Appendix 8 Characteristics of eligible studies included in the systematic reviews (n=60)

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
Prevention of adverse drug events							
CPOE system	Wolfstadt et al., 2008 (22)	Up to 2007	2 (10)	Computerized physician order entry system	Hospital and ICU patients	U	CT = 1; ITS = 1
CPOE system	Maaskant et al., 2015 (23)	Up to 2014	2 (7)	Computerized physician order entry (CPOE)	≥ 18 years	36730	CBA = 1; ITS = 1
Medication reconciliation	Holland et al., 2008 (24)	Up to 2005	22 (32)	Medication review	≥ 60 years	13305	RCT = 22
Medication reconciliation	Mueller et al., 2012 (25)	Up to 2012	5 (26)	Medication reconciliation	Not specified	1819	RCT = 3; non- RCT = 1; CBA = 1
Medication reconciliation	Christensen and Lundh, 2013 (26)	Up to 2011	5 (5)	Medication review	Not specified	1186	RCT = 5
Medication reconciliation	Hohl et al., 2015 (27)	2000-2013	6 (7)	Medication review	≥ 18 years in acute care	1970	RCT = 5; non-RCT = 1
Computer assisted decision support/ alerts	Durieux et al., 2008 (28)	1966 - 2006	10 (23)	Computer-assisted decision support on drug dosage	Patients receiving drug therapy	1210	RCT = 9; non- RCT = 1
Computer assisted decision support/ alerts	Gillaizeau et al., 2013 (29)	1996 - 2013	33 (46)	Computerized advice on drug dosage as a recommendation provided to the healthcare professional	Not specified	30341	RCT = 33
Computer assisted decision support/ alerts	Bayoumi et al., 2014 (30)	1974 - 2013	9 (36)	Computerized drug lab alerts for clinicians on prescribing or monitoring decisions	≥ 18 years	N.R.	RCT = 9
Multi component interventions	Kaboli et al., 2006 (31)	1985 - 2005	13 (36)	Clinical pharmacy activities and responsibilities (patient interview, medication profile and medical record review, presentation of drug regimen, recommendations to care team or physician, participating on rounds with inpatient care team, drug monitoring and recommendation follow-up, drug therapy dosing or management, documentation of clinical interventions or recommendations, patient counseling before discharge and telephone follow-up after discharge)	≥ 18 years	12397	RCT = 7; non- RCT = 1; quasi experimental = 1; CBA = 4
Multi component interventions	Manias et al., 2012 (32)	Up to 2011	10 (24)	Computerized physician order entry; changes in work schedules; intravenous systems; modes of education; medication reconciliation; pharmacist involvement; protocols and guidelines; support systems for clinical decision-making	ICU	U	non- RCT = 2; quasi RCT = 1; CBA = 7

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
Multi component interventions	Davey et al., 2013 (33)	1980 - 2009	23 (89)	Persuasive interventions (e.g. distribution of educational materials, local consensus processes, educational outreach visits and local opinion leaders); restrictive interventions (e.g. selective reporting of laboratory susceptibilities, formulary restriction and requiring prior authorization of prescriptions by infectious diseases physicians, microbiologists, pharmacists etc); structural interventions (e.g. changing from paper to computerized records, rapid laboratory testing and computerized decision support systems)	Acute care	U	RCT = 13; CCT = 2; CBA = 3; ITS = 5
Multi component interventions	Patterson et al., 2014 (34)	Up to 2009	3 (10)	Professional interventions (e.g. educational programs aimed at prescribers); organizational interventions (e.g. skill-mix changes, pharmacist-led medication review services or specialist clinics); information and communication technology (ICT) interventions (e.g. clinical decision support systems or use of risk screening tools); financial interventions (e.g. incentive schemes for changes in prescribing practice); regulatory interventions (e.g. government policy or legislative changes affecting prescribing)	≥ 65 years	1152	RCT = 3
Multi component interventions	Ensing et al., 2015 (35)	Up to 2014	19 (30)	Pharmacist interventions (e.g. different categories: admission, patient counseling, medical team, medication review, discharge reconciliation and provision of adherence aids)	≥ 18 years	7829	RCT = 19
Multi component interventions	Wang et al., 2015 (36)	Up to 2014	2 (4)	Pharmacist interventions (e.g. physician rounds, providing physicians with information and advice on ADE, drug interactions and dose intervals)	(Pediatric) ICU	2794	CBA = 2
Infection prevention							
Prevention of device-related infections (CAUTI; CLABSI; VAP)	Flodgren et al., 2013 (37)	Up to 2012	10 (13)	Interventions to avoid the use, or decrease the length of use of invasive medical devices (i.e. urinary catheters, central line catheters, mechanical ventilators), or interventions to improve adoption of measures to prevent device-related infection, such as: professional interventions (distribution of educational materials, educational meetings, local consensus processes, local opinion leaders, audit and feedback and reminders); organizational interventions (revision of professional roles and clinical multidisciplinary teams); financial interventions; regulatory interventions.	Patients with invasive devices	U	ITS = 10
Prevention of device-related infections (CAUTI;	Jansson et al., 2013 (38)	2003 – 2012	2 (8)	Education: continuing education, ongoing education, clinical education, inter-professional education.	Critically ill patients ICU	N.R.	Quasi experimental = 2

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
CLABSI; VAP)							
Prevention of device-related infections (CAUTI; CLABSI; VAP)	Blot et al., 2014 (39)	1995 – 2012	8 (43)	Education; training; feedback; clinical reminders; bundle; checklist; empowerment to stop procedure; surveillance; leader designation; prepackaging of CVS materials; infrastructure changes; organizational changes	Patients with central line catheters on the ICU	N.R.	CBA = 1; ITS = 7
Prevention of device-related infections (CAUTI; CLABSI; VAP)	Meddings et al., 2014 (40)	2008 – 2012	3 (30)	Education on improving appropriate use in catheter placement and behavior (e.g. catheter restriction and removal protocols); use of specific technologies	Patients with a urinary catheter	U	RCT = 1; non- RCT = 1; CBA =1
Interventions to improve compliance to sepsis bundle interventions	Damiani et al., 2015 (41)	2004-2014	5 (50)	Improving compliance to sepsis bundle interventions, consisting of educational programs (e.g. lectures and training sessions) and decision support tools (e.g. screening tools, checklist or introduction of dedicated staff (e.g. sepsis teams).	≥ 18 years with (severe) sepsis or septic shock	42295	ITS = 5
Interventions to improve hand hygiene compliance	Silvestri et al., 2005 (42)	1976 – 2003	7 (9)	Hand washing	ICU	N.R.	RCT = 2; non- RCT = 5
Interventions to improve hand hygiene compliance	Gould et al., 2010 (43)	Up to 2009	1 (4)	Education; audit with performance feedback; health promotion; and variations in availability and type of products used for hand hygiene.	Not specified	N.R.	ITS = 1
Overall hospital acquired infection prevention	Safdar and Abad, 2008 (44)	Up to 2006	25 (26)	Educational interventions for prevention of healthcare associated infections (lectures or classes, video presentations, posters, questionnaires and fact sheets, practical demonstrations, standardized self-study module, direct feedback and protocols to remove catheters when no longer necessary)	ICU and long-term care	N.R.	RCT = 1; non- RCT = 1; CBA = 23
Delirium prevention							
Delirium prevention	Cole et al., 1998 (45)	Up to 1998	8 (10)	Psychiatric assessment; education of patient and spouse; special (medical, surgical, nursing) care	Cardiac, elderly orthopedic, elderly surgical, elderly medical	N.R.	RCT = 2; non-RCT = 6
Delirium prevention	Milisen et al., 2005 (46)	Up to 2003	7 (7)	Psychiatric assessment; staff education; daily visits by a liaison nurse; screening for early detection of delirium	≥ 60 years	1683	RCT = 3; non-RCT = 3; CBA = 1
Delirium	Hempenius et al.,	1979 – 2009	7 (16)	Non pharmacological interventions to prevention delirium	≥ 18 years	1626	RCT = 1; Non RCT =

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
prevention	2011 (47)			(interdisciplinary team; proactive geriatric consultation; education nursing staff; systematic cognitive screening; scheduled pain protocol; supportive psychotherapy)	(geriatric wards; general medicine service; hip surgery; coronary artery bypass surgery)		3; CBA = 3
Delirium prevention	Reston et al., 2013 (48)	1999 – 2012	17 (19)	Anesthesia protocols; medication review; pain management; staff education	Elderly	U	RCT = 4; non- RCT = 2; CBA = 11
Delirium prevention	Collinsworth et al., 2014 (49)	1988 – 2014	8 (14)	Daily assessment; monitoring; mediating strategies	ICU	2846	RCT = 3; CCT = 5
Delirium prevention	Hshieh et al., 2015 (50)	1999-2013	8 (14)	Multi component non pharmacological delirium interventions (early mobility; cognition and orientation; sleep-wake- cycle preservation; hydration; hearing; vision)	≥ 65 years	3113	RCT = 4; non-RCT = 4
Delirium prevention	Martinez et al., 2015 (51)	Up to 2012	7 (7)	Multi component interventions (e.g. physiotherapy, daily reorientation, family involvement in care, stimulation programmes with avoidance of sensorial deprivation and staff/family member education)	≥ 60 years	1691	RCT = 7
Prevention of adverse event after clinical handover or hospital discharge							
Handover of inpatients	Griffiths et al., 2005 (52)	Up to 2003	8 (9)	Post acute intermediate care	Post acute and ≥ 18 years	N.R.	RCT = 7; quasi RCT = 1
Handover of inpatients	Conroy et al., 2011 (53)	Up to 2009	5 (5)	Geriatric assessment for frail older people being rapidly discharged from acute hospital	≥ 65 years being rapidly discharged (<72 h) from a acute hospital setting	2287	RCT = 5
Handover of inpatients	Niven et al., 2014 (54)	Up to 2012	5 (9)	Critical care transition programs	ICU	16433	CBA = 5
Hospital discharge	Rennke et al., 2013 (55)	1990 – 2012	7 (47)	Intervention to improve transitional care at hospital discharge: pre discharge interventions (assessment of risk for adverse events, patient engagement, creation of individualized patient record, facilitation of communication with outpatient providers, multidisciplinary discharge planning team, dedicated transition provider and medication reconciliation); Postdischarge interventions (Outreach to patients, facilitation of clinical follow-up and medication reconciliation after discharge); Bridging interventions (inclusion of at least 1 predischarge component and at least 1 postdischarge component	≥ 18 years	1943	RCT = 6; non- RCT = 1
Hospital	Sheppard et al.,	Up to 2012	7 (24)	Discharge planning from hospital to home	Elderly medical	U	RCT = 7

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
discharge	2013 (56)				patients, patients recovering from surgery and those with a mix of conditions		
Hospital discharge	Lowthian et al., 2015 (57)	Up to 2013	3 (9)	Comprehensive geriatric nurse assessment; community based service transfer; identifying high risk patients;	≥ 65 years, ED	2668	RCT = 3
Hospital discharge	Zhu et al., 2015 (58)	Up to 2014	5 (10)	Nurse-led early discharge planning programmes (e.g. initial nurse visit within 48 hours of hospital admission; predischarge assessment; structured home visits; telephone follow- ups after discharge)	Older adults	2503	RCT = 5
Fall prevention							
Fall prevention	Oliver et al., 2007 (59)	Up to 2005	12 (43)	Risk assessment; care planning; medical/diagnostic approaches; changes in the physical environment; education; medication review; hip protectors; removal of physical restraints		N.R.	RCT = 5; CBA = 7
Fall prevention	Coussement et al., 2008 (60)	Up to 2006	8 (8)	Unifactorial interventions (vitamin D supplement; identification bracelet; bed alarm system; flooring types) and multifactorial interventions (exercise program; medication review; multidisciplinary teams and meetings; staff awareness; improving patient activities)	≥ 69 years, long stay geriatric care units and geriatric rehabilitation units.	3894	RCT = 6; CT = 2
Fall prevention	Cameron et al., 2012 (61)	Up to 2012	15 (60)	Management of urinary incontinence; fluid or nutritional therapy; environment/ assistive technology (e.g., carpeted floors); social environment; patient education; staff education	≥ 65 years (or mean age > 65 years)	26887	RCT = 15
Fall prevention	Miake-Lye et al., 2013 (62)	2005 - 2012	21 (21)	Patient education; bedside risk sign; staff education; fall alert wristband; footwear; review after fall; toileting schedules; medication review; environment modification; movement alarms; bedrail review; hip protectors; urine screening; vest/ belt or cuff restraint	General population or older adults	U	RCT = 7; non- RCT = 14
Prevention of surgical adverse event							
Preventing surgical site infections	Chen et al., 2013 (63)	Up to 2012	4 (19)	Screening and decolonization of surgical site infections	Orthopedic and trauma	7845	RCT = 2; Systematic review = 2
Interventions to reduce adverse events in surgery	Howell et al., 2014 (64)	Up to 2012	7 (91)	Interventions to reduce adverse events in surgery: staffing factors; subspecialisation; benchmarking; mixed process interventions ; checklist interventions; technology or training; colorectal pathways; care pathways	Surgical patients	88423	RCT = 7

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
Preventing wrong site surgery	Hempel et al., 2015 (65)	2004-2014	4 (138)	Universal protocol; team training and education; retained surgical items	Surgical patients	U	RCT = 1; ITS = 3
Surgical safety checklist	Bergs et al., 2014 (66)	Up to 2013	5 (7)	WHO surgical safety checklist	≥ 18 years, non cardiac surgery; trauma and orthopaedic surgery; elective general surgery; high risk surgical procedures	U	ITS = 5
Surgical safety checklist	Algie et al., 2015 (67)	2011-2014	1 (2)	Preventing wrong site surgery with safety checklist	Surgical patients	22749	ITS = 1
Prevention of hospital mortality and cardiopulmonary arrest with rapid response systems							
Critical care outreach service	Esmonde et al., 2006 (68)	1996-2004	7 (23)	Critical care outreach service	Critically ill patients	N.R.	RCT = 2; quasi experiment = 3; CBA = 2
Rapid response teams	Chan et al., 2010 (69)	Up to 2008	16 (17)	Rapid response teams	Adults and children	N.R.	Non-RCT = 2; CBA = 12; ITS 2
Rapid response systems	Massey et al., 2010 (70)	1995 - 2009	5 (16)	Rapid response systems	Critically ill patients	U	RCT = 2; non- RCT = 2; CBA = 1
Rapid response systems	Maharaj et al., 2015 (71)	1990 - 2013	5 (29)	Rapid response teams	Pediatric and adult patients	225686	RCT = 2; CBA = 1; ITS = 2
Prevention of venous thromboembolism							
Prevention of venous thromboembolism	Kahn et al, 2013 (72)	Up to 2010	17 (55)	Alerts, education and multifaceted interventions for the implementation of appropriate administration of thromboprophylaxis	≥ 18 years, medical or surgical, at risk for venous thromboembolism (VTE)	79021	RCT = 1; quasi RCT =1; non- RCT = 15
Prevention of venous thromboembolism	Lau and Haut 2014 (73)	2001 to 2012	8 (16)	Education; paper based tools; computerized tools; real time audit and feedback or combinations of interventions to improve prescription of VTE prophylaxis	Unknown	U	RCT = 2; CBA = 6
Prevention of adverse events by changes in staffing							
Staffing	Reed et al., 2010 (74)	1989 to 2010	2 (64)	Shift length; protected sleep time; night float; education among residents	Patients and residents	1294	RCT = 1; non- RCT = 1

Patient-Safety Area	Study, year (reference)	Time range	No. of studies eligible studies (total included studies (n))	Intervention components eligible to patient safety	Studied in-hospital patients	Total no. of participants	Study designs
Staffing	Butler et al., 2011 (75)	Up to 2009	2 (15)	Nursing staff models	Not specified	938	RCT = 2
Staffing	Pannick et al., 2015 (76)	1998-2013	20 (30)	Interdisciplinary team care interventions	Geriatrics, infectious disease, pharmacotherapy and stroke	30969	RCT = 14; non-RCT = 5; CBA = 1
Prevention of pressure ulcers							
	Sullivan and Schoelles, 2013 (77)	2000 - 2012	15 (26)	Interventions for preventing pressure ulcers	All inpatient units, including, surgical, ICU, critical care, acute care, rehabilitation, intermediate care medical care, oncology patients	N.R.	ITS = 15
Prevention of mechanical complications and underfeeding							
	Naylor et al., 2004 (78)	Up to 2011	8 (11)	Total parenteral nutrition team	≥ 18 years	U	non- RCT = 8
Prevention of complications and mortality by clinical pathways							
	Rotter et al., 2010 (79)	Up to 2008	10 (27)	Clinical pathways (CPW)	Patients with conditions managed on a CPW	2632	RCT = 9, quasi RCT = 1
Prevention of adverse events by promoting a culture of safety							
	Weaver et al., 2013 (80)	2000 –2012	1 (33)	Intervention to promote a culture of patient safety (error prevention training coaching; family engagement; restructured patient safety governance; lessons learned program; cause analysis program; executive rounds)	≤ 18 years	3752	ITS = 1
Prevention of adverse events by external inspection							
	Flodgren et al., 2011 (81)	Up to 2011	1 (2)	External inspections of compliance with standards	Not reported	U	ITS = 1

CAUTI = catheter associated urinary tract infection; CBA= controlled before after; C(C)T= controlled (clinical) trial; CLABSI = central line associated blood stream infections; IC = intensive care; ICU = intensive care unit; inc = inception of database (start); ITS = Interrupted time series; NR= not reported; RCT = randomized controlled trial; U = unclear; VAP = ventilator-associated pneumonia