

screening rates and adherence to preventive measures) often improve earlier than outcome indicators, forming an early “evidence chain” that signals the occurrence of improvement. For example, a pilot study in an intensive care unit used standardized nursing-sensitive quality indicators (staff qualifications, life-support certification, continuing education hours, and patient satisfaction) to evaluate QI effects. Following implementation, the validity rates of basic and advanced life support certification and continuing education hours increased significantly, alongside marked improvements in patient satisfaction with pain management, nursing care, and overall care, indicating that structural and process indicators are highly responsive to QI interventions. In geriatric specialty nursing, models such as “high-quality nursing” or “seamless care” have likewise been associated with higher nursing quality scores (service capacity, procedural compliance, humanistic care, and health education) and improvements in functional and psychosocial outcomes, further supporting the logical chain of “strengthened nursing processes→improved outcomes” (Zuo et al., 2023; Liu, 2025; Wei et al., 2025).

Beyond traditional manual audits, digital quality assessment and nursing informatics tools have enhanced the sensitivity and sustainability of NSIs for QI evaluation. An automated quality assessment system for pressure injury management in older adults demonstrated high concordance between its quality scores and expert nurse judgments, while significantly reducing assessment time, thereby supporting long-term tracking of guideline adherence as a process NSI. In critical care settings, systematic reviews indicate that nursing informatics interventions (e.g., electronic health records, decision support, and telemedicine) are associated with higher risk screening completion rates, improved adherence to pressure injury and fall prevention bundles, and greater process consistency. These findings mechanistically illustrate how “information-enabled process control” can optimize nursing process indicators upstream of adverse event occurrence. Accordingly, evaluation of QI effects should link changes in outcome indicators with concurrent improvements in structural and process indicators to avoid overinterpretation based solely on outcome fluctuations (Shi et al., 2025).

6.2 Changes in the incidence of adverse events during hospitalization of older patients

The ultimate goal of nursing QI is to reduce both the incidence and severity of adverse events during hospitalization of older patients. Comparing pre- and post-QI rates of falls, pressure injuries, catheter-related adverse events, aspiration, and other safety outcomes allows validation of intervention effectiveness at the patient safety endpoint level. Existing evidence suggests that targeted QI initiatives can reduce overall adverse event rates or alter their occurrence patterns to some extent; however, effects vary depending on care settings, implementation intensity, and patients’ structural vulnerability (Järbrink et al., 2025). A national longitudinal chart review study, after adjusting for case mix, found that the incidence of adverse events among acutely admitted older patients declined from 10.7% to approximately 7.2% between 2008 and 2016, with many events being medication-related. This improvement likely reflects system-level patient safety initiatives and strengthened nursing surveillance and standardized care processes. Among older patients with coronary heart disease, “seamless care” models significantly reduced adverse event rates while improving angina control and quality of life; similarly, in older patients undergoing cataract surgery, high-quality nursing interventions were associated with fewer postoperative complications and improved recovery trajectories (Zuo et al., 2023; Wei et al., 2025).

It should be emphasized, however, that risk does not “automatically disappear” with QI and that residual risk concentration and pattern shifts may occur. In studies of older trauma patients, the incidence of nursing-sensitive adverse events (e.g., infections, pressure injuries, bladder overdistension, and malnutrition) remained at approximately 30% and was strongly associated with greater frailty, injury severity, and longer hospital stays, suggesting that structural vulnerability may partially offset QI gains (Järbrink et al., 2025). Moreover, longitudinal data indicate that although overall adverse event rates declined, the proportion of events deemed preventable did not continue to decrease and even increased in later periods. This finding suggests that, against a backdrop of increasing disease complexity and healthcare congestion, there may be substantial remaining scope to prevent residual events through improved care. Registry data likewise indicate that burdens of falls, pressure injuries, and weight loss persist across care settings; even with risk registration and preventive care in place, adverse events are not fully eliminated.