Supplemental Tables (i) Description of included QIC studies and (ii) findings

**Table 1. QICs according to setting of care delivery (acute hospital, ambulatory, nursing home, pre-hospital ambulance) and ordered by study design.**

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| **Hospital Acute Care (39 studies)** | | | | | | |
| **Reference** | **Study Design\*** | **Principal Patient group\*** | **QIC reference\*** | **Topic\*** | **Number of sites/participants in groups** | **Country\*** |
| Dirks et al. 2011  Dirks et al. 2012 | Cluster RCT | Adults | BTS | Acute thrombolysis for ischemic stroke | 12 hospitals  2990 (Intervention patients)  2525 (Control patients) | The Netherlands |
| Horbar et al. 2004 | Cluster RCT | Neonates | VON | Surfactant for pre-term infants | 57 hospitals  3332 (Intervention patients)  3313 (Control patients) | USA |
| Kritchevsky et al. 2008 | Cluster RCT | Adults | NR | Preoperative antibiotic prophylaxis | 44 hospitals  2200 (Intervention patients)  2200 (Control patients) | USA |
| Lee et al. 2009 | Cluster RCT | Neonates | NR | Bronchopulmonary dysplasia and hospital associated infection | 6 NICU (pulmonary group, control group for infection)  6 NICU (infection group, control for pulmonary) | Canada |
| Newhouse et al. 2013 | Cluster RCT | Adults | NR | Heart failure care | 23 hospitals  109 (Intervention patients)  107 (Control patients) | USA |
| Power et al. 2014 | Cluster RCT | Adults | BTS | Stroke acute care | 18 hospitals  3533 (Intervention patients)  3059 (Control patients) | UK |
| Russell et al. 2014 | Cluster RCT | Adults | NR | Lung cancer services | 81 NHS trusts | UK |
| Benning et al 2011,2011 | CBA | Adults | BTS | Patient safety | (SPI1) 4 intervention hospitals  18 control hospitals  (SPI2) 9 intervention hospitals  9 control hospitals | UK |
| Brush et al 2009 | CBA | Adults | BTS | Acute myocardial infarction and heart failure | 29 intervention hospitals; 21 control hospitals | USA |
| Campbell et al 2010 | CBA | NR | Michigan Surgical Quality Collaborative | Surgical mortality and morbidity | 16 intervention hospitals  126 control hospitals | USA |
| Carlhed et al 2006, 2009, 2012 | CBA | Adults | BTS | Acute myocardial infarction | 19 intervention hospitals; 19 control hospitals | Sweden |
| Horbar et al 2001  Rogowski et al  2001 | CBA | Neonates | VON | Neonatal intensive care practice- hospital associated infections and chronic lung disease | 10 intervention hospitals; 10 control hospitals | USA |
| Howard et al 2007 | CBA | Organ donation | BTS | Organ donation | 95 intervention hospitals; 125 control hospitals | USA |
| Lee et al 2012 | CBA | Neonates | BTS | Breast milk use in very low birth weight infants | 11 QIC NICU; 88 control NICU | USA |
| Lee et al 2014 | CBA | Neonates | BTS | Delivery room resuscitation practice | 20 intervention teams from 31 hospitals; 44 control NICU | USA |
| Schouten et al 2008 | CBA | Adults | BTS | Stroke acute care services and length of hospital stay | 23 intervention stroke teams; 44 control services | The Netherlands |
| Wirtschafter et al 2011 | CBA | Neonates | NR | Nosocomial\* infections in very low birth weight infants | 27 intervention hospitals; 27 control hospitals | USA |
| Battersby et al. 2014 | ITS with control sites | Neonates | NR | Maternal breast milk use in pre-term infants | 17 intervention NICU; 144 control NICU | UK |
| Power et al. 2010 | ITS with control sites | Adults | BTS | *Clostridium difficile* infection | 5 QIC wards; 35 control wards | UK |
| Shafer et al. 2008 | ITS with control sites | Organ donors | BTS | Organ donation | 44 organ procurement organisations and 95 hospitals  131 control hospitals | USA |
| Bonello et al. 2008 | ITS | ICU patients | BTS | CLABSI\*  VAP | 12 ICUs in 9 hospitals | USA |
| Broughton et al. 2013 | ITS | Obstetric patients | NR | Active management of third-stage labor | 33 maternity hospitals | Niger |
| Bundy et al. 2014 | ITS | Children | NR | CLABSI | 32 Pediatric hematology /oncology centers | USA |
| dePalo et al. 2010 | ITS | ICU patients | Keystone | CLABSI  VAP | 11 ICUs | USA |
| Donovan et al. 2010 | ITS | Obstetric patients | BTS | Inappropriate scheduled births between 36 to 39 weeks gestation | 20 maternity hospitals | USA |
| Glasgow et al. 2012 | ITS | Adults | BTS | Length of stay and discharges before noon | 130 hospitals | USA |
| Hayes et al. 2012 | ITS | Children | BTS | Pediatric ‘codes’ outside the ICU | 20 hospitals | USA |
| Jeffries et al. 2009 | ITS | ICU patients | BTS | CLABSI | 26 ICUs | USA |
| Kaplan et al. 2011 | ITS | Neonates | VON | Late onset bloodstream infection in preterm infants | 24 NICUs | USA |
| Koll et al. 2008 | ITS | Adults | NR | CLABSI | 49 ICUs in 36 hospitals | USA |
| Miller et al. 2010, 2011 | ITS | Pediatric ICU patients | NR | CLABSI | 29 Pediatric ICUs | USA |
| O’Connor et al. 1996 | ITS | Adults | NNECVDSG | Mortality associated with coronary artery bypass graft surgery | 5 Centers (all cardiothoracic surgeons in 3 states) | USA |
| Quigley et al. 2014 | ITS | Adults | BTS | Falls and fall-related injuries | 5 inpatient psychiatric units | USA |
| Ralston et al. 2013 | ITS | Pediatric | NR | Acute bronchiolitis care | 17 hospitals | USA |
| Rosen et al. 2013 |  | Adult | NR | Rapid response system | 26 hospitals | USA |
| Toltzis et al. 2014 | ITS | Children | BTS | Surgical site infections | 8 pediatric hospitals | USA |
| Weeks et al. 2014 | ITS | ICU patients | Keystone | Central line days | 1071 ICUs in 793 hospitals | USA |
| Wheeler et al. 2011 | ITS | ICU patients | BTS | CLABSI | 3 ICUs | USA |
| Wirtschafter et al. 2010 | ITS | Neonates | NR | CLABSI | 13 NICUs | USA |

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| **Ambulatory care/general practice (20 studies)** | | | | | | |
| **Reference** | **Study Design** | **Principal Patient group** | **Type of QIC** | **Topic** | **Number of sites/participants in groups** | **Country** |
| Barcelo et al. 2010 | Cluster RCT | Adults | BTS | Diabetes care | 5 intervention primary care centers;5 control centers  196 (Intervention patients)  111 (Control patients) | Mexico |
| Homer et al. 2005 | Cluster RCT | Children | BTS | Asthma care | 22 intervention primary care practices;21 control practices  4218 patients | USA |
| Shaw et al. 2013 | Cluster RCT | Adults | NR | Colorectal cancer screening | 12 intervention primary care practices;11 control practices  320 (Intervention patients)  353 (Control patients) | USA |
| Asch et al 2005 | CBA | Adults | BTS | Chronic heart failure | 4 ambulatory care intervention clinics; 4 control clinics | USA |
| Benedetti et al  2004 | CBA | Adults | BTS | Diabetes care | 11 intervention teams; 19 control teams | USA |
| Franx et al  2009,2014 | CBA | Adults | BTS | Implementation of guideline recommendations for antidepressant prescribing | 17 intervention general practices; 41 control practices | The Netherlands |
| Haggstrom et al 2012 | CBA | Adults | BTS | Implementation of Chronic Care Model to increase cancer screening and follow-up | 19 intervention community health centers; 22 control centers | USA |
| Landon et al  2004 | CBA | Adults | BTS | HIV care | 44 intervention community health centers; 25 control centers | USA |
| Landon et al  2007 | CBA | Adults | BTS | Diabetes, asthma or hypertension | 44 intervention community health centers; 22 control centers | USA |
| Mangione-Smith et al 2005  Schonlau et al 2005 | CBA –one collaborative that reported pediatric and adult results separately | Children  Adults | BTS | Asthma care | 9 intervention pediatric practices; 4 control pediatric practices  6 intervention practices; 3 control practices | USA |
| Margolis et al  2008 | CBA | Children | BTS | Practice-based systems for preventive and developmental services | 18 intervention pediatric primary care practices; 17 control | USA |
| Peterson et al  2014 | CBA | Children | BTS | Diabetes care | 12 intervention centers; 31 control pediatric diabetes centers | Sweden |
| Powell et al  2011 | CBA | Adult | BTS | Follow-up after a positive colorectal cancer screening test | 21 intervention sites  3 control sites | USA |
| Schouten et al 2010, 2010 | CBA | Adults | BTS | Diabetes care | 6 intervention regions (12 general practices and 5 outpatient clinics)  9 control regions (25 practices and 8 outpatient clinics | The Netherlands |
| Vernacchio et al 2014 | CBA | Adults | BTS | Asthma care | 56 physicians in 45 intervention practices  129 control physicians | USA |
| Youngelson et al. 2010 | ITS with control sites | Maternity patients/Children | BTS | Mother to child HIV transmission | 17 primary care intervention sites and birthing centers in Eastern metro sub-district  Control sites: remainder of metro district | USA |
| Crandall et al 2012 | ITS | Children | BTS | Inflammatory bowel disease | 6 Centers | USA |
| Patel et al. 2013 | ITS | Adults | NR | Bloodstream infections from vascular access | 17 outpatient hemodialysis facilities | USA |
| Pierce-Bulger et al. 2001 | ITS | Infants | NR | Post-neonatal infant mortality | 1 community center- multiple sites | USA |
| Webster et al. 2012 | ITS | Adults | BTS | HIV care | 14 primary health centers and 3 highly active antiretroviral treatment (HAART) initiation centers | South Africa |

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| **Nursing Homes (4 Studies)** | | | | | | |
| **Reference** | **Study Design** | **Principal Patient group** | **Type of QIC** | **Topic** | **Number of sites/participants in groups** | **Country** |
| Baier et al 2004 | CBA | Older Adults | BTS | Pain management | 17 intervention nursing homes; 78 control nursing homes | USA |
| Colon-Emeric et al 2006 | CBA | Older Adults | BTS | Falls prevention | 36 intervention nursing homes; 353 control nursing homes | USA |
| Arling et al. 2014 | ITS with control sites | Older Adults | NR | Falls prevention | 15 intervention nursing homes; 357 control nursing homes | USA |
| Lynn et al. 2007 | ITS with control sites | Older Adults | NR | Pressure ulcer prevention and care | 52 intervention nursing homes; control nursing homes national reporting | USA |

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| **Pre-hospital paramedical care (1 Study)** | | | | | | |
| Siriwardena et al. 2014  Taljaard et al. 2014 | ITS | Adults | NR | Pre-hospital care for acute myocardial infarction and stroke | 12 ambulance organisations | UK |

\*Study design RCT Randomised Controlled Trial, CBA Controlled Before-After study, ITS Interrupted Time Series study

\*Principal patient group: ICU intensive care unit

\*QIC reference: BTS Breakthrough Series, VON Vermont Oxford Network, NR Not Reported; NNECVDSG Northern New England Cardiovascular Disease Study Group

\*Topic: Note: Nosocomial infections are also known as Healthcare associated infections. CLABSI central line associated bloodstream infection also referred to as Central venous catheter-related bloodstream infection, VAP Ventilator Associated Pneumonia, HIV Human Immunodeficiency Virus

\*Country: USA: United States of America; UK: United Kingdom

**Table 2. Findings of QIC studies summarised by setting and study design**

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| **Hospital Acute Care (39 studies)** | | | | |
| **Study** | **Study Design** | **Topic** | **Primary effect measure/s** | **Results** (grey shade indicates statistically significant improvement reported in one or more of the study’s primary effect measures. |
| Dirks et al. 2011,  Dirks et al. 2012 | Cluster RCT | Acute thrombolysis for ischemic stroke | *Clinical process:* Thrombolysis with intravenous recombinant tissue plasminogen activator given to patients admitted with stroke within 24 hours of onset of symptoms  Thrombolysis given to patients who were admitted within 4 hours of stroke onset  *Short- and long-term healthcare costs* | Thrombolysis given to 13.1% intervention patients vs\* 12.2% control patients. Adjusted Odds Ratio (adj OR) 1.25; 95% confidence interval 0.93-1.68.  Thrombolysis given to patients admitted within 4 hours of stroke onset: 44.5% intervention patients vs 39.3% control patients (adj OR 1.58;1.11-2.27)  Mean cost per patient at 3 months for intervention group $US 9192 vs $US 9647 (difference -$US 455; -$US 232 to-$US 679). Mean lifetime costs lower for intervention group (difference -$US 1321; -$US 1722 to- $US 921) |
| Horbar et al. 2004 | Cluster RCT | Surfactant for pre-term infants | *Clinical process:* Surfactant given in delivery room; first dose of surfactant treatment given more than two hours after birth; time after birth when surfactant administered  *Patient outcomes:* in-hospital death, pneumothorax | Surfactant given in delivery room to 54.7% intervention infants vs 18.2% control infants (adj OR 5.38; 2.84 to 10.20);  First dose surfactant treatment > 2hrs after birth given to 9.4% intervention infants vs 24.9% control infants (adj OR 0.35; 0.24 to 0.53); Median time to surfactant administration to intervention infants 21minutes (interquartile range 10-128) vs 78 minutes (interquartile range 29-410) adj Hazard ratio HR 1.57;1.42-2.07  Patient outcomes: no stat sig\* differences in |
| Kritchevsky et al. 2008 | Cluster RCT | Preoperative antibiotic prophylaxis | *Clinical process:* Proportion of patients receiving at least one antibiotic dose within 60 minutes of surgery (120 minutes if vancomycin) | Proportion patients receiving preoperative antibiotic dose within appropriate time; 83.2% intervention vs 85.3% control. No stat sig difference after adjustment. |
| Lee et al. 2009 | Cluster RCT | Bronchopulmonary dysplasia and Hospital associated infection | *Patient outcomes:* Incidence trend rates of bronchopulmonary dysplasia vs infection group OR hospital associated infection vs pulmonary group | Absolute difference in incidence trend bronchopulmonary dysplasia -0.0006 (95%CI - 0.0011 to- 0.0001) vs infection group  Absolute difference in incidence trend hospital associated infection -0.0020 (95%CI - 0.0007 to 0.0004) vs pulmonary group |
| Newhouse et al. 2013 | Cluster RCT | Heart failure care | *Clinical process*: Left ventricular ejection fraction assessment, angiotensin converting enzyme inhibitor/angiotensin receptor blocker use, discharge instructions, and smoking cessation counselling. | Mean compliance with heart failure measures was high at baseline for both groups (80%-98%). No stat sig improvements found for any of the four primary effect measures. |
| Power et al. 2014 | Cluster RCT | Stroke acute care | *Clinical process:* Compliance with Early Hours bundle (brain imaging, antiplatelet agent, swallow screen, weight assessment) and Rehabilitation bundle (physiotherapy, OT and mood assessment, goals, hospital stay on stroke unit) | Relative improvement in intervention group vs control group for compliance with Early Hours Bundle 10.9%; 1.3%- 20.6%.  (OR 1.56;1.06-2.31)  Relative improvement for Rehabilitation bundle.11.2%; 1.4% - 21.5%. (OR 1.61;1.07-2.42) |
| Russell et al. 2014 | RCT | Lung cancer services | *Clinical process:* Multidisciplinary team discussion, histological confirmation, active treatment, surgical resection, small-cell chemotherapy and specialist nurse review. | Active treatment increased in the intervention group by 5.2% vs 1.2% in the control group, mean difference 4.1%, 0.1 to 8.2%, P=0.055). The remaining audit indicators improved similarly in all groups. |
| Benning et al 2011,2011 | CBA | Patient safety  Two phases SPI 1 and SPI 2 | *Clinical process:* 5 separate processes (monitoring vital signs, routine tests, evidence-based standards, prescribing errors, medical history taking);error rates from case note review of respiratory patients,  *Provider outcome:* Safety culture survey score *patient outcomes:* adverse events, mortality rates of patients in medical wards , patient satisfaction | Five clinical processes- little net differences found in SPI 1 and 2  Safety culture survey:-SPI 1 Sig difference found for only one of the 11 scores (organisational climate) in favour of intervention p<0.01 but SPI 2 found in favour of control hospitals (p=0.009)  No differences reported for adverse events (SPI 1 and 2) No stat sig differences in mortality found SP1 1 but for SPI 2 hospitals mortality fell from 10.3% to 6.1% while it increased from 17.3% to 21.4% in control hospital (p=0.043)  SPI 1: Only one of 5 patient satisfaction scores (cleanliness of bathrooms showed a stat sig change compared to controls (p=0.009), no differences seen in SPI 2 |
| Brush et al 2009 | CBA | Acute myocardial infarction (AMI) and heart failure (HF) | *Clinical processes:* Composite quality measure (medication and documentation of counselling) at discharge for acute myocardial infarction, heart failure or both | AMI and HF measures increased by 61% to 77% vs 51% to 60% in non-participating hospitals but no stat sig differences after adjustment. |
| Campbell et al  2010 | CBA | Surgical mortality and morbidity | *Patient outcomes:* 30 day post-operative mortality and morbidity (complications) | Mortality- after adjustment , no sig differences were noted between intervention and control sites  Sig reduction in unadjusted morbidity rate for all cases 10.7% to 9.7% in intervention sites vs 12.4% to 12.4% in controls. Adjusted OR 0.898 vs 1.00 (p=0.004) |
| Carlhed et al 2006, 2009, 2012 | CBA | Acute myocardial infarction | *Clinical process*- Adherence to five guideline quality indicators (coronary angiography and use of angiotensin-converting enzyme inhibitor [ACEI], lipid lowering therapy, clopidogrel and low molecular weight heparin) reported separately or as a composite measure  *Sustainability:* improvement of indicators sustained 6 months post intervention  *Patient outcomes*: Mortality, cardiovascular readmissions, bleeding complications during at one year follow-up post intervention | Compared to control hospitals, the mean absolute increase in intervention group for; angiography 6.2% vs 16.8% (p=0.027), ACEI 1.4% vs 12.6% (p=0.002), lipid lowering therapy 2.3% vs 7.2% (p=0.065), clopidogrel 26.3% vs 41.2% (p=0.01), heparin 5.3% vs 16.3 (p=0.01). Treatment level of 70% or more patients receiving 4-5 indicators was reached by 15% intervention sites vs 0% control hospitals  Improvements sustained for 6 months for all indicators except ACEI.  Bleeding outcomes only stat sig change (-0.82;-1.66 to 0.01). |
| Horbar et al 2001  Rogowski et al  2001 | CBA | Neonatal intensive care practice- hospital associated infections and chronic lung disease | *Patient outcomes*: Rates of coagulase-negative staphylococcal or other bacterial infection after the 3rd day of life, oxygen supplementation or death at 36 weeks adjusted gestational age for low birth weight infants  *Treatment Costs per infant and sustainability of costs* | Compared to control sites, there was an absolute decrease in all infections -5.5% vs -1.6% (p= 0.058), coagulase negative infections -5.4% vs -0.8% (p=0.26) and oxygen supplementation -12.1% vs -0.1% (p=0.045) but not mortality 1.7% vs-2.1% (p=0.44)  Median change in treatment cost per infant in the infection intervention declined $10,932 vs increased 12,249 in control group (p<0.0001) and was sustained one year post intervention. Similar trends were seen for lung disease intervention group but not stat sig. |
| Howard et al 2007 | CBA | Organ donation | *Clinical process*: Identifying potential organ donors and obtaining consent for deceased organ donation | Organ donation increased from 52% to 60% in intervention group while remaining at 51% in control hospitals. (Absolute change 8%; 2-13%) |
| Lee et al 2012 | CBA | Breast milk use in very low birth weight infants | *Patient outcome*: Breast milk feeding rate  *Sustainability* at 6 months post-intervention | Breast milk feeding rates at the intervention sites increased 54.6% to 61.7% (adj OR 1.31; 1.05-1.64) significantly more than control site 64.2% to 65.7% (adj OR 1.03; 0.92-1.16). With baseline rates as the reference, the improvement in the intervention group was sustained (adj OR 1.44; 1.09-1.91). |
| Lee et al 2014 | CBA | Delivery room resuscitation practice | *Patient outcome:* Proportion of very low birth weight infants with hypothermia | Hypothermia rates declined in the intervention sites 39% to 21%; (adj OR 0.37; 0.31-43) significantly more than control site reduction 42% to 34% (adj OR 0.67; 0.57-0.79) |
| Schouten et al 2008 | CBA | Stroke acute care services and length of hospital stay | *Patient outcome:* Length of hospital stay post-stroke | Length of stay reduced 27% in the intervention hospitals from 18.3 to 13.3 days vs 5.7% reduction in control hospitals (19.2 to 18.1 days) |
| Wirtschafter et al 2011 | CBA | Nosocomial\* infections in very low birth weight infants | *Patient outcome*: Rate of nosocomial infection (late sepsis or meningitis ) | Rate of nosocomial infection decreased from 15.6%.to 13.5% vs 19.4% to 16.4% in the control sites (adj OR 0.81; 0.68-0.96). |
| Battersby et al. 2014 | ITS with control sites | Maternal breast milk use in pre-term infants | *Patient outcome*: Proportion of preterm infants receiving maternal breast milk (exclusive or any) at discharge and % days/month where any maternal breast milk was received | Exclusive and any maternal breast milk at discharge increased from 26% to 33% and 50% to 57% respectively at intervention sites. Exclusive breast milk improved significantly faster with increase per month 0.22%; 0.11 to 0.34 vs control sites 0.05%; 0.01 to 0.09 (p=0.007). |
| Power et al. 2010 | ITS with control sites | *Clostridium difficile* infection | *Patient outcome*: *Clostridium difficile* infection per 1000 occupied bed days | Intervention ward Infection rates dropped from 2.60 (2.11 to 3.17) cases/1000 bed days at baseline to 0.69 (0.50 to 0.60), a 73% (0.69, 0.50 to 0.91) reduction from baseline. Control wards dropped from 1.15 (1.03 to 1.29) cases/1000 bed days to 0.51(0.44 to 0.60), a 56% from baseline (0.51, 0.44 to 0.60). |
| Shafer et al. 2008 | ITS with control sites | Organ donation | *Clinical process*: Identifying potential organ donors and obtaining consent for deceased organ donation | Organ donation for intervention sites increased by 14.1% vs 8.3% for control sites-in the first year and over the three year period increased 22.5% from baseline compared with a 5.5% increase for the same period of time preceding the collaborative. |
| Bonello et al. 2008 | ITS | CLABSI\*  VAP\* | *Clinical process:* Compliance with VAP and CLABSI bundles | VAP bundle compliance improved from 50% to 82%  CLAB bundle compliance increased from 58% to 74%  Associated with reductions in VAP and CLABSI rates |
| Broughton et al. 2013 | ITS | Active management of third-stage labor | *Clinical process:* Compliance with components of active management third stage of labour  *Patient outcomes*: proportion of vaginal deliveries with postpartum haemorrhage  Cost-effectiveness | Active management compliance went from 0% to over 95%  Vaginal deliveries with postpartum hemorrhage reduced from 83% to 5%. The average delivery-cost decreased from $35 to $28 after the intervention. The collaborative incremental cost-effectiveness was $147/disability-adjusted life year averted. |
| Bundy et al. 2014 | ITS | CLABSI | *Patient outcome*: CLABSI rate per 1000 central line days | Mean baseline CLABSI rate of 2.85 per 1000 line-days reducing to 2.04 per 1000 line-days, a reduction of 28% (RR 0.71; 0.55–0.92). |
| dePalo et al. 2010 | ITS | CLABSI  VAP | *Patient outcome*: CLABSI and VAP rate per 1000 central line/ventilator days | CLABSI rates reduced from 3.73/1000 days to 0.97, a 74% reduction. VAP rate reduced from 3.44 /1000 ventilator days to 2.92/1000 ventilator days; a 15% reduction. |
| Donovan et al. 2010 | ITS | Inappropriately scheduled births between 36 to 39 weeks gestation | *Clinical process:* Proportion of scheduled births between 36-39 weeks without documented medical indication | Proportion declined from 25% to less than 5% over study period (p<0.05) |
| Glasgow et al. 2012 | ITS | Length of stay and discharges before noon | *Clinical process:* Hospital length of stay and rate of discharges before noon  *Sustainability* two year post intervention | Hospital length of stay improved for 35% of hospitals (45 out of 130) with 60% (27 out of 45) with sustained improvement two years post-intervention. Discharges before noon improved for 46% of hospitals (60 out of 130) with 32% (19 out of 60) with sustained improvement two years post-intervention. |
| Hayes et al. 2012 | ITS | Pediatric ‘codes’ outside the ICU | *Patient outcome*: Pediatric cardiopulmonary arrests (pediatric codes) outside the ICU | Code rate decreased by 3% (not stat sig). |
| Jeffries et al. 2009 | ITS | CLABSI | *Patient outcome*: Median CLABSI rate per 1000 central line days  *Sustainability:* 12 months post-intervention | Median CLABSI rate dropped from 6.3/1000 line days (IQR 5.0-8.9) to 4.3 (IQR 2.6-7.6); a median reduction of 32%  20/26 (77%) ICUs provided 12 months data post intervention with sustained improvement. |
| Kaplan et al. 2011 | ITS | Late onset bloodstream infection in preterm infants | *Patient outcome*: Proportion of eligible infants with at least one late onset (>72 hours of life) bloodstream infection (catheter associated or non-catheter associated) | Mean prevalence of late onset bloodstream infections reduced from 18.2% at baseline to 14.3%. |
| Koll et al. 2008 | ITS | CLABSI | *Patient outcome*: Mean CLABSI rate per 1000 central line days | Mean CLABSI rate reduced from 4.85 infections/1000 line days to 2.24 infections/1000 line days; a 54% reduction. |
| Miller et al. 2010  Miller et al. 2011 | ITS | CLABSI | *Patient outcome*: Mean CLABSI rate per 1000 central line days  *Sustainability:* 2 years post-intervention | Mean CLABSI rate reduced from 5.4 /1000 line days to 3.1 infections/1000 line days; a 43% reduction (p<0.0001).  Two years post-intervention, mean CLABSI rate further reduced to 2.3/1000 line days [Rate ratio RR 0.44; 0.37-0.53]. |
| O’Connor et al. 1996 | ITS | Mortality associated with coronary artery bypass graft surgery | *Patient outcome*: Mortality rate post coronary artery bypass graft surgery | Mortality rate post coronary artery bypass graft surgery reduced by 24% (P=.001). |
| Quigley et al. 2014 | ITS | Falls and fall-related injuries | *Patient outcome*: Average rate of falls per 1000 occupied bed days, average fall-related injury rates and average % falls with serious injury | Compared to the VA (mean 4.3 falls per 1000 occupied bed-days), the mean fall rate was similar in the intervention hospitals. Average fall-related injury rates remained the same (1-2/1000 occupied bed-days) and average % falls with serious injury increased. |
| Ralston et al. 2013 | ITS | Acute bronchiolitis care | *Clinical process-* Utilisation of unnecessary therapies in inpatient care of bronchiolitis (6 care processes) | Absolute decrease in bronchodilator dose per patient by 3.4 (95% CI 1.4–5.8) doses per patient. Overall exposure to any dose of bronchodilator decreased by 12% (95% CI 5%–25%). Reduction in chest physiotherapy usage by 10% (95% CI 3%–18%), but no decrease for steroids, chest radiography, or viral testing. |
| Rosen et al. 2013 | ITS | Rapid response system | *Patient outcome*: Rate of cardiac or respiratory arrest codes | The rate of ICU and non-ICU arrests/1000 discharges decreased but not stat sig. |
| Toltzis et al. 2014 | ITS | Surgical site infections | *Patient outcome*: Surgical site infections per 100 procedures | Surgical site infections reduced from 4.48/100 procedures to 1.89/100 procedures, a 58% reduction. |
| Weeks et al. 2014 | ITS | Central line days | *Clinical process*: Central line days | Mean central line days reduced from 516(standard deviation SD 403) to 481 (SD420). Median central line days reduced from 441 (interquartile range IQR 225-688) to 400 (IQR 187-652). Compared with baseline there were 4% fewer central line days at the project’s conclusion. |
| Wheeler et al. 2011 | ITS | CLABSI | *Patient outcome*: CLABSI rates per 1000 central line days | CLABSI/1000 line days reduced from 3.0/1000 line days to <1.0/1000 line days |
| Wirtschafter et al. 2010 | ITS | CLABSI | *Patient outcome*: CLABSI rates per 1000 central line days | CLABSI/1000 line days reduced from 4.32/1000 line days to 3.22 during follow-up; a 25% reduction. |

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| **Ambulatory care/general practice (20 studies)** | | | | |
| **Study** | **Study Design** | **Topic** | **Primary outcome Measure/s** | **Results** (grey shade indicates statistically significant improvement reported in one or more of the study’s primary effect measures. |
| Barcelo et al. 2010 | Cluster RCT | Diabetes care | *Clinical process:* foot and eye examinations  *Patient outcomes:* HbA1c control (<7%), TC\* <200mg/dl, BP\*<140/90mmHg | Compared to control sites there were stat sig increases in foot (p<0.01) and eye examinations (p<0.01) and in the proportion of patients reaching three or more treatment goals(p<0.01), HbA1c controlled (p<0.01), TC <200mg/dl (p<0.01) but no difference in BP control |
| Homer et al. 2005 | Cluster RCT | Asthma care | *Clinical process:* asthma management plan  *Patient outcomes:* parental report of daily medication therapy in past 4 weeks | No stat sig differences found |
| Shaw et al. 2013 | Cluster RCT | Colorectal cancer screening | *Clinical process:* Colorectal cancer screening rates | No stat sig differences found |
| Asch et al 2005 | CBA | Chronic heart failure | Composite set of 23 quality indicators relating to *Clinical processes* of care (e.g. counselling, prescription, monitoring) or 4 *patient outcomes* (BP goals, INR or LDL control) | Compared to control sites, intervention sites showed greater improvement in 11 of 23 indicators, achieving 17% vs 1% improvement in the composite set (p<0.0001)  *Patient outcomes* – no stat sig differences found |
| Benedetti et al  2004 | CBA | Diabetes care | *Clinical processes* and *patient outcomes*: 12 quality indicators including annual retinal and foot examinations, documented self-management goals and risk factor control | Compared to control sites, intervention sites showed greater improvement in 7 of 12 indicators (<0.05) |
| Franx et al  2014 | CBA | Implementation of recommendations for antidepressant prescribing | *Clinical process*: Antidepressant prescription rates for newly diagnosed patients with depressive symptoms | Compared to control sites, antidepressant prescription rates decreased in intervention sites by 23% vs no decrease (OR 0.44; 0.21-0.92) one year after intervention ceased |
| Haggstrom et al 2012 | CBA | Implementation of Chronic Care Model to improve cancer screening and follow-up | *Clinical process:* Implementation Chronic Care Model(CCM)  *Note:* cancer screening and timeliness of follow-up were secondary effect measures | Compared to control sites, overall improvement in CCM model implementation (p=0.002) |
| Landon et al  2004 | CBA | HIV care | *Clinical process:* rates of highly active antiretroviral therapy use and control of HIV viral load plus 7 other quality of care measures for HIV screening, prophylaxis and access to care | No stat sig differences |
| Landon et al  2007 | CBA | Diabetes, asthma or hypertension | *Clinical process*: composite measures for quality of care for asthma, diabetes and hypertension  *Patient outcomes:* urgent care or hospitalisation for asthma, HbA1c,BP or LDL control | For all three conditions, compared to external and internal control sites, intervention sites showed an additional 4.5% and 4.9% improvement respectively (p<0.001). By condition, asthma and diabetes care but not hypertension significantly improved  *Patient outcomes*-No stat sig differences |
| Mangione-Smith et al 2005  Schonlau et al 2005 | CBA | Asthma care-pediatric [Mangione-Smith] and adult [Schonlau] | *Clinical and patient process:* composite score 8 asthma care indicators, 5 patient (pediatric) and 6 (adult) asthma self-management indicators  *Patient outcome:* general and asthma specific quality of life (QOL), impact on family functioning, satisfaction with provider communication, adolescent satisfaction with care, acute service use, school days missed, work days lost, and bed days due to asthma | [Mangione-Smith] Compared to control sites, intervention sites showed an overall change in composite pediatric process score 13% vs 0% (p<0.0001) and two of 5 self-management indicators; peak flow monitoring (70% vs 43%, p<0.0001) and action plan (41% vs 22% p<0.001)  [Schonlau] Compared to control sites, overall change in composite adult process score 10% vs 1% (p=0.003) and one of 6 self-management indicators; attending educational session 20%vs 5% p=0.028)  [Mangione-Smith] 2 of 9 patient outcomes stat sig; general QOL (p=0.05)and asthma-specific QOL scores (p<0.05)  [Schonlau] 1 of 5 patient outcomes; satisfaction with provider communication (62% vs 39% p=0.02) |
| Margolis et al  2008 | CBA | Practice-based systems for preventive and developmental services | *Clinical process*: care delivery systems, composite quality indicator (4 aspects of parental reported care)  Developmental and psychological screening (only for intervention group) | Mean number of care delivery systems increased from 12.9 (SD4.6) to 19.4 (SD3.87) in intervention group with no change for controls 15.4 (SD 6.1). No stat sig difference found for children whose parents reported high quality care (at least 3 of 4 aspects) RR 1.25; 0.93-1.75 |
| Peterson et al  2014 | CBA | Diabetes care | *Patient outcome:* mean HbA1c | Compared to controls, intervention practices reduced mean HbA1c -3.7 mmol/mol vs -1.7 mmol/mol (p<0.001) |
| Powell et al  2011 | CBA | Follow-up after a positive colorectal cancer screening test | *Clinical process*: Proportion patients with positive fecal occult blood tests who received follow-up colonoscopy within 1 year, within 60 days and mean days to colonoscopy | Compared to control sites, the intervention group increased 60-day follow-up colonoscopy from 27% to 39% vs control site decrease from 45% to 29% (p<0.02). Mean days to colonoscopy decreased for intervention sites from 129 to 103 days and increased for control sites from 81 to 103 days (p=0.001) Differences in 1 year follow-up not stat sig . |
| Schouten et al 2010, 2010 | CBA | Diabetes care | *Clinical process*: guideline adherence to 19 indicators of diabetes care  *Patient outcome:* 9 indicators including levels of HbA1c, lipids, blood pressure (BP), smoking  *Sustainability*- one year and 2-year follow-up  Cost-effectiveness | Compared to controls, intervention sites improved in 4 of 19 process measures at 2 years follow-up; visit to dietician (17.8% vs 9.9%, p<0.01); instruction for glucose monitoring (61.7% vs 55.8%, p <0.05); advice to examine feet (75.2% vs 69.4%, p<0.05); instruction on foot examination (66% vs 59.5%, p<0.05) and improved in 2 of 9 patient outcomes; mean systolic BP 139.3 (SD 17.4) vs 141.8 (SD 16.5), p< 0.05); mean HDL 14.4 (SD 0.4) vs 1.3 (SD 0.4).  Incremental cost per quality adjusted life year €1937 for men and €1751 for women compared to usual care costs |
| Vernacchio et al 2014 | CBA | Asthma care | *Patient outcome:* asthma exacerbations requiring medical attention (compared to controls)  *Clinical process*- 5 processes of asthma care (only intervention group) | *Patient outcome* Asthma exacerbations declined greater than controls but not stat sig. |
| Youngelson et al. 2010 | ITS with control sites | Mother to child HIV transmission | *Patient outcome:* proportion of HIV-exposed infants testing positive  *Clinical process:* antenatal HIV testing, antenatal azidothymidine (AZT) and intrapartum AZTand highly active antiretroviral treatment (HAART) treatment, post-natal HIV testing | HIV-exposed infants testing positive declined 7.6% to 5%  Antenatal AZT increased 74% to 86%. Intrapartum AZT increased from 43% to 84%and HAART from 10% to 25%.  Post-natal HIV testing 79% to 95% |
| Crandall et al. 2012 | ITS | Inflammatory bowel disease: Crohn’s disease (CD) and ulcerative colitis (UC) | *Clinical process:* Completion of standardised assessment bundle, measured thiopurine methyltransferase (TPMT) before initiation of thiopurine and initial thiopurine dose appropriate to TPMT status.  *Patient outcomes*: remission, nutritional status, growth, steroid-free treatment | Completion of assessment bundle increased (CD 55% to 93%; UC 62% to 89%, both p<0.01). Measurement of TPMT (CD 60% to 80%; UC 50% to 73%, both p<0.01). Appropriate thiopurine dose (CD 48% to 56% not stat sig; UC 23% to 64% p<0.01)  *Patient outcomes*: Remission (CD55% to 68%; UC 61% to 72%) steroid-free treatment (CD 86% to 90%; UC unchanged at 85%) No change in nutritional status or growth |
| Patel et al. 2013 | ITS | Bloodstream infections from vascular access | *Patient outcomes*: mean blood stream infections and access-related blood stream infections per 100 patient months | Mean blood stream infections and access-related blood stream infections rates changed from 1.09 and 0.73 events/100 patient-months to 0.89 and 0.42 events/100 patient-months. Modeled rates decreased 32% (P=0.01) for blood stream infections and 54% (P=0.001) for access-related blood stream infections |
| Pierce-Bulger et al. 2001 | ITS | Post-neonatal infant mortality | *Patient outcome*: days between infant death | 50% reduction in infant mortality with days between infant deaths increasing from mean 100 days to over 300 days |
| Webster et al. 2012 | ITS | HIV care | *Clinical process*: Highly active antiretroviral treatment (HAART) initiation for HIV positive patients | HAART initiations increased from 179/month (SD 17.2) to 511/month (SD 44.9); a 185% increase |

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| **Nursing home (4 studies)** | | | | |
| **Study** | **Study Design** | **Topic** | **Primary outcome Measure/s** | **Results** (grey shade indicates statistically significant improvement reported in one or more of the study’s primary effect measures. |
| Baier et al | CBA | Pain management | *Clinical process*: 7 indicators of pain assessment and treatment  *Patient outcome:* prevalence of pain | Compared to controls, intervention sites improved 3 out of 7 pain indicators (appropriate pain assessment 43.8% vs 3.9%, p<0.001; pain intensity scales 73.9% vs 15.6% p<0.001; non-pharmacological treatments 81.9% vs 40.5% p<0.001)  *Patient outcome* change in prevalence of pain -5% vs -1.5% |
| Colon-Emeric et al | CBA | Falls prevention | *Patient outcome:* fall rates (compared to controls)  *Clinical process*: falls risk screening, 10 fall reduction measures (only intervention group) | No stat sig difference in fall rates |
| Arling et al. 2014 | ITS with control sites | Falls prevention | *Patient outcome*: change in falls incidence | Overall 31% decline in mean rate of new falls compared to controls sites (no change) |
| Lynn et al. 2007 | ITS with control sites | Pressure ulcer prevention and care | *Clinical process and Patient outcome*: 10 measures of prevalence and incidence of pressure ulcers (PU), healing and adoption of care processes | Compared to national control data, change in prevalence Stage I-IV PU not stat sig. Incidence of new Stage III or IV lesions declined from median incidence of 0.3/100 occupied beds per month to 0.0/100 beds; a 69% reduction p<0.001. Assessments within one day of admission increased from 87% to 99% (p=0.002) and weekly PU documentation 45% to 67% (p=0.004) |

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| **Prehospital ambulance care (1 study)** | | | | |
| **Study** | **Study Design** | **Topic** | **Primary outcome Measure/s** | **Results** (grey shade indicates statistically significant improvement reported in one or more of the study’s primary effect measures. |
| Siriwardena et al. 2014  Taljaard 2014 | ITS | Pre-hospital care for acute myocardial infarction and stroke | *Clinical process*: delivery of composite care pre-hospital bundle for acute myocardial infarction (AMI) and stroke | Care bundle performance increased from 43% to 79% for AM (OR 1.04; 1.04 - 1.04) and from 83% to 96% for stroke (OR 1.06; 1.05 - 1.07) |

\*vs= versus, stat sig = statistically significant, TC= total cholesterol, BP= blood pressure