

**Appendix 10 Summary of the results of eligible studies reported in the systematic reviews (n=60)**

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
<b>Prevention of adverse drug events</b>						
Wolfstadt et al., 2008 (22)	CPOE system	Preventable AEs	No (Reason not reported)	N.A.	N.A.	Few studies have measured the effect of CPOE with clinical decision support on the rates of ADEs, and none were randomized controlled trials.
Maaskant et al., 2015 (23)	CPOE system	ADE	No (Heterogeneity of methods of data collection, populations and study designs)	N.A.	N.A.	Current evidence on effective interventions to prevent medication errors and adverse drug events in a pediatric population in hospital is limited.
Holland et al., 2008 (24)	Medication reconciliation	All cause mortality	Yes	Medication review	<i>Mortality (Relative Risk)</i> = 0.96, 95% CI [0.82-1.13] p = 0.62 (22 studies; all eligible)	Pharmacist-led medication review interventions do not have any effect on reducing mortality or hospital admission in older people, and cannot be assumed to provide substantial clinical benefit. Such interventions may improve drug knowledge and adherence, but there are insufficient data to know whether quality of life is improved.
Mueller et al., 2012 (25)	Medication reconciliation	ADE; mortality	No (Heterogeneity in methods, interventions, and reported outcomes)	N.A.	N.A.	Rigorously designed studies comparing different inpatient medication reconciliation practices and their effects on clinical outcomes are scarce. Available evidence supports medication reconciliation interventions that heavily use pharmacy staff and focus on patients at high risk for AE.
Christensen and Lundh, 2013 (26)	Medication reconciliation	Mortality; falls; ADE	Yes (for mortality, not for adverse drug events and falls because of the lack of valid data)	Medication review	<i>Mortality (Risk Ratio)</i> = 0.98, 95% CI [0.78-1.23] p = 0.86 (4 studies; all eligible)	It is uncertain whether medication review reduces mortality or hospital readmissions, but medication review seems to reduce emergency department contacts. However, the cost-effectiveness of this intervention is not known and due to the uncertainty of the estimates of mortality and readmissions and the short follow-up, important treatment effects may have been overlooked.
Hohl et al., 2015 (27)	Medication reconciliation	Mortality	Yes	Medication review	<i>Mortality (Odds Ratio)</i> = 1.09, 95% CI [0.69-1.72] p = 0.71 (3 studies; all eligible)	This systematic review failed to identify an effect of pharmacist-led medication review on health outcomes.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Durieux et al., 2008 (28)	Computer assisted decision support/alerts	Deaths; ARs	Yes (for mortality, not for AR due to diversity of drugs and of type of adverse reactions)	Computerized advice on drug dosage	<i>Deaths (Risk Ratio)</i> = 0.81, 95% CI [0.37-1.81] p = 0.61 ( 6 studies; all eligible)	This review suggests that computerized advice for drug dosage has some benefits: it increased the initial dose of drug, increased serum drug concentrations and led to a more rapid therapeutic control. It also reduced the risk of toxic drug levels and the length of time spent in the hospital. However, it had no effect on adverse reactions or mortality rates.
Gillaizeau et al., 2013 (29)	Computer assisted decision support/alerts	Mortality; clinical AE	Yes (for mortality; not for clinical AEs due to diversity in outcomes)	Computerized advice on drug dosage	<i>Mortality (Risk Ratio)</i> = 1.08, 95% CI [0.80-1.45] p = 0.61 (10 studies; all eligible)	It tends to decrease unwanted effects for aminoglycoside antibiotics and anti-rejection drugs, and it significantly decreases thromboembolism events for anticoagulants [...]. However, there was no evidence that decision support had an effect on mortality or other clinical adverse events for insulin (hypoglycaemia), anaesthetic agents, anti-rejection drugs and antidepressants. [...] Taking into account the high risk of bias of, and high heterogeneity between, studies, these results must be interpreted with caution.
Bayoumi et al., 2014 (30)	Computer assisted decision support/alerts	AE (bleeding and thrombosis)	Yes	Computerized drug- lab alerts	<i>Adverse events (bleeding and thrombosis) (Odds Ratio)</i> = 0.88, 95% CI [0.78-1.00] p = 0.05 (4 studies; all eligible)	There is no evidence that computerized drug-lab alerts are associated with important clinical benefits, but there is evidence of improvement in selected clinical surrogate outcomes (time in therapeutic range for vitamin K antagonists), and changes in process outcomes (lab monitoring and prescribing decisions).
Kaboli et al. 2006 (31)	Multi component interventions	(Preventable) ADE; mortality; bleeding complications; VTE	No (Small sample size and methodological limitations of included studies)	N.A.	N.A.	The addition of clinical pharmacist services in the care of inpatients generally resulted in improved care, with no evidence of harm.
Manias et al., 2012 (32)	Multi component interventions	Severity of harm of medication errors; ADE; preventable prescribing AE	No (Heterogeneity for the outcome variable)	N.A.	N.A.	It is not possible to promote any interventions as positive models for reducing medication errors.
Davey et al., 2013 (33)	Multi component interventions	Mortality	Yes	Intervention to increase appropriate antibiotic treatment	<i>Mortality (Risk Ratio)</i> = 0.92, 95% CI [ 0.69-1.22] p = 0.56 (3 studies; all eligible)	The results show that interventions to reduce excessive antibiotic prescribing to hospital inpatients can reduce antimicrobial resistance or hospital-acquired infections, and interventions to increase effective prescribing can improve clinical outcome.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
				Antibiotic guideline compliance for pneumonia	<i>Mortality (Risk Ratio)</i> = 0.89, 95% CI [0.82-0.97] p = 0.01 (4 studies; all eligible)	
				Interventions to decrease excessive prescribing of antibiotics	<i>Mortality (Risk Ratio)</i> = 0.92, 95% CI [0.81-1.06] p = 0.25 (11 studies; all eligible)	
Patterson et al., 2014 (34)	Multi component interventions	ADE	No (Heterogeneity of scales to measure outcome measures and reporting methods)	N.A.	N.A.	It is unclear if interventions to improve appropriate polypharmacy, such as pharmaceutical care, resulted in a clinically significant improvement; however, they appear beneficial in terms of reducing inappropriate prescribing and medication-related problems.
Ensing et al., 2015 (35)	Multi component interventions	Mortality; ADE	No (Heterogeneity among studies)	N.A.	N.A.	In multifaceted intervention programs, performing medication reconciliation alone is insufficient in reducing postdischarge clinical outcomes and should be combined with active patient counseling and a clinical medication review. Furthermore, close collaboration between pharmacists and physicians is beneficial. Finally, it is important to secure continuity of care by integrating pharmacists in these multifaceted programs across health care settings. Ultimately, pharmacists need to know patient clinical background and previous hospital experience.
Wang et al., 2015 (36)	Multi component interventions	Preventable ADE	Yes	Pharmacist interventions	<i>Preventable ADE (Odds Ratio)</i> = 0.23, 95% CI [0.11-0.48] p < 0.01 (3 studies, 2 eligible)	Results suggest that pharmacist intervention has no significant contribution to reducing general MEs, although pharmacist intervention may significantly reduce preventable adverse drug events and prescribing errors.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
<b>Infection prevention</b>						
Flodgren et al., 2013 (37)	Prevention of device related infections	VAP; CLASBI; mortality	No (Heterogeneity among studies)	N.A.	N.A.	The low to very low quality of the evidence of studies included in this review provides insufficient evidence to determine with certainty which interventions are most effective in changing professional behavior and in what contexts. However, interventions that may be worth further study are educational interventions involving more than one active element and that are repeatedly administered over time, and interventions employing specialized personnel, who are focused on an aspect of care that is supported by evidence e.g. dentists/ dental auxiliaries performing oral care for VAP prevention.
Jansson et al., 2013 (38)	Prevention of device related infections	VAP; mortality	No (Methodological limitations of the included studies)	N.A.	N.A.	Education has significant benefits for improving patient safety, and thus the quality of care. Active implementation strategies involving repeated lectures and regular surveys of VAP occurrence would be beneficial.
Blot et al., 2014 (39)	Prevention of device related infections	CLASBI	Yes	Bundle/ checklist and non bundle/checklist interventions	<i>Total number of CLASBI (Odds Ratio)</i> = 0.39, 95% CI [0.33 -0.46] p = <0.01 (41 studies; 5 eligible)	These results suggest that quality improvement interventions contribute to the prevention of central line-associated bloodstream infections. Implementation of care bundles and checklists appears to yield stronger risk reductions.
					<i>Change in CLASBI rate levels at 3 months post intervention (Odds Ratio)</i> = 0.30, 95% CI [0.10-0.88] p= 0.03 (6 studies; 4 eligible)	
Meddings et al., 2014 (40)	Prevention of device related infections	CAUTI	Yes	Reminder and stop order	<i>CAUTI episodes per 1000 catheter days (Risk Ratio)</i> = 0.47, 95% CI [0.30-0.64] p = < 0.01 (11 studies; 1 eligible)	Urinary Catheter reminders and stop orders appear to reduce CAUTI rates and should be used to improve patient safety.
					<i>Percentage of patients who developed CAUTI (Risk Ratio)</i> = 0.72, 95% CI [0.52-0.99] p = 0.045 (8 studies; 2 eligible)	
Damiani et al., 2015 (41)	Interventions to improve compliance to sepsis bundle interventions	Mortality	Yes	Performance improvement program	<i>Mortality (Odds Ratio)</i> = 0.66, 95% CI [0.61-0.72] p <0.01 (48 studies, 3 eligible)	Performance improvement programs are associated with increased adherence to resuscitation and management sepsis bundles and with reduced mortality in patients with sepsis, severe sepsis or septic shock.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Silvestri et al., 2005 (42)	Interventions to improve hand hygiene compliance	Infection rates; mortality	No (Reason not reported)	N.A.	N.A.	Hand washing on its own does not abolish but only reduces transmission, as it is dependent upon the bacterial load on the hands of healthcare workers. Hand washing can only influence a subset of long-stay patients on ICUs. Only a randomized trial could support the statement of the Hand washing Liaison Group providing evidence for hand washing being a modest measure with big effects.
Gould et al., 2010 (43)	Interventions to improve hand hygiene compliance	Healthcare associated infections	No (Heterogeneity of interventions and methods)	N.A.	N.A.	The quality of intervention studies intended to increase hand hygiene compliance remains disappointing. Although multifaceted campaigns with social marketing or staff involvement appear to have an effect, there is insufficient evidence to draw a firm conclusion.
Safdar and Abad, 2008 (44)	Overall hospital acquired infection prevention	CRBSI; VAP; CAUTI; overall nosocomial infections	No (Heterogeneity of studies)	N.A.	N.A.	The implementation of educational interventions may reduce healthcare- associated infections considerably.
<b>Delirium prevention</b>						
Cole et al., 1998 (45)	Delirium prevention	ARR of delirium	No (Small number of included studies; mostly nonrandomized designs in which outcomes were not rated blind; heterogeneity of populations and interventions)	N.A.	N.A.	It is difficult to draw firm conclusions because of three methodological problems.
Milisen et al., 2005 (46)	Delirium prevention	Incidence, severity and duration of delirium; mortality	No (Small number of included studies; heterogeneity of populations and interventions; methodological limitations of included studies)	N.A.	N.A.	Multicomponent interventions to prevent delirium are the most effective and should be implemented through synergistic cooperation between the various healthcare disciplines.
Hempenius et al., 2011 (47)	Delirium prevention	Delirium (incidence)	Yes	Multi-component interventions	<i>Incidence of delirium (Odds Ratio) = 0.58, 95% CI [ 0.38- 0.92] p value NR (5 studies; all eligible)</i>	Interventions to prevent delirium are effective. Interventions seem to be more effective when the incidence of delirium in the population under study is above 30%.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
				One component interventions	<i>Incidence of delirium (Odds Ratio)</i> = 1.05, 95% CI [ 0.09- 11.57] p value NR (2 studies; all eligible)	
Reston et al., 2013 (48)	Delirium prevention	Incidence of delirium	No (Methodological limitations of included studies, heterogeneity of interventions; small number of studies)	N.A.	N.A.	The evidence from 19 studies that met the inclusion criteria suggests that most multicomponent interventions are effective in preventing onset of delirium in at-risk patients in a hospital setting.
Collinsworth et al., 2014 (49)	Delirium prevention	Incidence and duration of delirium; mortality	No (Heterogeneity of interventions and measured outcomes)	N.A.	N.A.	Although multifaceted care approaches may reduce delirium and improve patient outcomes, greater improvements may be achieved by deploying a comprehensive bundle of care practices including awakening and breathing trials, delirium monitoring and treatment, and early mobility.
Hshieh et al., 2015 (50)	Delirium prevention	Incidence of delirium; falls	Yes	Multi-component interventions	<i>Incidence delirium (Odds Ratio)</i> = 0.47, 95% CI [0.38- 0.58] p <0.01 (11 studies; 7 eligible)	Multicomponent nonpharmacological delirium prevention interventions are effective in reducing delirium incidence and preventing falls, with a trend toward decreasing length of stay and avoiding institutionalization.
Martinez et al., 2015 (51)	Delirium prevention	Incidence and duration of delirium; falls	Yes	Multi component interventions	<i>Prevention of incident delirium (Risk Ratio)</i> = 0.73, 95% CI [0.63-0.85] p <0.01 (7 studies; all eligible)	Multicomponent interventions are effective in preventing incident delirium among elderly inpatients.
<b>Prevention of mortality or adverse events after discharge</b>						
Griffiths et al., 2005 (52)	Handover of inpatients	Mortality	Yes	NLU (nursing-led inpatients units)	<i>Inpatient mortality (Odds Ratio)</i> = 1.10, 95% CI [0.56-2.16] p = 0.64 (7 studies; all eligible)	The NLU successfully functions as a form of intermediate care, so far there is no evidence of adverse outcome from the lower level of routine medical care. There is no evidence of benefit over the longer term.
					<i>Mortality to longest follow up 3 or 6 months post- admission (Odds Ratio)</i> = 0.96, 95% CI [0.63-1.47] p = 0.62 (6 studies; all eligible)	
Conroy et al., 2011 (53)	Handover of inpatients	Mortality	Yes	Comprehensive geriatric assessment	<i>Mortality at final follow up (Risk Ratio)</i> = 0.92, 95% CI [0.55-1.52] p = 0.77 (5 studies; all eligible)	There is no clear evidence of benefit for comprehensive geriatric assessment interventions in frail older people being discharged from emergency departments or acute medical units.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Niven et al., 2014 (54)	Handover of inpatients	Mortality	Yes		<i>Mortality (Risk Ratio)</i> = 0.84, 95% CI [0.66–1.05] p = 0.1 (3 studies; 2 eligible)	Critical care transition programs appear to reduce the risk of ICU readmission in patients discharged from ICU to a general hospital ward.
Rennke et al., 2013 (55)	Hospital discharge	Postdischarge AE; ADE; ADR; falls	No (Heterogeneity of interventions, study settings, and patient populations)	N.A.	N.A.	Because of scant evidence, no conclusions could be reached on methods to prevent postdischarge AEs. Most studies did not report intervention context, implementation, or cost. The strategies hospitals should implement to improve patient safety at hospital discharge remain unclear.
Sheppard et al., 2013 (56)	Hospital discharge	Mortality; falls	Yes	Discharge planning from hospital to home	<i>Mortality at 6 to 9 months (Risk Ratio)</i> = 1.00, 95% CI [0.79-1.26] p = 0.69 (6 studies; all eligible) <i>Number of falls at follow up (Risk Ratio)</i> = 0.87, 95% CI [0.50-1.49] p = 0.61 (1 study)	The evidence suggests that a discharge plan tailored to the individual patient probably brings about reductions in hospital length of stay and readmission rates for older people admitted to hospital with a medical condition. The impact of discharge planning on mortality, health outcomes and cost remains uncertain.
Lowthian et al., 2015 (57)	Hospital discharge	Mortality	Yes	Optimized ED discharge	<i>Mortality up to 18 months post discharge (Odds Ratio)</i> = 1.01, 95% CI [0.70-1.47] p = 0.94 (2 studies; all eligible)	There is limited high-quality data to guide confident recommendations about optimal ED community transition strategies, highlighting a need to encourage better integration of researchers and clinicians in the design and evaluation process, and increased reporting, including appropriate robust evaluation of efficacy and effectiveness of these innovative models of care.
Zhu et al., 2015 (58)	Hospital discharge	Mortality	Yes	Nurse-led early discharge planning programmes	<i>Mortality (all cause) (Risk Ratio)</i> = 0.70, 95% CI [0.52-0.95] p = 0.02 (5 studies; all eligible)	Compared to standard care, nurse-led early discharge planning programmes have a positive impact on several aspects of care for inpatients with chronic disease and rehabilitation requirements, including reducing readmission, readmission length of stay and mortality and improving quality of life.
<b>Fall prevention</b>						
Oliver et al., 2007 (59)	Fall prevention	Falls; fallers; fractures	Yes	Multifaceted interventions	<i>Falls (Rate Ratio)</i> = 0.82, 95% CI [0.68-1.00] p value NR (12 studies; all eligible) <i>Fallers (Relative Risk)</i> = 0.95, 95% CI [0.71-1.27] p value NR (12 studies; all eligible)	There is some evidence that multifaceted interventions in hospital reduce the number of falls. There is insufficient evidence, however, for the effectiveness of other single interventions in hospitals.

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
					Fractures (Rate Ratio) = 0.59, 95% CI [0.22-1.58] p value NR (12 studies; all eligible)	
Coussement et al., 2008 (60)	Fall prevention	Falls; fallers; physical injuries	Yes (for falls and fallers, not for physical injuries)	Multifactorial intervention	<p>Fall (Risk Ratio) = 0.82, 95% CI [0.65-1.03] p value NR (4 studies; all eligible)</p> <p>Number of fallers (Risk Ratio) = 0.87, 95% CI [0.70-1.08] p value NR (4 studies; all eligible)</p>	This meta-analysis found no conclusive evidence that hospital fall prevention programs can reduce the number of falls or fallers, although more studies are needed to confirm the tendency observed in the analysis of individual studies that targeting a patient's most important risk factors for falls actively helps in reducing the number of falls. These interventions seem to be useful only on longstay care units.
Cameron et al., 2012 (61)	Fall prevention	Rate of falls; risk of fallings; number of people sustaining a fracture	Yes	<p>Multifactorial interventions</p> <p>Exercises</p>	<p>Rate of falls (Rate Ratio) = 0.69, 95% CI [0.49-0.96] p = 0.03 (4 studies; all eligible)</p> <p>Risk of fallings (Risk ratio) = 0.71, 95% CI [0.46-1.09] p = 0.12 (3 studies; all eligible)</p> <p>Number of people sustaining a fracture (Risk Ratio) = 0.43, 95% CI [0.10-1.78] p = 0.24 (3 studies; all eligible)</p> <p>Risk of falling (Rate Ratio) = 0.36, 95% CI [0.14-0.93] p = 0.04 (2 studies; all eligible)</p>	Exercise in subacute hospital settings appears effective. There is evidence that multifactorial interventions reduce falls in hospitals but the evidence for risk of falling was inconclusive.
Miake-Lye et al., 2013 (62)	Fall prevention	Reduction in fall rate; incidence of falls; injuries per fall; injury rate per fall	No (Reason not reported)	N.A.	N.A.	For multicomponent inpatient fall programs, our review provides both evidence that such programs reduce falls and insight into how facilities can successfully implement them.
<b>Interventions to reduce adverse events in surgery</b>						
Chen et al., 2013 (63)	Preventing surgical site infections	Overall SSI; infections of S aureus; MRSA; wound complications	No (Heterogeneity of studies)	N.A.	N.A.	Preoperative screening and decolonization of S. aureus in orthopaedic patients is a cost-effective means to reduce SSIs.
Howell et al., 2014 (64)	Interventions to reduce adverse events in surgery	Adverse events	No (Heterogeneity of subject groups, end points, and specialties)	N.A.	N.A.	Only a small cohort of medium- to high-quality interventions effectively reduce surgical harm and are feasible to implement.



Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Hempel et al., 2015 (65)	Preventing wrong site surgery	Incidence of wrong site surgery	No (Heterogeneity of publications)	N.A.	N.A.	Despite promising approaches and global Universal Protocol evaluations, empirical evidence for interventions is limited.
Bergs et al., 2014 (66)	Surgical safety checklist	Any complication; mortality; surgical site infections	Yes	WHO surgical safety checklist	<i>Any complication (Risk Ratio)</i> = 0.59, 95% CI [0.47-0.74] p = <0.01 (5 studies; all eligible)	The evidence is highly suggestive of a reduction in postoperative complications and mortality following implementation of the WHO SSC, but cannot be regarded as definitive in the absence of higher-quality studies.
					<i>Mortality (Risk Ratio)</i> = 0.77, 95% CI [0.60-0.98] p = 0.04 (4 studies, 3 eligible)	
					<i>Surgical site infections (Risk Ratio)</i> = 0.57, 95% CI p = <0.01 [0.41-0.79] (5 studies; all eligible)	
Algie et al., 2015 (67)	Surgical safety checklist	Incidence of wrong site neurological events	No (Small number of studies)	N.A.	N.A.	The data suggested a strong downward trend in the incidence of wrong-site surgery prior to the intervention with the incidence rate approaching zero. The effect of the intervention in these studies however remains unclear, as data reflect only two small low-quality studies in very specific population groups.
<b>Prevention of hospital mortality and cardiopulmonary arrest with rapid response systems</b>						
Esmonde et al., 2006 (68)	Critical care outreach service	Mortality; cardiac arrest	No (Reason not reported)	N.A.	N.A.	Although improvements in patient outcomes were found, the evidence in this review is insufficient to demonstrate this conclusively.
Chan et al., 2010 (69)	Rapid response teams	Mortality; cardiopulmonary arrest	Yes	Rapid response team	<i>Hospital mortality (Relative Risk)</i> = 0.92, 95% CI [0.82-1.04] p value NR (16 studies; all eligible)	Although rapid response teams have broad appeal, robust evidence to support their effectiveness in reducing hospital mortality is lacking.
					<i>Cardiopulmonary arrest (Relative Risk)</i> = 0.65, 95% CI [0.55-0.77] p value NR (16 studies; all eligible)	

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Massey et al., 2013 (70)	Rapid response systems	Mortality; cardiac arrest	No (Reason not reported)	N.A.	N.A.	The paper illustrates two important gaps in the literature. First, 'ramp-up' systems have not been subjected to formal evaluation. Second, rapid response systems are under-activated and underused by nursing staff. There is an urgent need to explore the reasons for this and to identify interventions to improve the activation of these systems in an effort to promote safe and effective care to the deteriorating ward patient.
Maharaj et al., 2015 (71)	Rapid response teams	Mortality; cardiopulmonary arrest	Yes	Rapid response team	<p><i>Hospital mortality adults (Risk Ratio)</i> = 0.91, 95% CI [0.85-0.97] p &lt; 0.01 (4 studies; all eligible)</p> <p><i>Hospital mortality pediatric patients (Risk Ratio)</i> = 0.76, 95% CI [0.53-1.09] p = 0.14 (1 study; all eligible)</p> <p><i>Cardiopulmonary arrest adults (Risk Ratio)</i> = 0.74, 95% CI [ 0.56-0.98] p = 0.04 (2 studies; all eligible)</p> <p><i>Cardiopulmonary arrest pediatric patients (Risk Ratio)</i> = 0.35, 95% CI [0.08-1.59] p = 0.17 (1 study; all eligible)</p>	Rapid response systems were associated with a reduction in hospital mortality and cardiopulmonary arrest. Meta-regression did not identify the presence of a physician in the rapid response system to be significantly associated with a mortality reduction.
<b>Prevention of venous thromboembolism</b>						
Kahn, et al., 2013 (72)	Prevention of venous thromboembolism	All VTE; DVT; PE; bleeding; mortality	Yes	Alerts	<i>All VTE (Risk Ratio)</i> = 0.85, 95% CI [0.49-1.46] p value NR (3 studies; all eligible)	We found statistically significant improvements in prescription of prophylaxis associated with alerts (RCTs) and multifaceted interventions (RCTs and NRS), and improvements in prescription of appropriate prophylaxis in NRS with the use of education, alerts and multifaceted interventions. Multifaceted interventions with an alert component may be the most effective.
				Multifaceted	<i>All VTE (Risk Ratio)</i> = 1.01, 95% CI [0.51-1.98] p value NR (5 studies; all eligible)	
					<i>Symptomatic DVT (Risk Ratio)</i> = 0.59, 95% CI [0.18-1.98] p value NR (3 studies; all eligible)	

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
Lau and Haut 2014 (73)	Prevention of venous thromboembolism	(Preventable) VTE	No (Reason not reported)	N.A.	N.A.	Many intervention types have proven effective to different degrees in improving VTE prevention. Provider education is likely a required additional component and should be combined with other intervention types. Active mandatory tools are likely more effective than passive ones. Information technology tools that are well integrated into provider workflow, such as alerts and computerized clinical decision support, can improve best practice prophylaxis use and prevent patient harm resulting from VTE.
<b>Prevention of adverse events by changes in staffing</b>						
Reed et al., 2010 (74)	Staffing	Preventable AE; mortality	No (Heterogeneity of outcomes)	N.A.	N.A.	For the limited outcomes measured, most studies supported reducing shift length but did not adequately address the optimal shift duration.
Butler et al., 2011 (75)	Staffing	Mortality; post discharge adverse events	Yes	Addition of specialist nursing post to staffing	<i>In-hospital mortality (Risk Ratio)</i> = 0.96, 95% CI [0.59-1.56] p = 0.86 (1 study) <i>Post discharge adverse events (Risk Ratio)</i> = 1.03, 95% CI [0.70-1.53] p = 0.87 (1 study)	The findings suggest interventions relating to hospital nurse staffing models may improve some patient outcomes, particularly the addition of specialist nursing and specialist support roles to the nursing workforce. Interventions relating to hospital nurse staffing models may also improve staff-related outcomes, particularly the introduction of primary nursing and self-scheduling. However, these findings should be treated with extreme caution due to the limited evidence available from the research conducted to date.
				Increasing the proportion of support staff	<i>Death in trauma unit (Risk Ratio)</i> = 0.41, 95% CI [0.16-1.01] p = 0.05 (1 study) <i>Death in hospital (Risk Ratio)</i> = 0.56, 95% CI [0.29-1.09] p = 0.09 (1 study)	
					<i>Death at 4 months (Risk Ratio)</i> = 0.57, 95% CI [0.34-0.95] p = 0.03 (1 study)	
Pannick et al., 2015 (76)	Staffing	Mortality; delirium episode; ADE; bleeding; falls; AE	Yes (for mortality, not for the other outcomes)	Interdisciplinary team composition interventions	<i>Mortality (weighted risk ratio)</i> = 0.92, 95% CI [0.816-1.049] p value NR (7 studies; all eligible)	Current evidence suggests that interdisciplinary team care interventions on general medical wards have little effect on traditional measures of health care quality. Complications of care or preventable adverse events may merit inclusion as quality indicators for general medical wards.
				Team practice interventions	<i>Mortality (weighted risk ratio)</i> = 0.665, 95% CI [0.449-0.986] p value NR (2 studies, all eligible)	

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
<b>Prevention of pressure ulcers</b>						
Sullivan and Schoelles, 2013 (77)	Prevention of pressure ulcers	Pressure ulcer prevalence	No (Reason not reported)	N.A.	N.A.	Moderate-strength evidence from 26 implementation studies suggests that the integration of a common set of components in pressure ulcer prevention programs could lead to reductions in pressure ulcer rates. Key issues were the simplification and standardization of pressure-ulcer specific interventions and documentation, involvement of multidisciplinary teams and leadership, designated skin champions, ongoing staff education, and sustained audit and feedback for promoting.
<b>Prevention of mechanical complications and underfeeding</b>						
Naylor et al., 2004 (78)	Prevention of mechanical complications and underfeeding	Mechanical complication, underfeeding	No (Heterogeneity of studies)	N.A.	N.A.	The general effectiveness of the total parenteral nutrition team has not been conclusively demonstrated. There is evidence that patients managed by TPN teams have a reduced incidence of total mechanical complications; however, it is unclear if there is a reduction in catheter-related sepsis and metabolic and electrolyte complications.
<b>Prevention of complications and mortality by clinical pathways</b>						
Rotter et al., 2010 (79)	Prevention of complications and mortality by clinical pathways	Mortality rate; (in hospital) complications	Yes	Clinical pathway	<i>Mortality rate (Odds Ratio)</i> = 0.84, 95% CI [0.64-1.11] p = 0.23 (3 studies; all eligible)	Clinical pathways are associated with reduced in-hospital complications and improved documentation without negatively impacting on length of stay and hospital costs.
					<i>Complications up to three months (Odds Ratio)</i> = 0.31, 95% CI [0.13-0.72] p = 0.07 (1 study; all eligible)	
					<i>In-hospital complications (Odds Ratio)</i> = 0.58, 95% CI [0.36-0.94] p = 0.03 (5 studies; all eligible)	

Study, year (reference)	Patient-Safety Area	Patient outcome	Meta analysis	Intervention component	Outcome (n = studies included in meta analysis; number of eligible studies)	Conclusion reported by the authors
<b>Prevention of adverse events by promoting a culture of safety</b>						
Weaver et al., 2013 (80)	Prevention of adverse events by promoting a culture of safety	AE	No (Heterogeneity of interventions and survey instruments and outcomes)	N.A.	N.A.	Twenty-nine studies reported some improvement in safety culture or patient outcomes, but measured outcomes were highly heterogeneous. Strength of evidence was low, and most studies were pre–post evaluations of low to moderate quality. Within these limits, evidence suggests that interventions can improve perceptions of safety culture and potentially reduce patient harm.
<b>Prevention of adverse events by external inspection</b>						
Flodgren, et al., 2011 (81)	Prevention of adverse events by external inspection	MRSA rates	No (Too few studies identified)	N.A.	N.A.	No firm conclusions could therefore be drawn about the effectiveness of external inspection on compliance with standards.

ADE: Adverse Drug Events; ADR: Adverse Drug Reaction; AE: Adverse events; AR: Adverse reactions; ARR: Absolute risk reduction; CAUTI: Catheter associated urinary tract infection; CI: Confidence interval; CLASBI: Central line associated blood stream infections; CRBSI: Catheter Related Blood Stream Infections; DVT: Deep vein thrombosis; N.A: Not applicable; PE: Pulmonary embolism; SSI: Surgical site infections; VAP: Ventilator associated pneumonia; VTE: Venous thromboembolism