

Table 2 (Supplementary file) Resilience interventions, effectiveness measures and results.

Author (year)	Intervention [intervention type]	Study target outcomes	Relevant resilience findings/results with examples
Debono <i>et al.</i> , (2017)(30)	Electronic medication management system [Technology]	1) Identification of nurses' use of electronic medication management systems in everyday practice 2) perceived barriers to appropriate use of electronic medication management systems using TDF*	Barriers to technology use were represented in 9 TDF domains. The major barriers were in domains 1 and 2: Domain 1 societal/professional role and identity, e.g. at night to avoid waking patients, nurse did not take computer on wheels to bedside Domain 2 environmental context and resources e.g. When nurses judged that taking the computer on wheels into a room created a falls or infection risk, they left it outside.
Durham <i>et al.</i> , (2016)(38)	Medication safety programme [Education]	1) the frequency of error interception practices 2) reduction in medication administration errors	Immediately post-programme, 99% of 99 nurses agreed their awareness of potential error risk increased. 10 weeks post-programme, error interception practices increased by 92% in the acute unit and by 303% in intensive care unit; 61% of respondents were using brief breath mindfulness meditative exercise to gain situational awareness. The programme effect was significant if route errors are removed from the analysis. Observed medication errors decreased.
Eisenhauer <i>et al.</i> , (2007)(31)	Bar code medication administration and electronic medication [Technology]	1) Documentation of nurses' reported thinking processes 2) effect on practice during medication administration	10 descriptive categories of nurses' thinking were identified including workarounds, anticipating problem-solving, assessment and evaluation. For example, workarounds included working around technology-related protocols to ensure a patient receives emergency medication. Anticipatory problem-solving included starting with a lower dose to enable assessment of patient's response to the dose before increasing. Most nurses' reported thinking did not change after the implementation of technology, except for the different types of checking it introduced.
Freeman <i>et al.</i> , (2013)(26)	Bundle of safety measures (e.g. no interruption zone, phone call /pager triage, patient / family / MDT education, staff	1) Reduction in interruptions during medication administration 2) reduction in reported medication errors	Number of interruptions reduced by 2.11 per medication encounter. Reported total errors reduced by 28 incidents over 3 months when compared with the same period in the previous year. Anecdotal feedback indicated the medication room was much quieter post-implementation and nurses placed more importance on the process of medication administration which assisted to reduce interruptions.

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	rounding, response to alarms) [Education]		
Holden <i>et al.</i> , (2013)(24)	Barcode medication administration technology [Technology]	The nature of new problem-solving behaviours	3 themes of new problem-solving behaviours: 1) invention of new problem-solving behaviour e.g. electronically sorting medications by name before printing, to enable quick access to that information by making a paper administration schedule. 2) intervention of technology blocked familiar problem-solving behaviour e.g. nurse collaborated with pharmacist to create 2 new orders (for 2 x 10mg of a drug) when a 20 mg dose not available. 3) technology created new problems, only some of which nurses were able to solve using familiar or novel problem-solving behaviours. e.g. turning on scanner in advance to account for slow booting.
Holden <i>et al.</i> , (2015)(27)	Barcode medication administration technology [Technology]	Changes in perceptions of safety, error likelihood and mental workload	Confirmation of hypothesis that external workload (interruptions, divided attention and being rushed), but not internal mental workload (concentration, mental effort) was associated with the perceived likelihood of a medication safety event. Perceived likelihood of medication errors decreased in one clinical area following the intervention. Nurses' perception was that how they reacted to external pressures, such as feeling rushed, had a perceived impact on safety.
McAlearney <i>et al.</i> , (2007)(32)	Smart IV pumps with decision support [Technology]	Improvements in understanding and challenges of additional decision support with smart pumps.	Challenges to smart pumps identified and nurses' workarounds in response to challenges identified, such as programming pump for extra volume to be administered to make sure all drug is given; using different modes to allow infusion of medications not listed in pump library.
Nemeth <i>et al.</i> , (2014)(34)	Smart IV pumps with decision support [Technology]	Desirable and unforeseen outcomes of implementation of smart IV pumps	Nurse-pump interaction and pump interface variability created both desirable and unforeseen outcomes. Workarounds are used to cope with mismatch between smart infusion design and actual care requirements. Such as working around the pump options when prescribed drug was not programmed into drug library, so nurse enters more or less than the amount indicated on the bag.
Niazkhani <i>et al.</i> , (2011)(35)	Computer physician order entry [Technology]	Medication-use process problems and workarounds	Some workarounds either eased or accelerated performance of tasks that support safety e.g. double checking for clarification of online orders, writing down verbal orders in records or notes

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			and following up with a call to physicians to issue an electronic version, asking patients to bring in home medications
Tucker (2016)(28)	Impact of work design factors on responses to operational failures [Critical thinking]	Responses to operational failures (missing medications) including 1) speaking up about the operational failure 2) contribution of a written improvement idea and 2) engagement in policy compliant workarounds	Nurses engaged in policy compliant workarounds only when it was easy to do so, but they are more likely to use the policy compliant workaround when they have high access to the process owner; otherwise, they used non-policy compliant workarounds. The inconvenience of the operational problem is what motivates them to contribute an improvement idea.
Van Ornum, (2018)(29)	Leadership initiative [Education]	Nurses' medication scanning compliance	Improvement in medication scanning compliance from 95% to 98% of medications. Nurses identified technical problems, quickly corrected these and made changes in clinical workflow and communication to ensure medication administered in a timely fashion.

***TDF: Theoretical Domains Framework**