significant impact of 66 million medication errors (Elliott et al., 2021), it is important to assess the extent to which interruptions contribute to this error rate. All of this evidence supports the argument that interruptions can have a systemic influence on patient safety. However, it is important to note that all of this evidence is from the international context and there remains scarcity in UK-based research measuring the impact of interruptions on patient safety outcomes.

Prior Attempts to Solve the Problem

Two randomised controlled trials (RCTs) have tested the impact of 'do not interrupt' cues during medication rounds. They show that visual cues work best as part of a specific bundle.

Westbrook et al. (2018), in their evaluation of a "Do not Interrupt" programme through a cluster RCT in a teaching hospital, evaluated the impact of visual cues. In their programme, they used multiple strategies including staff education, patient education and reminders about the programme, as well as wearing vests during rounds. The evidence showed that there was a reduction in non-medication-related interruption within the intervention ward. For example, pre-intervention, interruptions were at 50 per 100 administrations. After the intervention, this reduced to 34 per 100 administrations. Despite its effectiveness, some nurses had questions about the use of vests. This is because they were bulky and hot, and it took time to implement the policy. Westbrook et al. (2018) argued that one should look at aspects including effect size, opportunity cost and the acceptability of proposed interventions. A potential limitation of this

study was that it did not directly measure medication-related adverse effects. Interestingly, Westbrook et al.'s (2018) sub-analysis showed that reduced interruption from other nurses was a primary factor. The authors found that a reduction in social sources of interruption had a significant impact in terms of reducing medication errors. Patient-initiated interruptions had a limited impact. This could mean that visual cues do not remove clinically relevant and necessary access. Therefore, any visual cue that is implemented needs to be complemented by other interventions, like scripts or a buddy nurse who can triage non-urgent requests.

In another study, Berdot et al. (2021) directly compared the effectiveness of using vests and posters across units from French hospitals. Their study did not show a significant difference between medication-related mistakes across the intervention (7.09%) and control groups (6.23%) ($p=0.192$). There was also no measurable change in the interruption rate compared to controls. In their study, the authors believe that simply depending on vests is not enough. No education is given to nurses on how to deal with interruptions. Similarly, though posters were given to the patients, no steps were taken to help them understand the challenges of medication interruption. This supports the arguments of Westbrook et al. (2018) in that there is a combination of factors that could reduce interruptions during medication and such behavioural change requires multiple inputs.

Overall, the methodological rigour was effective in both studies. Westbrook et al. (2018) and Berdot et al. (2021) both adopted a cluster-based RCT, conducting appropriate treatment of clusters. In an analysis of outcome selection, Berdot et al.'s (2021) selection was clearer (e.g. medication adverse errors) and therefore more clinically useful. Both Berdot et al. (2021) and Westbrook et al. (2018) report on the number of interruptions. While this does provide insights into how many times nurses may be distracted due to interruptions, it does not directly provide insights into patient safety or other critical outcomes. One advantage with a secondary outcome included in Westbrook et al. (2018) is monitoring nurses' perception. The authors documented

acceptance by nurses as an outcome showing nurse perceived advantages and barriers to adoption.

There are others who have adopted other research designs. For example, in a pilot study by Huckels-Baumgart et al. (2017), combining staff training with safety vests was useful in reducing interruptions. The authors performed a pre- and post-intervention pilot study where direct observations were used to monitor 26 nurses. Direct observation of 431 medication doses across 36 patients was carried out. Staff training and the introduction of safety vests led to a reduction in interruptions. The study did not track medication-related adverse events but rather errors during medication preparation and interruption time. The introduction of staff training and safety vests led to a reduction in interruptions from 36.8 to 28.3 per hour. Visual cues were clearly more effective when integrated with a behavioural component. Though the authors highlight the intervention, there are several issues pertaining to methodological rigour in their research. These include the lack of a comparative/control group and the use of a pre-post approach. No effect size is reported in the study.

Practical application of the use of vests is evident in NHS Scotland's medication administration policy. NHS Scotland (2024) supports the use of vests to reduce interruptions. Purple aprons are worn by nurses who wear an apron. Hospitals are encouraged to have huddles where teams are reminded about the purpose of the purple aprons and their role in reducing disturbances/interruptions. In addition, a whole system communication strategy is developed so that staff and the public become aware of the relevance of the purple aprons. Nurses who are administering medicines are empowered to respond to interruptions from staff or patients (with non-emergency requests). For example, they can use sentences like "I'm afraid I'm involved in a safety critical process which can't be interrupted; however, you can speak to ..."

(NHS Scotland, 2024, p. 7).

Overall, this essay argues that visible “Do not Disturb” cues can be effective in reducing non-essential interruptions. However, the evidence does show that these need to be embedded in a bundle where training, diversion/buddy engagement and clear patient messaging are important. A vest/apron-only approach may not reduce the incidence of medication adverse events.

Proposed Intervention

This research recommends that the use of visible “Do not Disturb” cues can be integrated as a bundle rather than as a standalone intervention. The evidence from literature and practice supports this view. For example, Westbrook et al. (2018) support the need for combining vests with staff/patient education. In contrast, the use of just vests by Berdot et al. (2021) showed no reduction in medication administration error. Similarly, current practice guidelines in the NHS (NHS Scotland, 2024) call for a whole-system approach to integrating purple aprons with training and patient education. This research recommends that visual cues could be part of a short bundle including a behavioural change package. The bundle will have aprons along with staff training and patient education. Critically, this essay concludes that RCT evidence demonstrates the usefulness of education/training, patient engagement and visual cues. Therefore, any proposed design should integrate training, patient messaging and fidelity checks.

Successful implementation requires ensuring that there are clear primary and secondary measures to monitor outcomes. The secondary metric is non-essential interruptions per hour, while the primary metric is the medication administration error count. These outcomes will be monitored over a period of one month by two observers within a single ward. These observers will conduct 15-minute observations of ten rounds/week. Weekly run charts will be created to monitor progress. The week 4 mean will be compared against the baseline to report percentage

changes. Overall, a 30% reduction in non-essential interruptions/round and reductions in medication administrated errors are expected.

This essay also concludes that such a bundling strategy can be aligned with the broader UK policy context. For example, the Patient Safety Strategy (NHS England, 2019) calls for building safer systems and cultures where system-level changes are implemented. The UK Government's 10 Year Health Plan calls for designing systems which support pragmatic and locally adopted interventions. Therefore, any intervention that is implemented should be a visual cue bundle which is tested at a pilot level in specific wards (UK Government, 2025). The operational precedent from NHS Scotland can be used as a starting point to achieve such implementation.

Conclusion

Interruptions during medication rounds can lead to medication-related adverse events and threaten patient safety. This essay concludes that implementing visual “Do not Disturb” cues, including the use of aprons, is effective only when it is embedded within a small behavioural change bundle, including education/training, patient participation, and visual cues.

References

- Alemu, W., Belachew, T., & Yimam, I. (2017). Medication administration errors and contributing factors: A cross sectional study in two public hospitals in Southern Ethiopia. *International Journal of Africa Nursing Sciences*, 7(1), 68–74. <https://doi.org/10.1016/j.ijans.2017.09.001>
- Ali, S., & Sherali, S. (2019). Association of medication administration errors with interruption among nurses in public sector tertiary care hospitals. *Pakistan Journal of Medical Sciences*, 35(5), 13–18. doi:[10.12669/pjms.35.5.287](https://doi.org/10.12669/pjms.35.5.287)
- Alteren, J., Hermstad, M., Nerdal, L., & Jordan, S. (2021). Working in a minefield; Nurses' strategies for handling medicine administration interruptions in hospitals—a qualitative interview study. *BMC Health Services Research*, 21(1), 10-94. <https://doi.org/10.1186/s12913-021-07122-8>
- Berdot, S., Vilfaillot, A., Bezie, Y., Perrin, G., Berge, M., Corny, J., ... & Sabatier, B. (2021). Effectiveness of a 'do not interrupt' vest intervention to reduce medication errors during medication administration: a multicenter cluster randomized controlled trial. *BMC Nursing*, 20(1), 100–153. <https://doi.org/10.1186/s12912-021-00671-7>
- Blignaut, A. J., Coetzee, S. K., Klopper, H. C., & Ellis, S. M. (2017). Medication administration errors and related deviations from safe practice: an observational study. *Journal of Clinical Nursing*, 26(21–22), 3610–3623. <https://doi.org/10.1111/jocn.13732>
- Eid, T., Machudo, S., & Eid, R. (2022). Interruptions during medication work in a Saudi Arabian hospital: An observational and interview study of nurses. *Journal of Nursing Scholarship*, 54(5), 639–647. <https://doi.org/10.1111/jnu.12765>
- Hanson, A., & Haddad, L. M. (2023). Nursing rights of medication administration. In *StatPearls [Internet]*. StatPearls Publishing.

- Huckels-Baumgart, S., Niederberger, M., Manser, T., Meier, C. R., & Meyer-Masseti, C. (2017). A combined intervention to reduce interruptions during medication preparation and double-checking: a pilot-study evaluating the impact of staff training and safety vests. *Journal of Nursing Management*, 25(7), 539–548. <https://doi.org/10.1111/jonm.12491>
- Kwon, Y. E., Kim, M., & Choi, S. (2021). Degree of interruptions experienced by emergency department nurses and interruption related factors. *International Emergency Nursing*, 58(1), 101–136. <https://doi.org/10.1016/j.ienj.2021.101036>
- Laustsen, S., & Brahe, L. (2018). Coping with interruptions in clinical nursing—A qualitative study. *Journal of Clinical Nursing*, 27(7-8), 1497–1506. <https://doi.org/10.1111/jocn.14288>
- Martyn, J. A., Paliadelis, P., & Perry, C. (2019). The safe administration of medication: Nursing behaviours beyond the five-rights. *Nurse Education in Practice*, 37, 109–114. <https://doi.org/10.1016/j.nepr.2019.05.006>
- NHS England (2023). *Learning from Medication Errors*. Retrieved from: <https://resolution.nhs.uk/2023/03/30/learning-from-medication-errors/> (Accessed on 1st Oct, 2025).
- NHS England (2019). *The NHS Patient Safety Strategy*. Retrieved from: https://www.england.nhs.uk/wp-content/uploads/2020/08/190708_Patient_Safety_Strategy_for_website_v4.pdf
- Rafferty, A. M., & Franklin, B. D. (2017). Interruptions in medication administration: are we asking the right questions?. *BMJ Quality & Safety*, 26(9), 701–703. <https://doi.org/10.1136/bmjqs-2017-006737>
- Sasaki, R. L., Cucolo, D. F., & Perroca, M. G. (2019). Interruptions and nursing workload during medication administration process. *Revista Brasileira de Enfermagem*, 72(4), 1001–1006. <https://doi.org/10.1590/0034-7167-2018-0680>

- Schroers, G., Ross, J. G., & Moriarty, H. (2021). Nurses' perceived causes of medication administration errors: A qualitative systematic review. *The Joint Commission Journal on Quality and Patient Safety*, 47(1), 38–53.
<https://doi.org/10.1016/j.jcjq.2020.09.010>
- Schutijser, B. C., Klopotoska, J. E., Jongerden, I. P., Spreeuwenberg, P. M., De Bruijne, M. C., & Wagner, C. (2019). Interruptions during intravenous medication administration: a multicentre observational study. *Journal of Advanced Nursing*, 75(3), 555–562.
<https://doi.org/10.1111/jan.13880>
- UK Government (2025). 10 Year Health Plan for England: fit for the future. Retrieved from: <https://www.gov.uk/government/publications/10-year-health-plan-for-england-fit-for-the-future> (Accessed on 17th Oct, 2025).
- Westbrook, J. I., Raban, M. Z., Walter, S. R., & Douglas, H. (2018). Task errors by emergency physicians are associated with interruptions, multitasking, fatigue and working memory capacity: a prospective, direct observation study. *BMJ Quality & Safety*, 27(8), 655–663. doi:10.1136/bmjqs-2017-007333
- World Health Organization (WHO) (2023). *Global Burden of Preventable Medication-Related Harm in Health Care: A Systematic Review*. Retrieved from: <https://www.who.int/publications/i/item/9789240088887>. (Accessed on 2nd Oct, 2025).
- Zhang, W., Zhang, Y., Guo, Z., He, Y., & Ma, W. (2025). Effectiveness of Interventions for Reducing Interruptions During Medication Administration: A Systematic Review. *Worldviews on Evidence-Based Nursing*, 22(4), 67–70.
<https://doi.org/10.1111/wvn.70067>