Supplementary Table 1: Characteristics of included studies (N=46)

Study # and relevant citations	First author	Location of study Year(s)	Intervention	Primary outcome	Components of implementation intervention (alphabetical)*	Risk of bias
OBSTETRICS AND GYNAECOLOGY						
1 [1 2]	Kramer	Belarus 1996-1997	Implementation of a modified WHO Baby Friendly Hospital Initiative - a 10 step intervention program designed to protect, promote, and support breast feeding – implemented with training of lead clinicians, onsite training of all health professionals providing maternal and newborn care, and monitoring visits by a	The risk of ≥ 1 gastrointestinal infection in the first 12 months of life Intervention group OR 0.60 (95% CI 0.40-0.91)	Barrier identification Context Education	Unclear

			steering committee			
2 [3]	Bashour	Syria 2008-2009	Multifaceted training package on interpersonal and communication skills aimed at recognising the impact of effective communication, to identify characteristics and principles of effective communication, to recognise and overcome barriers to effective communication, to enhance and reinforce the interpersonal and communication skills of health care providers	Women's satisfaction with interpersonal relationships in labour No significant difference (effect increase 0.03, 95% CI -0.08-0.15)	Barrier identification Education (3)	High
3 [4-6]	Dumont	Senegal Mali	Multifaceted program for reducing hospital based maternal mortality involving training in best practices in	Reduction of risk of hospital based mortality. Reduction in maternal mortality in intervention hospitals	Audit and feedback Education (2)	Low

		2007-2011	emergency obstetric care, in maternal death reviews, and in audit and feedback	higher than control (OR 0.85 95%CI 0.73-0.98, p=0.0299) but effect limited to first level referral hospitals	Leadership	
4 [7]	Foy	Scotland	Multifaceted guideline implementation for abortion care. This involved barrier identification through interviews with staff, feedback and distribution of audit results, education about care recommendations, provision of a model for care adapted to local use	Compliance with guideline recommendation (5 key guidelines; attendance at assessment appointment within 5 days of referral, ascertain cervical cytology, use of antibiotic prophylaxis, use of misoprostol, supply of contraception). No effect observed for any recommendation.	Audit and feedback Barrier identification Context (2) Education (2)	Unclear
5	Althabe	Argentina	Multifaceted behavioural intervention for development and implementation of 2	Increase in oxytocin use and decrease in episiotomy use. Intervention sites	Barrier identification	Low

[8 9]		Uruguay 2005-2005	guidelines about episiotomy use and management of the third stage of labour. This involved selection of opinion leaders, interactive workshops, academic detailing, training, reminders, audit and feedback, and resources using information technology	increased oxytocin use from 2.1% to 83.6%, compared to a change from 2.6% to 12.3% at controls (p=0.01). Episiotomy rates in the intervention group went from 41.1% to 29.9% and in the control group from 13.5% to 44.5% (p<0.001)	Communication Education (2) Leadership Provision of resources	
6 [10 11]	Ismail	UK	QI intervention for evidence based perineal repair involving provision of education materials for independent study and self-directed learning, provision of resources, interactive education, education of women about the process	Percentage of women who had pain on sitting or walking at 10-12 days post-partum. No difference primary outcome (mean diff 0.7% CI -10.1%-11.4%, p=0.89)	Education Patient involvement	Unclear

7 [12]	Deneux-Tharaux	France 2004-2006	Multifaceted strategy for reduction of severe PPH involving an outreach visit with academic detailing, reminders, and reviews of cases with severe PPH	Incidence of severe PPH. Rate 1.64% in intervention groups, and 1.65% in control groups, no significant difference	Audit and feedback Barrier identification Communication Education Leadership Provision of resources (2)	Low
8 [13]	Brown	South Africa 1998-2000	All hospitals given access to WHO Reproductive Health Library and trained on its use. Intervention hospitals were then given a multi-dimensional education package aimed at increasing site rates of	Whether a woman was allowed a companion during labour - no effect	Context Education Patient involvement Provision of resources	High

			companion of choice in labour; this involved workshop education of doctors and midwives, posters and information for pregnant women, information and video for staff on how to promote companion use.			
9 [14 15]	Gulmezoglu	Mexico Thailand 2001-2001	Multifaceted intervention based on the WHO Reproductive Health Library. The intervention involved barrier identification and interactive workshops	10 obstetric practices - no statistically significant change in any of the practices in either country.	Barrier identification Education Provision of resources	Low
NEONATOLOGY AND PAEDIATRICS						

10 [16]	Horbar	USA 1999-2001	Multifaceted quality improvement intervention involving audit and feedback, a workshop and ongoing support	3 process of care measures (proportion of infants receiving first surfactant in delivery room, proportion receiving first surfactant 2 hours after birth, median time from birth to first surfactant. Clinical outcome: death before discharge and pneumothorax. Significant improvement in process of care measures but not in mortality or pneumothorax	Audit and feedback Education Provision of resources	Unclear
11 [17]	Lee	Canada 2002-2005	Multifaceted implementation of quality improvement practice for reducing nosocomial infection and incidence of	Reduction in nosocomial infection and incidence of bronchopulmonary dysplasia Intervention group had a	Audit and feedback Barrier identification	High

			bronchopulmonary dysplasia in the NICU. The program involved communication strategies, group meetings to share lessons learned and training resources, and audit and feedback	difference in trend of -0.002 (95%CI -0.0007-0.0004) for nosocomial infection and -0.0006 (95% CI -0.0011 to -0.0001) for bronchopulmonary dysplasia	Communication Education Patient involvement Provision of resources	
12 [18 19]	Acolet	UK 2006-2007	Active education and knowledge transfer strategy to change practice in early neonatal care. Both control and intervention arm received feedback of previous audit and education about recommendations for early newborn care. Intervention arm also implemented regional champions, and training on	Timing of surfactant administration, admission temperature, staffing of resuscitation team present at birth. Intervention arm had babies more likely to be given surfactant on labour ward (RR1.30, 95% CI 0.99-1.70, p=0.06), have a higher admission temperature (mean	Education Leadership	Unclear

			implementing research evidence	difference 0.29%, 95% CI 0.22-0.55, p=0.03). Intervention arm had a trend towards ideal staffing of resuscitation team (RR 1.18 95% CI 0.97-1.43, p=0.09)		
13 [20]	Ayieko	Kenya 2006-2008	Multifaceted implementation of best practice guidelines for paediatric care. Involved assessment and feedback, training, provision of practice guidelines, external supervision and facilitators.	14 process indicators - improvement in most effectiveness measures	Audit and feedback Education Provision of resources Supportive supervision	High
INTENSIVE CARE						
14 [21 22]	Scales	Canada 2005-2007	Multifaceted quality improvement targeting 6 ICU care practices involving	Improvement in adoption of all 6 care practices. Overall improvement	Audit and feedback Communication	Low

			educational outreach, reminders and other tools, and audit and feedback	of all practices greater in intervention (OR 2.79, 95% CI 1.0-7.74)	Education Provision of resources	
15 [23]	Doig	Australia New Zealand 2003-2004	Multifaceted guideline development and implementation strategy for patient feeding in ICU involving opinion leaders, educational outreach visits, academic detailing, active reminders, timely audit and feedback, passive reminders, and in servicing	Hospital mortality at discharge. No difference between intervention and control groups in hospital discharge mortality 28.9% vs 27.4%, p=00.75	Audit and feedback Communication Education (3) Leadership Provision of resources	High
16 [24]	Martin	Canada 1997-1998	Multifaceted program for improving nutritional support in ICU patients using algorithms built from an evidence-based	Hospital mortality, length of ICU stay, length of hospital stay. Intervention group had a shorted	Audit and feedback Communication	Unclear

			consensus conference. Implementation employed academic leaders, education, reminders, provision of resources, and audit and feedback	mean length of hospital stay (25sv35 days, p=0.003), no significant difference in mortality (27%vs37%, p=0.058) or in mean length of ICD stay (10.9vs11.8 days, p=0.7)	Education (3)	
17 [25 26]	Van der veer	Netherlands 2009-2011	Multifaceted performance feedback strategy for length of stay in ICU. Both control and intervention arms receive a program called Information Feedback on Quality Indicators (InFoQI) with the intervention arm more frequent and comprehensive feedback, a local QI team, and two educational outreach visits	Length of ICU stay and proportion of shifts with bed occupancy >80%. ICU length of stay did not significantly reduce after 1 year in intervention units compared with controls (hazard ratio, 1.02 [95% CI, 0.92-1.12]).	Audit and feedback Context Education Supportive supervision	Low

INTERNAL MEDICINE SPECIALITIES (n=20)						
18 [27]	Fuller	UK 2006-2009	A feedback intervention trial to improve hand hygiene compliance direct observation and instant feedback to individuals and direct observation and delayed feedback to groups of participants.	Compliance to hand hygiene. Improved in intervention group in intensive care but not internal medicine OR 1.44 95% CI 1.18-1.76, p<0.001	Audit and feedback Barrier identification Education	Unclear
19 [28 29]	Dijkstra	Netherlands 1999-2000	Multifaceted complex diabetes care involving feedback to health care professionals, educational meetings, promotion of a diabetic 'passport', discussions about barriers and facilitators to implementation, and patient education	Change in HbA1C. Intervention group HbA1C fell -0.3%, control group HbA1C increased by +0.2% (p<0.001)	Audit and feedback Barrier identification Education Patient involvement Supportive supervision	Unclear

20 [30]	Power	UK 2008-2010	Quality improvement collaborative in two stroke care bundles involving appointing leaders, training, collaborating, implementation at the point of care, data collection, and feedback and audit	Rate of improvement in compliance with the bundles. Intervention groups had a relative improvement in the Early Hours Bundle (10.9%, 95%CI 1.3-20.6%) and in the Rehabilitation Bundle (11.2%, 95%CI 1.4-21.5%)	Audit and feedback Communication Education Leadership	Unclear
21 [31]	Lakshminarayan	USA 2000-2003	Stroke care program involving clinical and management leader recruitment, collection of data, and identification of barriers. Based around 10 performance measures grouped in to 3 bundles of care: acute, in-hospital and discharge care	Improvement in three bundles of care. No significant intervention effect in the three bundles	Audit and feedback (2) Barrier identification Leadership	High

22 [32]	Schouten	Netherlands 2002-2005	Multifaceted guideline implementation for adherent AB prescribing in CAP or AECB. Involved analysis of barriers to implementation of guidelines, followed by a 2 phase process. Phase 1 - local committee formed, education performed, feedback given, resources distributed. Phase 2 - components of phase 1 adjusted to local context	Rate of guideline adherence to antibiotic prescription Increased from 50.3% - 64.3% OR 2.63 (1.57-4.42), p=0.0008	Audit and feedback Barrier identification (2) Context	Unclear
23 [33 34]	Middleton	Australia 2003-2005	Multifaceted implementation of acute stroke care guidelines. Fever, Sugar, Swallowing (FeSS) intervention focused on barrier identification, multi-disciplinary teamwork, local adaptation,	Death or disability 90 days 42% vs 58%, absolute diff 15.7%, p=0.002	Barrier identification Communication Leadership	Low

			and use of site champions			
24 [35]	Barkun	Canada 2008-2009	Multifaceted guideline implementation for management of ulcer bleeding. Both control and intervention arms received guidelines and algorithm on the care of patients with bleeding ulcer. Intervention arm also received identification and analysis of needs and barriers, education sessions, production of an institution specific algorithm for care of these patients.	No improvement in guideline adherence	Audit and feedback Barrier identification Context Education Provision of resources	Low
25 [36 37]	Scott	USA 2005-	Multifaceted behavioural change to increase tissue plasminogen activator use is stoking care. Approach involving the	No significant difference in altephase use between 2 groups in ITT analysis	Audit and feedback Barrier identification	Unclear

		2010	identification of barriers, clinical practice guideline promotion, development of local champions, education, support, academic detailing, and audit and feedback		Communication Education Leadership	
26 [38]	Pai	Canada 2009	Multifaceted strategy targeting VTE prophylaxis compliance involving standardised education sessions, standardised VTE risk assessment algorithm, and audit and feedback	VTE prophylaxis rates. No difference in VTE prophylaxis rates between intervention and control (OR 0.80 95% CI 0.50-1.28, p=0.36)	Audit and feedback Education Leadership Provision of resources	Unclear
27	Metlay	USA 2003-	Multifaceted educational intervention for reducing antibiotic prescription in	Antibiotic use in upper respiratory tract infections. Decreased in control	Education (2)	High

[39]		2005	respiratory tract infections, centred around increasing provider knowledge, reinforcing strategies, and patient education as an enabler to physicians	sites of 0.5% and in intervention sites of 10% in intervention sites	Leadership Patient involvement	
28 [40]	Berwanger	Brazil 2011-2012	Multifaceted quality improvement intervention to improve number of patients receiving evidence based therapies to reduce the incidence of major cardiovascular events amongst patients with acute coronary syndrome involving reminders, checklists, case management, and educational materials	Percentage of patients receiving all evidence based therapies. Significant improvement in intervention group in number of patients that received all interventions (67.9%vs49.5%,OR 2.64, p0.01)	Communication Education Provision of resources	Low
29	Romero	Spain	Multifaceted clinical practice guideline for management of unstable angina -	Absolute improvement in appropriate	Audit and feedback	High

[41]		1998-1999	implementation involving a systematic review of the literature, expert panel opinion, local consensus, interactive education, feedback on representative cases	UA care 11% (CI 0.85-21.1), p=0.03	Context Education	
30 [42 43]	Panella	Italy 2003-2004	Multifaceted guideline implementation for hospital treatment of heart failure beginning with education about the protocol, assignment of a methodological leader, education, formation of protocols and documentation of processed	In-hospital mortality. Intervention group had an in hospital mortality of 5.6% compared with 15.4% in controls (p=0.001)	Education (2) Leadership Provision of resources	Unclear
31 [44 45]	Kinsman	Australia 2008-	Multifaceted clinical pathway implementation process for AMI treatment. All sites received a hard copy	The proportion of patients receiving a thrombolytic, and time to thrombolysis and electrocardiogram.	Audit and feedback Communication	High

		2009	of the guidelines and then the intervention sites underwent a five step implementation process involving engaging clinicians, clinical pathway development, reminders, education, and audit and feedback.	78% versus 84% in intervention versus control received a thrombolytic (p=0.739), time to thrombolysis was 29 mins in both groups (p=0.632) and time to electrocardiogram was 7 mins versus 6mins in the intervention versus the control group (p=0.669)	Education Leadership Provision of resources	
32 [46]	Thilly	France 1998-2000	Complex clinical practice guideline implementation concerning the use of ACE inhibitor therapy in patients with systolic heart failure. This involved appointment of lead cardiologists to develop and implement guidelines,	Compliance with 17 clinical practice guidelines around ACE inhibitor use	Education Leadership Provision of resources (2)	High

			education, provision of supporting and educational material			
33 [47]	Du	China 2007-2010	Complex clinical pathway intervention for acute coronary syndrome involving adoption of American Heart Association guidelines, formation of a local working group in each site, education and senior leadership in implementation, feedback and audit	8 key performance indicators. Intervention group had an increase in proportion of patients discharged on appropriate medical therapy (aRR 1.21 96%CI 1.06-1.37 p=0.004) with no difference in the other 7	Audit and feedback Context Education Leadership	High
34 [48 49]	Panella	Italy 2005-2007	Multifaceted complex stroke care clinical pathways involving the formation of multi-disciplinary teams, training on quality improvement, education, formation of team driven protocols,	30/7 mortality. There was no significant effect on 30 day mortality	Audit and feedback Education Leadership Provision of resources	High

			monitoring and feedback			
35 [50]	Cumming	Australia 2003-2006	Multifaceted intervention for falls prevention - nurse led interventions, tailored to the patient, and physiotherapy led individual and group exercises. Patient and family education	Falls during hospital stay. No difference between intervention and control 9.26 falls per 1000 bed days vs 9.20 falls per 1000 bed days (p=0.96)	Education Leadership Patient involvement Provision of resources	Unclear
36 [51 52]	Costantini	Italy 2007-2009	10 step implementation of the Liverpool Care Pathway which is centred around development of the implementation project on the ward, implementation of the program on the ward, initiation of a strategy for sustainability, and formation	Quality of care measured using a toolkit. No overall improvement in quality of care - a cluster adjusted mean difference between the implementation and the controls of 7.6 out of 100, 95% CI -3.6-18.7,	Audit and feedback Communication Education Provision of resources Supportive supervision	Low

			of a regional and national strategy	p=0.186		
37 53-55	Weaver	Uganda 2009-2010	Implementation of an Integrated Management of Infectious Diseases (IMID) Program in both groups, with the intervention group also receiving On Site Support (OSS) consisting of clinical mentorship, multidisciplinary team training cadre-specific breakout sessions, and continuous quality improvement	The role of IMID training+/- OSS on 23 performance indicators IMID training improved 3 indicators (outpatients triaged - aRR 1.29, emergency and priority patients admitted - aRR 1.59, and pneumonia suspects assessed - aRR 2.31). OSS improved emergency patients receiving at least one appropriate treatment (aRR 1.84)	Education (3) Supportive supervision	High
ANAESTHETICS AND SURGERY (n=3)						
38	Rycroft-	UK	Multiformat guideline interventions	Duration of fluid fast prior to	Barrier identification	Unclear

[19 56]	Malone	2006-2009	targeting pre-anaesthetic fluid fast - three interventions; standard (guideline package to clinicians and patients), standard plus a web based education package championed by a leader, and standard plus a plan-do-study-act approach	surgery. Duration of fluid fast effect size web based vs standard 0.33. Duration of fluid fast Effect size plan-do-study-act vs SD 0.12	(3) Communication Education Leadership	
39 [57-60]	Simunovic	Canada 2002-2004	Multifaceted quality intervention designed to improve patient outcomes following surgically treated rectal cancer involving workshops, opinion leaders, operative demonstrations, a post-operative questionnaire, and feedback and audit	Improvement in rate of permanent colostomy and in local recurrence of rectal cancer. Permanent colostomy 39% vs 41% (OR 0.97, 95%CI 0.63-1.48). Local recurrence 7% vs 6% (OR 1.06 95%CI 0.68-1.64)	Audit and feedback Education (2) Leadership Resources	High
40	Wright	Canada	Multifaceted education intervention for	Mean number of lymph nodes	Barrier identification	Low

[61]		2004	lymph node in colon cancer sampling involving a standardised lecture at both the control and the intervention sites. Intervention sites then had appointment of local opinion leaders, education of staff, identification of local barriers and solutions and the provision of resources	assessed in patients with stage 2 colon cancer and the proportion of cases staged with a minimum of 12 nodes. Both control and intervention improved the number of lymph nodes assessed ($p<0.001$). No additional benefit in intervention sites	Context Education (2) Leadership Provision of resources	
CROSS SPECIALITY / HOSPITAL WIDE PROGRAMS (n=6)						
41 [62-65]	Huis	Netherlands 2008-2009	A multifaceted program directed at nurses to improve hand hygiene, combining education, reminders, feedback, and resources in the state of the art intervention with setting norms and targets with the team, gaining active	The percentage of nurse's actions in line with hand hygiene guidelines post intervention and 6 months later. Change in compliance in team leaders-directed group greater post intervention (37.9% vs 19.2%	Audit and feedback Communication Education Supportive supervision	Unclear

			commitment, and modelling by informal leaders in the team leaders-directed intervention	p<0.01) and at 6 months (38.8% vs 22.6% p=0.002)	(2)	
42 [66 67]	Schultz	Australia 2011-2012	Intervention of three linked activities: (1) introduction and use of the Malnutrition Universal Screening Tool (MUST), (2) the provision of food supplements to at risk patients, and (3) introduction of a system using red feeding trays to flag patients requiring full feeding assistance	The rate of change in body mass and body mass index over weekly periods from admission to discharge. No difference in weight loss between control and intervention	Barrier identification Leadership(2) Provision of resources	High
43 [68]	Murray	UK 2010-2011	Multipronged approach to support for smoking cessation involving education, therapy, and education of professionals	Smoking cessation at 4 weeks. Non-significant improvement in smoking cessation results - intervention38% versus17% controls aRR2.10 95%CI	Education Patient involvement (2)	High

			providing smoking cessation advice	0.96-4.61, p=0.036		
44 [69]	Haines	Australia 2007-2008	Provision of resources: Addition of one low bed plus written policy to intervention wards	Falls and fall injuries No difference in rate of falls or in the rate of fall injury	Education Provision of resources	High
45 [70 71]	Merit investigators	Australia	Multifaceted intervention with introduction of medical emergencies teams and education about the implementations	Composite of the incidence of cardiac arrests without a pre-existing not-for- resuscitation order, unplanned ICU admission and unexpected deaths. Intervention versus control 5.86 versus 5.31 per 1000 admissions p=0.640	Education Provision of resources (2)	Low
46	Stevenson	USA	Multifaceted intervention targeting infection control measures involving a	Proportion of health care providers compliant with hand hygiene	Audit and feedback	High

[72]	2003	campaign tailored to the hospital promoting compliance with hand hygiene policies and isolation practices. These included education, provision of resources and feedback and audit.	protocols. Change in complete hand hygiene compliance in intervention +20% compared with -3.1% in controls (p=0.001)	Education Provision of resources

* Number in parenthesis following a component denotes the number of times that component was used in a particular study

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