Appendix 1: Detailed Summary of Systematic Review

Study, Methodologic Feature Score, Funding	Type of Analysis, Modelling Method	Effectiveness Data Safety Improvement Strategies	Cost Data	Cohort and Time Horizon for Analysis	Main Outcome Measures and Discounting	Results of Base Case Analysis	Results: Sensitivity Analysis	Limitations
Adverse Drug Events (ADEs)								
Karnon 2009 [1] Methodologic feature score = 27 Funding not stated	Cost utility Decision analytic model	One randomized trial of pharmacist-led medication reconciliation [2], non-randomized trials [3-6] Pharmacist-led medication reconciliation	Case control studies [7-9]; Case series with attributable costs [9]	Patients at risk of medication error due to lack of medication reconciliation	Cost per Quality Adjusted Life Year (QALY) gained No discounting	Pharmacist-led medication reconciliation is a dominant strategy	Pharmacist-led medication reconciliation remained the dominant strategy as long as a value is attached to a QALY gained	Effectiveness based on single small randomized controlled trial; no utility measures available so these were estimated

Study, Methodologic Feature Score, Funding	Type of Analysis, Modelling Method	Effectiveness Data Safety Improvement Strategies	Cost Data	Cohort and Time Horizon for Analysis	Main Outcome Measures and Discounting	Results of Base Case Analysis	Results: Sensitivity Analysis	Limitations
Transfusion-related Adverse Events (AE) in critically ill patients								
Shermock 2005 [10] Drummond Checklist score = 28 Funding not stated	Cost effectiveness Decision analytic model	Randomized control trial [11] Use of EPO in preventing transfusion-related AEs	Randomized control trial [11]	Patients at risk of contracting transfusion-related AEs	Cost to avoid one transfusion-related AE No discounting	Incremental cost: $4,700,000 to avoid one transfusion-related AE, $25,600,000 to avoid one serious transfusion-related AE, and $71,800,000 to avoid a likely fatal transfusion-related AE	Results withstood extensive sensitivity analysis	Single estimate of effectiveness

Study, Methodologic feature score, Funding	Type of Analysis, Modelling Method	Effectiveness Data Safety Improvement Strategies	Cost Data	Cohort and Time Horizon for Analysis	Main Outcome Measures and Discounting	Results of Base Case Analysis	Results: Sensitivity Analysis	Limitations
Catheter-related bloodstream infections (CRBSI)								
Maenthaisong 2006 [12] Methodologic feature score = 25 Funded by Thailand Research Fund	Cost-effectiveness Decision analytic model	Randomized control trials from a meta-analysis [13]	Published reports from national health security office [14]	Catheterized patients at Siriraj hospital, Thailand, for the duration of hospitalization	Incidence of catheter-related bloodstream infections (CRBSI) and death related to CRBSI No discounting	Chlorhexidine gluconate showed a cost savings of 304.49 Baht in central line catheter sites and 13.56 Baht per catheter in peripheral line catheter site with a 1.16% decrease in incidence of CRBSI and a 0.32% decrease in death	Chlorhexidine gluconate increased direct medical costs by 3.29 Baht. Cost of CRBSI was the cost driver in worst-case scenario, but did not increase rate of CRBSI nor death due to CRBSI	None listed

Study, Methodologic feature score, Funding	Type of Analysis, Modelling Method	Effectiveness Data Safety Improvement Strategies	Cost Data	Cohort and Time Horizon for Analysis	Main Outcome Measures and Discounting	Results of Base Case Analysis	Results: Sensitivity Analysis	Limitations
Central Line Associated Blood Stream Infection (CLABSI)								
Waters 2011 [15] Methodologic feature score = 20 Funded by Blue Cross Blue Shield of Michigan through the Michigan Health and Hospital Association	Cost-effectiveness Decision analytic model	Interrupted time series [16]	Activity-based Costing through interviews with staff	Patients at risk of CLABSIs Three year time horizon	Cases of CLABSI averted by the intervention for each hospital No discounting	Intervention cost was about $3,375 per infection averted and considered economically dominant	If the median hospital infection rate was used as the main outcome rather than the mean then cost per infection averted is $4,725	Results may not be generalizable outside of Michigan and did not include longer term health care costs

Study, Methodologic feature score, Funding	Type of Analysis, Modelling Method	Effectiveness Data Safety Improvement Strategies	Cost Data	Cohort and Time Horizon for Analysis	Main Outcome Measures and Discounting	Results of Base Case Analysis	Results: Sensitivity Analysis	Limitations
Retained Surgical Foreign Bodies								
Regenbogen 2009 [17] Methodologic feature score score = 24 Funding not stated	Cost effectivenes s analysis Decision analytic model	Randomized control study of bar coded sponges [18] and epidemiologic studies providing estimates of sensitivity and specificity of standard counts and universal radiography [19,20] Comparing standard counting against alternative strategies: universal or selective x-ray, bar-coded sponges (BCS), and radiofrequency-tagged (RF) sponges	Published literature [21,22] OR managers at the hospital, University of California, San Francisco Medical Center, and the Hospital of the University of Pennsylvania	Average risk of inpatient operation from published literature [18-20,23] Duration of hospitalization	Retained sponges incidence and cost-effectiveness ratios for each strategy No discounting	Standard count $1,500 per retained sponge averted; Bar-coded sponges $95,000 per retained sponges averted; Routine intraoperational radiology over $1 million per retained sponges averted	Results were robust over the plausible range of effectiveness assumptions, but sensitive to cost	Evidence of effectiveness for some comparisons within this analysis came from lower quality studies such as cadaver studies.

Reference List

1. Karnon J, Campbell F, Czoski-Murray C. Model-based cost-effectivness analysis of interventions aimed at preventing medication error at hospital admission (medicines reconciliation). J Eval Clin Pract 2009; 15: 299-306.

2. Kwan Y, Fernandes O, Nagge J et al. Implementation and a randomized controlled evlauation of pharmacists medication assessments in a surgical preadmission clinic. Pharmacotherapy 2005; 25: 1462.

3. Bates DW, Leape LL, Petrycki S. Incidence and preventability of adverse drug events in hospitalized adults. J Gen Intern Med 1993; 8: 289-94.

4. Mcfazdean E, Isles C, Moffar J et al. Is there a role for a prescribing pharmacist in preventing prescribing errors in the medical admissions ward? Pharmaceutical Journal 2003; 270: 896-9.

5. Scarsi KK, Fotis MA, Noskin GA. Pharmacist participation in medical rounds reduces medication errors. Am J Health-Syst Pharm 2002; 59: 2089-92.

6. Collins DJ, Nickless GD, Green CF. Medication histories: does anyone know what medicines a patients should be taking? International Journal of Pharmacy Practice 2004; 12: 173-8.

7. Bates DW, Spell N, Cullen DJ et al. The costs of adverse drug events in hospitalized patients. Adverse Drug Events Prevention Study Group 1997; 307-11.

8. Pinilla J, Murillo C, Carrasco F et al. Case-Control analysis of the financial cost of medication errors in hospitalized patients. European Journal of Health Economics 2006; 7: 66-71.

9. Classen DC. Adverse drug events in hospitalized patients: excess length of stay, extra costs, and attributable mortality. JAMA 1997; 277: 301-6.

10. Shermock KM, Horn E, Lipsett PA et al. Number needed to treat and cost of recombinant human erythropoeitin to avoid one transfusion-related adverse event in critically ill patients. Crit Care Med 2005; 33: 497-503.

11. Corwin HL, Gettinger A, Pearl RG et al. Efficacy of reconbinant human erythropoietin in critically ill patients. JAMA 2002; 288: 2827-35.

12. Maenthaisong R, Chaiyakunapruk N, Thamlikitkul V. Cost-effectiveness analysis of chlorhexidine gluconate compared with povidone-iodine solution for catheter-site care in Siriraj hospital, Thailand. J Med Assoc Thai 2006; 89: S94-S101.

13. Chaiyakunapruk N, Veenstra DL, Lipsky BA et al. Chlorhexidine compared with povidone-iodine solution for vascular catheter-site care: A meta-analysis. Ann Intern Med 2002; 136: 792-801.

14. National Health Secutiry Office. J Diagnosis Related Group Relative Weight 2002-2003. 182-188. 2003.

15. Waters HR, Korn R Jr., Colantuoni E et al. The business case for quality: Economic analysis of the Michican Keyston patient safety program in ICUs. Am J Med Qual 2011; 26: 333-9.

16. Pronovost P, Needleman J, Berenholtz SM et al. An intervention to reduce catheter-related bloodstream infections in the ICU. N Engl J Med 2006; 355: 2725-32.

17. Regenbogen SE, Greenberg CC, Resch SC et al. Prevention of retained surgical sponges: A decision-analytic model predicting relative cost-effectiveness. Surgery 2009; 145: 527-35.

18. Greenberg CC, Diaz-Flores R, Lipsitz SR et al. Bar-coding surgical sponges to improve safety: A randomized control trial. Ann Surg 2008; 247: 612-6.

19. Cima RR, Kollengode A, Garnatz J et al. Incidence and characteristics of potential and actual retained foreign object events in surgical patients. J Am Coll Surg 2008; 207: 80-7.

20. Revesz G, Siddiqi TS, Buchheit WA et al. Detection of retained surgical sponges. Radiology 1983; 149: 411-3.

21. Gawande AA, Studdert DM, Orav EJ et al. Risk factors for retained instruments and sponges after surgery. N Engl J Med 2003; 348: 229-35.

22. Egorova NN, Moskowits A, Gelijins A et al. Managing the prevention of retained surgical instruments. What is the value of counting? Ann Surg 2008; 247: 13-8.

23. Forgue E, Aimes A. Les "Pieges" de la Chirurgie, Paris: Masson et Cie, 1939.