

Additional file 1- Data extracted from studies

Study (Year)	Country	Design study	Targets for improvement	N (institutions, health services, health professionals)	Duration of intervention (months)	Main results (Evidence of target improvement)	Effectiveness <sup>1</sup> (Yes/No)	Sustainability <sup>2</sup> (Yes/No)	Mention to non-technical skills (Yes/No)	Assessment of non-technical skills (Yes/No)	SQUIRE (item number)
Vos et al. (2010) (15)	Netherlands	Multiple case study	To reduce the time between the first visit to the outpatient's clinic and the start of treatment and to reduce the in-hospital length of stay by 30%	8;- 17 teams	24	Not show whether the QIC method can effectively contribute to process redesign. Apparently, it did not contribute to empower project teams to implement their process redesign in a short timeframe.	No	No	No	No	5
Youngleson et al.(2010) (16)	South Africa	Quasi-experimental, BTS	To reduce transmission of HIV from mother to infant in a multi-facility public health system in South Africa.	17,-,-	37	Perinatal HIV transmission rate in Eastern sub-district decreased from 7,6% to 5% (p=0,013); Perinatal HIV transmission rate in Cape Town Metro excluding Eastern sub-district decreased from 4,2% to 3,8% (p=0,22)	Yes	No	Yes, leadership	No	3
Castillo et al. (2010) (17)	USA	Quasi-experimental, BTS	To decrease ambulance diversion through the implementation of best practices and policies at the emergency medical agencies, hospital and Emergency Department levels	11, - , -	10	19.9% decrease ambulance diversion hours (17,618 during the pre-consortium period and 14,117 in the post-consortium period). There was a decrease in diversion hours for every month-to-month comparison, except January and February.	Yes	No	Yes, communication	No	4

Russ et al.(2010) (18)	USA	Quasi-experimental, Pretest-Posttest Design	To improve the quality of the follow-up process of US newborns screened for hearing loss at birth	8, - , 113	15	Participation in the collaborative was effective in opening dialogue between different service sectors that have traditionally operated independently . Working on a common task with common goals fostered the development of personal relationships across sectors and disciplines, and between parents and professionals, that facilitated progress of the improvement work	No	No	Yes, leadership and communication	No	4
Stevens et al. (2010) (19)	USA	Quasi-experimental, Pretest-Posttest Design	To improve training for residents who provide chronic illness care in teaching practice settings	37, - , 57	18	Teams in both Collaboratives showed improvement in process measures. In both Collaboratives, the majority of residents had worked with registries, practiced self-management support, and conducted planned visits. LDL< 100 mg/dL increased 3.7; LDL< 100 mg/dL increased 12.2%; BP< 130/80 increased 3.4%; Retinal Exam increased 15.6%;Foot Exam increased 15.6%;Documented Self-Management goal increased 26.2%	Yes partial	No	Yes ,leadership, teamwork, decision support	Yes only decision making	4

Arriaga et al.(2011) (20)	USA	Quasi-experimental, Pretest-Posttest Design	To reduce breakdowns in communication during inpatient surgical care	4, -, -	19	Critical events where no attempt was made by the resident to contact the attending decreased from 33% to 15% and further decreased to 2% for the institutions where timing allowed for a third round ( $P < 0.0001$ ); 90% or greater events were communicated to an attending within 1 hour. The percentage not visited by an attending for more than 24 hours on a weekend decreased by nearly half (odds ratio, 0.49; 95% confidence interval, 0.34–0.72), including a 25% reduction in the number of patients not seen by an attending for more than 48 hours. Patient management was consistently changed in more than one-third of the cases where there was an attending visit (37%).	Yes	No	Yes, communication	No	3
Ouslander et al.(2011) (21)	USA	Quasi-experimental, BTS	To reduce Acute Care Transfers in Nursing homes	25, -, -	6	17% reduction in hospitalization rates (95% confidence interval (CI)= - 0.08 to -1.30). Engaged NHs had the highest reduction (24%, 95% CI=0.23 to -1.56; $P=0.01$ relative to comparison NHs). NHs that were not engaged had only a 6% reduction.	Yes	No	Yes, communication, teamwork, task management	No	6
Webster et al.(2012) (22)	South Africa	Prospective observational study	To accelerate highly active antiretroviral treatment (HAART) initiation in South Africa.	17, -, > 200	36	The mean number of patients tested for HIV increased from 891/month (SD 94.2) in the 4 months prior to the regional initiative to 3580/ month (SD 327.7) during the 6 months post-intervention ( $p<0.001$ ). The HAART average monthly initiations increased from 179 per month (SD 17.22) to 511 per month (SD 44.93)( $p<0.001$ )	Yes	Yes	No	No	6

Hayes et al. (2012) (23)	Netherlands	Quasi-experimental, Pretest-Posttest Design	To reduce the rate of pediatric codes outside the ICU by 50% and to improve the patient safety culture scores by 5 % points in the target units	20;-;-	12	The use of pediatric early warning system, starting out in no hospitals and implemented in 92% of hospitals. Patient safety culture scores improved for the 14 hospitals (70%) that conducted the survey, the domains improved between 4.5 and 8.5 %. Code rate did not decrease significantly (3% decrease). 12 hospitals reported additional data after the collaborative and saw significant improvement in code rates (24% decrease).	Yes	Yes (safety culture)	No	No	5
Ebert et al. (2012) (24)	USA	Analytical observational study	To support the broad implementation and sustained use of Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) in community practice settings	11;11; 109	18	At the 1 year follow-up, all of the agencies (n = 11) were providing TF-CBT. All reported having at least the same number of clinicians providing TF-CBT and the same number of youth receiving TF-CBT as at the end of the collaborative, with seven agencies (64%) reporting more providers and 8 (73%) reporting more clients receiving TF-CBT.	Yes	Yes	No	No	4
Benn et al. (2012) (25)	UK	Quasi-experimental, BTS	To improve patient safety climate and capability (SCC) resulting from participation in the UK Safer Patients Initiative	19, - , 284	24	A modest but statistically significant improvement in local SCC scores over the 12-month follow-up period during which sites were expected to spread, embed and consolidate the structured phase of the programme	yes	No	Yes, leadership, teamwork and communication	No	6
Regenstein et al. (2012) (26)	USA	Quasi-experimental, BTS	To improve the quality of language services (LS) in hospitals	10, - , -	18	The majority of hospitals screened nearly all patients for preferred language and was able to provide timely LS (15 min or less for LS) over 90% of the time.	Yes	No	Yes, leadership , teamwork	No	5

Malik et al. (2014) (27)	USA	Quasi-experimental, BTS	To ensure that no child reaches kindergarten with an undetected developmental delay	7;-:30	12	Screening rates improved from 62% to 92% (P < 001). 97.0% of the providers were using the ASQ, and 3% used the M-CHAT. For validated tools, the screening rates were 0.0%, 20.0%, and 37.9% at baseline, to 100%, 81.2%, and 95.7% post collaborative	Yes	No	No	No	3
Zubkoff et al (2014) (28)	USA	Quasi-experimental, BTS	To improve care related to reducing postoperative respiratory failure	16, - , 16 teams	8	Improved use of spirometry in 9 of 16 teams; 8/16 teams improved documentation of care; 7/16 teams improved oral care ; 6/16 teams improved standardized orders ; 5/16 improved ambulation and provider education; 4/16 teams improved patient education 3/16 team weaning protocols; smoking cessation in 1/16 and communication in 1/16 teams	Yes partial	Yes	Yes, leadership, teamwork	Yes	5
Doerfler et al.(2015) (29)	USA	Quasi-experimental, BTS	To reduce sepsis mortality and variation in practice	11; - ; -	60	North Shore-LIJ has reduced sepsis mortality by approximately 50% (from 32% to 16%) in a six-year period (2008–2013; sustained through 2014) across the 11 hospitals included in the sepsis initiative	Yes	Yes	Yes, leadership, teamwork	No	6
Gover et al (2015) (30)	USA	Quasi-experimental, BTS	To reduce central line-associated bloodstream infections (CLABSIs) in high-risk neonates	17, 17 , -	12	20% decrease of CLABSI; 94% achieved an IHI Collaborative Assessment Scale score of 2.5 or more ("improvement"), with 6 centers achieving a score of 4 or more ("significant improvement") and 3 centers achieving a score of 4.5 ("sustainable improvement")	Yes	Yes	Yes, teamwork and leadership	No	4

Singh et al.(2016) (31)	Ghana	Quasi-experimental, Pretest-Posttest Design	To determine whether 'Project Fives Alive!' influenced maternal and child health outcomes at scale	744, -, -	50	Increasing in early antenatal care (ANC) from 37% to 42% to 48% ( pre-intervention phase to the transition phase to the post-intervention phase respectively); skilled delivery is at 42% to 47% to 51% ; 3 of the categories of change interventions – early ANC ( $\beta = 0.3540$ , $P < 0.01$ ), 4 or more ANC visits ( $\beta = 0.2882$ , $P < 0.05$ ) and skilled delivery/immediate PNC ( $\beta = 0.2822$ , $P < 0.01$ ) were significantly and positively associated with the skilled delivery outcome.	Yes	No	No	No	4
Zubkoff et al.(2016) (32)	USA	Quasi-experimental, BTS	To prevent pressure ulcers	15;-;38 teams	10	The pressure ulcer rate decreased from 1.2 to 0.9 per 1000 bed days of care ( $P = .017$ ). The most common interventions were education ( $N = 26$ ; 68%), improved documentation ( $N = 23$ ; 61%), and the use of equipment and supplies ( $N = 21$ ; 55%).	yes	Yes	Yes, leadership	No	4
Fabbruzzo-Cota et al.(2016) (33)	Canada	Quasi-experimental, BTS	To improve pressure ulcers prevention and management	1, 6, 38	24	80% reduction in HAPUs ; 63% of all patients at risk of developing a PU, as determined by their Braden scores, had a turning clock posted at the bedside; all clinical inpatient units had the Positioning Decision Tree for Patients at Risk available for reference to guide staff in clinical decision making.	Yes	No	Yes, leadership, teamwork	No	3
Bourhouse et. (2017) (34)	UK	Quasi-experimental, BTS	To increase the numbers of eligible women offered and receiving treatment in the West of England to 60% within the project timeline	5; 5; 664	6	The use of magnesium sulphate increased across the West of England from an average baseline of 21% to 88% by the conclusion of the project.	Yes	Yes	Yes, leadership, teamwork	No	6

Zubkoff et al.(2017) (35)	USA	Quasi-experimental, BTS	To reduce preventable falls and fall-related injuries	23, - , -	6	Decrease in fall injury rates from 8.0 to 5.4 per 100 census days (P < .001), decrease in falls with major injury rates from 1.2 to 0.6 per 100 census days (P = .004) Decrease in falls with non-major injury rates from 7.4 to 4.8 per 100 census days (P=.001).	Yes partial	No	No	No	2
King et al.(2017) (36)	USA	Quasi-experimental, BTS	To reduce preventable hospital acquired conditions (HACs) by 40% and readmissions (within 30 days) by 20%	55, - , -	24	5.8% cumulative reduction in HACs, an 11.1% reduction in readmissions, avoided nearly 500 harm events since PfP implementation. Increases in ADEs and Falls with Harm may have been the result of an increase in self-reporting by MTFs, demonstrating an increase in the safety culture.	Yes	Yes	No	No	2
Nieuwsma et al (2017) (37)	USA	Quasi-experimental, BTS	To improve screening, referrals, assessment, communication and documentation, cross-disciplinary training and role clarification	14, - , 42	11	More likely to use a routine process to identify patients that could benefit from chaplain services ( p = .01); regularly communicating with chaplains to improve patient care ( p = .01); having a clear understanding of how the disciplines can collaborate ( p = .02); and having opportunities for joint training when appropriate ( p = .001); less likely to report benefitting from reading mental health providers' notes ( p = .03), more likely to report using a routine process to identify patients that could benefit from seeing mental health ( p = .05).	Yes	No	Yes, communication	Yes	3

Calderwood et al.(2018) (38)	USA	Quasi-experimental with a control group	To promote adoption of evidence-based surgical site infection (SSI) prevention practices	193, - , -	6	For knee arthroplasty, the risk-adjusted model found a 12% greater decline in the odds of an SSI in intervention states relative to comparison states (OR 0.88, 95% CI 0.78 to 0.99, p=0.04). The mean SSI rates for hip arthroplasty decreased from 2.19% to 1.63% postintervention. The mean SSI rates for knee arthroplasty, decreased from 1.67% preintervention to 1.45% postintervention.	Yes	Yes	No	No	5
Bunger, Lengnick-Hall (2018) (39)	USA	Quasi-experimental, Pretest-Posttest Design	To change communication patterns within teams from children's mental health organizations	- ; 21; 135	17	Participants reported communicating with more team members by the end of the learning collaborative. By the end of the learning collaborative, participants' average out-degree increased to 5.1 (SD=2.0) team members which was significantly higher than at the beginning of the learning collaborative [t(110)=4.01, p<.001], suggesting an increase in number of team members with whom participants communicated.	No	No	Yes, communication	No	6
Wijaya et al.(2018) (40)	Indonesia	Quasi-experimental, BTS	To improve the Siloam Hospitals' patient satisfaction index (PSI) and overcome Indonesia's geographical barriers	15, - , -	18	A statistically significant increase in the patient satisfaction index (PSI), $\chi^2 = 44.00$ , $p < 0.001$ . O PSI was higher in 80% of implementation and action phases in all hospitals both inpatient and outpatient.	Yes	No	Yes, leadership	No	4

Norton et al.(2018) (41)	USA	Quasi-experimental, BTS	To decrease unnecessary streptococcal (GAS) pharyngitis testint and improve appropriate antibiotic use for GAS	2, -,35	24	Absolute reduction in unnecessary GAS pharyngitis testing decreased from 64% to 40,5% ; appropriate antibiotic use for GAS pharyngitis improved from 45% to 70% , but did not significantly changed.	Yes	No	Yes, communication	No	5
Werdenberg et al.(2018) (42)	Rwanda	Quasi-experimental, BTS	To reduce neonatal mortality	26, -,70	18	Reduction in barriers to quality care delivery related to training (p=0.018); QI knowledge 37 to 89%, p< 0.001); confidence (47 to 89%, p< 0.001), QI leadership (59 to 91%, p< 0.001); and peer-to-peer learning (37 to 66%, p=0.024).	Yes	Yes	Yes, leadership, teamwork, communication and peer-to-peer learning	Yes	6
Stern et al. (2019) (43)	Uganda, Tanzania, Lesotho, Kenya	Quasi-experimental, Pretest-Posttest Design	To increase the data completeness and accuracy, to increase the retention in care of mother–baby pairs (MBP's), to increase the coverage of MBPs with appropriate services and to reduce the vertical transmission of HIV	80;- ; -	36	Improving retention of mother–baby pairs from 0,8% to 66% in Kenya, from 1% to 82% in Lesotho, from 4,6% to 91% in Tanzania and 2,2% to 92% in Uganda.In Uganda, quality improvement teams improved the completeness and accuracy of records to over 90% .	Partial	No	No	No	3
Lorenz et al. (2019) (44)	USA	Quasi-experimental, BTS	To increase the frequency of preventive education and frequency of rescreening of T2 Diabetes Mellitus (DM)	15; - ; -	12	Education on the elevator risks of developing T2DM increased from 21,4% to 75% and screening education increased from 9,5% to 68,8% ; health and wellness education improved from 11,9% to 71.9% . Screening rates for women at risk to T2DM increased from 61.9% to 81.3% ; women at risk to T2DM based on 2 or more risk factors completed a screen an additional in 16.8% of the time.	Yes	No	No	No	4

Arbour et al. (2019) (45)	USA	Quasi-experimental, BTS	To improve breastfeeding through home visiting	16; - ; -	24	Visitors trained in basic competences increased from 54% to 100% ; infants who initiate breastfeeding increased from 47% to 61% ; infants fed exclusively breast milk until 3 months increased from 10% at baseline to 13,5%; infants fed exclusively breast milk until 6 months increased from 5% to 8%.	Yes	No	No	No	5
Bedwell et al.(2018) (46)	Australia, USA, UK	Quasi-experimental, BTS	To improve the care of tracheostomy patients	45, - ,>2000	48	Reduction of length of stay and rehospitalization episodes; reduction tracheostomy-related injuries, shorter times to vocalization and established oral intake following, improvement of knowledge related with tracheostomy care, good adherence of care protocols, patient and family involvement, and the use of data to drive improvement.	Yes	No	Yes, self-efficacy	Yes	1
Zubkoff et al. (2019) (47)	USA	Quasi-experimental, Pretest-Posttest Design	To reduce preventable falls and fall related injuries in State Veterans Homes (SVHs)	26; 21; 109 teams	14	There was no improvement in total fall rates ( $p>0.05$ ) or major injury rates ( $p>0.05$ ). However, the overall injury rate (injuries per 100 census days), decreased from 7.4 to 6.6 during ( $p<0.009$ ) and 5.6 after ( $p<0.005$ ) the breakthrough series. The minor injury rate (minor injuries per 100 census days) decreased from 6.4 to 5.8 ( $p<0.000$ ).	Yes	No	No	No	2
Poewr et al.(2014) (48)	England	Randomized Controlled Trial	To improve compliance to an average of 90% on each of the nine processes by the National Audit (2010)	18, - , -	12	Improvement of compliance of 10.9% (95% CI 1.3%, 20.6%) in the Early Hours Bundle and 11.2% (95% CI 1.4%, 21.5%) in the Rehabilitation Bundle.	Partial	No	No	No	5

1- Effectiveness of the intervention 2 - sustainability of intervention after at least six months; 3- SQUIRE 2.0 quality rating (5-6 = high quality; 3-4= medium, and 1-2= low).