King's Research Portal

DOI:

[10.1136/bmj.i5417](https://doi.org/10.1136/bmj.i5417)

Document Version

Publisher's PDF, also known as Version of record

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Pannick, S., Wachter, R. M., Vincent, C., & Sevdalis, N. (2016). Rethinking medical ward quality. *BMJ (Clinical research ed.)*, 355, i5417. <https://doi.org/10.1136/bmj.i5417>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

ANALYSIS

Rethinking medical ward quality

For quality to improve, we need to embrace the complexities of general medical inpatient care, say **Samuel Pannick and colleagues**

Samuel Pannick *clinical research fellow*¹, Robert M Wachter *professor of medicine and*² *interim chairman*², Charles Vincent *professor of psychology*³, Nick Sevdalis *professor of implementation science and patient safety*⁴

¹NIHR Imperial Patient Safety Translational Research Centre, Imperial College London, London, UK; ²Department of Medicine, University of California, San Francisco, USA; ³Department of Experimental Psychology, University of Oxford, Oxford, UK; ⁴Centre for Implementation Science, King's College London, London, UK

Medical wards deliver the majority of acute inpatient care in health systems worldwide. This care is expensive, costing the NHS around £5bn (€5.5bn; \$6.2bn) a year, a quarter of its inpatient expenditure.¹ Improving the performance of medical wards is an international priority,^{2,3} not only because of the scale of care that they deliver. Their core workload—treating complex, increasingly frail patients in a time pressurised setting—represents the broader challenges facing healthcare.⁴ Yet major gaps remain in our understanding of how wards perform.⁵⁻⁷

Safety and quality interventions have been most effective in improving standardised clinical tasks in the operating theatre and intensive care unit, such as the insertion of central venous catheters. The processes of ward care require a more nuanced approach to improvement. Medical patients' clinical syndromes often fall between traditional diagnostic categories,⁸ and specific organisational challenges exist for the teams that care for them. We discuss the unique properties of medical wards and the problems they face, before setting out a vision for ward improvement that embraces the complexity of ward care.

The medical ward is a different animal

Important differences exist between medical wards and other clinical settings, from haemodialysis units to operating theatres. Medical ward teams care for a particularly heterogeneous group of patients, with no single best pathway for diagnosis or treatment. Staff are skilled in the management of a diverse range of conditions, from pyelonephritis to gastrointestinal bleeding and terminal cancer. Many patients arrive without a diagnosis; indeed, empirical treatment can be concluded with no definitive diagnosis ever established. This sets medical wards apart from other hospital settings, which typically manage more narrowly defined patient populations with more predictable care trajectories. With such heterogeneity, medical ward teams may struggle to articulate their clinical and business aims and are

better defined by their interpersonal networks and the flow of information within them.⁹

Episodes of medical ward care can be long, involving large, dynamic, multidisciplinary teams. Team members are often dispersed throughout the hospital; physicians and allied health professionals are rarely located together on one unit with nurses and their patients. Frequent handovers are made more difficult by the absence of a central procedure around which a structured care narrative can be formed.

Errors are common and often serious—medical ward patients have the same risks of preventable and fatal adverse events as those in intensive care,^{7,10} and preventable hospital deaths are disproportionately caused by failures in general ward care.⁶ Crucially, ward failures are different from the procedural misadventures of the operating theatre or intensive care unit,¹⁰ resulting instead from the accumulation of missed opportunities to provide needed care.^{6,11} As a result, medical ward care may be 10-100 times more hazardous than elective surgery or low risk anaesthesia, crossing a perceived threshold into “unsafe” care.¹²

Even with this risk profile, medical wards struggle to attract the resources they need to improve.¹³ Senior decision makers may be less motivated to combat errors of omission on the ward, judging them more leniently than equally harmful errors of action.^{14,15} Responsibility for ward harms is spread diffusely, and the number of possible improvement targets may be overwhelming.⁷ Operating theatres, intensive care units, and specialty services draw more organisational attention, owing to their higher status and concentrated focus.^{13,16}

Improvement strategies devised for more structured clinical settings—namely, the intensive care unit and operating theatre—undergo little further testing on medical wards,¹⁷ even though their implementation faces different challenges (table

1↓). Wards may require a different combination of safeguards and tools to reliably deliver high quality care.

Variations in ward care are ignored

More variation—in adverse event rates, safety and teamwork climates, job satisfaction, and perceptions of management—is found within hospitals than between them.²⁵⁻³⁰ Pronovost and Sexton cautioned against a falsely unified view of each hospital's practice,²⁷ and public inquiries have found islands of excellence alongside wards with egregious deficiencies.^{25 26} Improvement efforts have accentuated this trend: within-hospital differences remain high.³⁰ Data analysis should target wards more intensively,^{28 29} providing a better understanding of variations in care that would enable the selection and tailoring of appropriate improvement interventions. Monitoring data from the ward is also typically needed for successful implementation.³¹

Instead, most published measures of healthcare quality—mortality, readmissions, and patient experience, for example—evaluate entire hospitals, not individual units. On both sides of the Atlantic, governments, regulators, and consumer organisations prioritise grades based on hospital aggregated data.^{32 33} Overlooking variations in ward performance results in blanket hospital grades that are unreliable³⁴ and aggregated hospital outcomes that are not accurate indicators of quality of care.³³⁻⁴² Aggregate measures obscure the need for greater investment in ward specific datasets. Without them, major policy decisions—on the adequacy of resources for safe staffing, for example—will be based on incorrect inferences drawn from averaged, hospital-wide data.⁴³

Quality metrics for medical wards should embrace complexity of care

Patients on medical wards primarily come to harm through suboptimal clinical monitoring, diagnostic errors, and inadequate drug or fluid management.⁶ These reflect the fundamental challenges of ward care, which is a dynamic, evolving, team process of assessment and reassessment. Quality metrics should reflect this complexity, but more commonly impose a reductive concept of care, where evidence based treatments are either delivered or not.

The quality of medical inpatient care in the US is represented by a set of common “tracer” conditions: myocardial infarction, pneumonia, congestive heart failure, chronic obstructive pulmonary disease, stroke, and venous thromboembolism.⁴⁴ Treating these conditions in a timely and effective manner is an understandable concern: they represent a significant burden of disease. Nonetheless, their prioritisation—with a national mandate to publicly report relevant process measures and outcomes—may be ineffective^{45 46} and has opportunity costs. Disease specific quality metrics do little to incentivise robust systems of care that protect complex medical patients from harm.⁴⁷ Rather, they imply that high quality care in this setting is best achieved by focusing on individual pathologies, one at a time.

The NHS is taking a different approach. NHS England recently issued an updated set of 10 overarching clinical standards for acute care,⁴⁸ which include shared decision making; early multidisciplinary assessment; multiprofessional handovers; repeated senior review; and attention to patient experience, safety, and clinical effectiveness. These aspirations are better aligned with the needs of a complex patient population, yet are still backed by a series of levers and incentives.⁴⁹

The future ward: four strategies to manage complexity

We envisage four broad categories of ward intervention to tackle complexity. The first two aim to reduce unnecessary variation, standardising and simplifying how predictable challenges are handled. The last two make better use of existing resources to optimise how complex care is managed (fig 1↓).

Standardise predictable care tasks to reduce specific harms

Interventions to improve the delivery of disease specific care are useful—they standardise common, predictable care tasks by establishing clear technical standards and introducing the socioadaptive changes necessary to embed them. Efforts to reduce central line associated infections and catheter associated urinary tract infections in this way have been notable successes.^{31 50} But staff may tire of numerous single issue, best practice campaigns. Each new initiative risks diluting attention to existing commitments⁵¹ and adds to the growing burden of costly performance data reporting.^{52 53} Standardisation efforts should be selected strategically, mindful of the organisation's capacity to implement them.⁵⁴

Simplify the care environment and the systems that support care delivery

The ward environment is rarely a focus for national initiatives.²² Excess noise, poorly designed supply chains, convoluted communication pathways, and inaccessible information force frontline staff to develop arduous workarounds. These complicate predictable tasks and reduce the time available for direct clinical care.^{55 56}

Interventions to improve the clinical environment and its support structures can reduce these unnecessary burdens and are likely to be cost effective.⁵⁷ Current intervention targets for patient safety organisations and researchers include standardised alarm parameters for devices; electronic communication channels between ward teams and the specialists who provide them with intermittent advice; accessible decision support incorporating multimorbidity appropriate guidance; and internal supply chains. Together, these would reduce unwarranted sensory inputs and information overload, streamline information exchange, reliably deliver useful clinical prompts, and increase time spent with patients.

Optimise effectiveness of interdisciplinary teams

Highly performing teams are needed to manage complex tasks,⁵⁸ and optimising the effectiveness of interdisciplinary teams requires appropriate team structures.^{59 60} Many ongoing ward initiatives share common themes: unit based teams, located with their patients; physician and nurse co-leadership; structured interdisciplinary rounds; and ward level performance feedback.⁶¹⁻⁶⁴ These act as useful “scaffolds,” binding physicians, nurses, and allied health professionals together with collective accountability and a sense of belonging, even with fluid team membership.⁶⁵ Their impact remains uncertain,⁶⁶⁻⁶⁸ and few high quality studies have reported whether they reduce adverse events or complications of care.⁶⁶ Refining these interdisciplinary team structures remains a key challenge.^{61 69} Some authors have called for them to be incentivised, seeing them as vital for the rapid translation of evidence into ward practice.¹⁹

Patient engagement in transitions of care

With patients largely stabilised rather than “cured” by inpatient care, the distinction between hospital and home care has become blurred. Transition between the two involves complex interactions between patients and multiple healthcare providers, who are poorly coordinated. Patients struggle to understand their post-discharge plan, and self management at home is not well supported. As a result, 27% of medical readmissions are still preventable.^{70 71}

Higher quality, patient centred discharge documentation would help patients to self manage, but this alone will be insufficient to bridge the gap between health settings. We need more expansive care delivery changes.⁷² Novel care models could integrate inpatient and outpatient management for high risk patients, reducing care discontinuity.⁷³ Patients might be best supported by community “health agents” to facilitate the move from one care setting to the next.⁷⁴ These programmes are still being evaluated, but they offer an alternative to hospital focused readmission prevention schemes, which may not be financially sustainable.⁷⁵

Conclusion

High quality care on medical wards is easy to value, but its inherent complexity makes it difficult to improve.⁷⁶ Targeted resources, data collection, quality metrics, and ward improvement strategies that facilitate the management of complexity hold promise for our ageing inpatient population.

- Monitor. Costing webinar. 2 Dec 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/383127/Costing_and_PLICS.pdf.
- Future Hospital Commission. *Future hospital: Caring for medical patients. A report from the Future Hospital Commission to the Royal College of Physicians*. Royal College of Physicians, 2013.
- American Hospital Association. Reconfiguring the bedside care team of the future. 2013. <http://www.aha.org/content/13/beds-whitepaper.pdf>.
- Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012;380:37-43. doi:10.1016/S0140-6736(12)60240-2 pmid:22579043.
- Pannick S, Beveridge I, Wachter RM, Sevdalis N. Improving the quality and safety of care on the medical ward: A review and synthesis of the evidence base. *Eur J Intern Med* 2014;25:874-87. doi:10.1016/j.ejim.2014.10.013 pmid:25457434.
- Hogan H, Healey F, Neale G, Thomson R, Vincent C, Black N. Preventable deaths due to problems in care in English acute hospitals: a retrospective case record review study. *BMJ Qual Saf* 2012;21:737-45. doi:10.1136/bmjqs-2011-001159 pmid:22927487.
- Wong BM, Dyal S, Etchells EE, et al. Application of a trigger tool in near real time to inform quality improvement activities: a prospective study in a general medicine ward. *BMJ Qual Saf* 2015;24:272-81. doi:10.1136/bmjqs-2014-003432 pmid:25749028.
- Dharmarajan K, Strait KM, Tinetti ME, et al. Treatment for multiple acute cardiopulmonary conditions in older adults hospitalized with pneumonia, chronic obstructive pulmonary disease, or heart failure. *J Am Geriatr Soc* 2016;64:1574-82. doi:10.1111/jgs.14303 pmid:27448329.
- Nelson EC, Batalden PB, Huber TP, et al. Microsystems in health care: Part 1. Learning from high-performing front-line clinical units. *Jt Comm J Qual Improv* 2002;28:472-93. pmid:12216343.
- Forster AJ, Worthington JR, Hawken S, et al. Using prospective clinical surveillance to identify adverse events in hospital. *BMJ Qual Saf* 2011;20:756-63. doi:10.1136/bmjqs.2010.048694 pmid:21367769.
- Hayward RA, Asch SM, Hogan MM, Hofer TP, Kerr EA. Sins of omission: getting too little medical care may be the greatest threat to patient safety. *J Gen Intern Med* 2005;20:686-91. doi:10.1111/j.1525-1497.2005.0152.x pmid:16050875.
- Vincent C, Amalberti R. *Safer Healthcare: Strategies for the Real World*. 1st ed. SpringerOpen, 2016. doi:10.1007/978-3-319-25559-0.
- Singer SJ, Gaba DM, Falwell A, Lin S, Hayes J, Baker L. Patient safety climate in 92 US hospitals: differences by work area and discipline. *Med Care* 2009;47:23-31. doi:10.1097/MLR.0b013e31817e189d pmid:19106727.
- Spranca M, Minsk E, Baron J. Omission and commission in judgment and choice. *J Exp Soc Psychol* 1991;27:76-105. doi:10.1016/0022-1031(91)90011-T.
- Baron J, Ritov I. Omission bias, individual differences, and normality. *Organ Behav Hum Decis Process* 2004;94:74-85. doi:10.1016/j.obhdp.2004.03.003.
- Salancik GR, Pfeffer J. Who gets power—and how they hold on to it: a strategic-contingency model of power. *Organ Dyn* 1977;5:3-21. doi:10.1016/0090-2616(77)90028-6.
- Ko HC, Turner TJ, Finnigan MA. Systematic review of safety checklists for use by medical care teams in acute hospital settings—limited evidence of effectiveness. *BMC Health Serv Res* 2011;11:211. doi:10.1186/1472-6963-11-211 pmid:21884618.
- Russ SJ, Sevdalis N, Moorhy K, et al. A qualitative evaluation of the barriers and facilitators toward implementation of the WHO surgical safety checklist across hospitals in England: lessons from the “Surgical Checklist Implementation Project”. *Ann Surg* 2015;261:81-91. doi:10.1097/SLA.0000000000000793 pmid:25072435.
- Umscheid CA, Brennan PJ. Incentivizing “structures” over “outcomes” to bridge the knowing-doing gap. *JAMA Intern Med* 2015;175:354-5. doi:10.1001/jamainternmed.2014.5293 pmid:25561391.
- Waters TM, Daniels MJ, Bazzoli GJ, et al. Effect of Medicare’s nonpayment for Hospital-Acquired Conditions: lessons for future policy. *JAMA Intern Med* 2015;175:347-54. doi:10.1001/jamainternmed.2014.5486 pmid:25559166.
- Barker AL, Morello RT, Wolfe R, et al. 6-PACK programme to decrease fall injuries in acute hospitals: cluster randomised controlled trial. *BMJ* 2016;352:h6781. doi:10.1136/bmj.h6781 pmid:26813674.
- Tucker AL, Singer SJ, Hayes JE, Falwell A. Front-line staff perspectives on opportunities for improving the safety and efficiency of hospital work systems. *Health Serv Res* 2008;43:1807-29. doi:10.1111/j.1475-6773.2008.00868.x pmid:18522667.
- Tsai TC, Joynt KE, Orav EJ, Gawande AA, Jha AK. Variation in surgical-readmission rates and quality of hospital care. *N Engl J Med* 2013;369:1134-42. doi:10.1056/NEJMsa1303118 pmid:24047062.
- Birkmeyer JD, Finks JF, O’Reilly A, et al. Michigan Bariatric Surgery Collaborative. Surgical skill and complication rates after bariatric surgery. *N Engl J Med* 2013;369:1434-42. doi:10.1056/NEJMsa1300625 pmid:24106936.
- Kennedy I. *Learning from Bristol. The report of the public inquiry into children’s heart surgery at the Bristol Royal Infirmary 1984-1995*. Stationery Office, 2001.
- Francis R. *Independent inquiry into care provided by Mid Staffordshire NHS Foundation Trust January 2005 - March 2009*. Stationery Office, 2010.
- Pronovost P, Sexton B. Assessing safety culture: guidelines and recommendations. *Qual Saf Health Care* 2005;14:231-3. doi:10.1136/qshc.2005.015180 pmid:16076784.
- Schwendimann R, Zimmermann N, Küng K, Ausserhofer D, Sexton B. Variation in safety culture dimensions within and between US and Swiss Hospital Units: an exploratory study. *BMJ Qual Saf* 2013;22:32-41. doi:10.1136/bmjqs-2011-000446 pmid:22773888.
- Deilakas E, Hofoss D. Patient safety culture lives in departments and wards: multilevel partitioning of variance in patient safety culture. *BMC Health Serv Res* 2010;10:85. doi:10.1186/1472-6963-10-85 pmid:20356351.
- Baines R, Langelaan M, de Bruijne M, Spreeuwenberg P, Wagner C. How effective are patient safety initiatives? A retrospective patient record review study of changes to patient safety over time. *BMJ Qual Saf* 2015;24:561-71. doi:10.1136/bmjqs-2014-003702 pmid:26150548.
- Saint S, Greene MT, Krein SL, et al. A program to prevent catheter-associated urinary tract infection in acute care. *N Engl J Med* 2016;374:2111-9. doi:10.1056/NEJMoa1504906 pmid:27248619.
- Rau J. Rating hospitals by the stars: the feds’ latest plan to measure quality is the most controversial. The Washington Post: To Your Health. 17th May 2016. <https://www.washingtonpost.com/news/to-your-health/wp/2016/05/17/rating-hospitals-by-the-stars-the-feds-latest-plan-to-measure-quality-is-the-most-controversial/>
- Griffiths A, Beaussier A-L, Demeritt D, Rothstein H. Intelligent monitoring? Assessing the ability of the Care Quality Commission’s statistical surveillance tool to predict quality and prioritise NHS hospital inspections. *BMJ Qual Saf* 2016; published online. doi:10.1136/bmjqs-2015-004687.
- Austin JM, Jha AK, Romano PS, et al. National hospital ratings systems share few common scores and may generate confusion instead of clarity. *Health Aff (Millwood)* 2015;34:423-30. doi:10.1377/hlthaff.2014.0201 pmid:25732492.
- Lilford R, Mohammed MA, Spiegelhalter D, Thomson R. Use and misuse of process and outcome data in managing performance of acute medical care: avoiding institutional stigma. *Lancet* 2004;363:1147-54. doi:10.1016/S0140-6736(04)15901-1 pmid:15064036.
- Shojania KG, Forster AJ. Hospital mortality: when failure is not a good measure of success. *CMAJ* 2008;179:153-7. doi:10.1503/cmaj.080010 pmid:18625987.
- Lilford R, Pronovost P. Using hospital mortality rates to judge hospital performance: a bad idea that just won’t go away. *BMJ* 2010;340:c2016. doi:10.1136/bmj.c2016 pmid:20406861.
- Scott IA, Brand CA, Phelps GE, Barker AL, Cameron PA. Using hospital standardised mortality ratios to assess quality of care—proceed with extreme caution. *Med J Aust* 2011;194:645-8. pmid:21692724.
- Girling AJ, Hofer TP, Wu J, et al. Case-mix adjusted hospital mortality is a poor proxy for preventable mortality: a modelling study. *BMJ Qual Saf* 2012;21:1052-6. doi:10.1136/bmjqs-2012-001202 pmid:23069860.
- van Gestel YR, Lemmens VE, Lingsma HF, de Hingh IH, Rutten HJ, Coebergh JW. The hospital standardized mortality ratio fallacy: a narrative review. *Med Care* 2012;50:662-7. doi:10.1097/MLR.0b013e31824ebd9f pmid:22410410.
- Hogan H, Healey F, Neale G, Thomson R, Vincent C, Black N. Relationship between preventable hospital deaths and other measures of safety: an exploratory study. *Int J Qual Health Care* 2014;26:298-307. doi:10.1093/intqhc/mzu049 pmid:24781497.
- Hogan H, Zipfel R, Neuburger J, Hutchings A, Darzi A, Black N. Avoidability of hospital deaths and association with hospital-wide mortality ratios: retrospective case record review and regression analysis. *BMJ* 2015;351:h3239. doi:10.1136/bmj.h3239 pmid:26174149.
- Griffiths P, Bail J, Murrells T, Jones S, Rafferty AM. Registered nurse, healthcare support worker, medical staffing levels and mortality in English hospital trusts: a cross-sectional study. *BMJ Open* 2016;6:e008751. doi:10.1136/bmjopen-2015-008751 pmid:26861934.
- Centers for Medicare and Medicaid Services. Hospital compare. <https://www.medicare.gov/hospitalcompare/search.html>.
- Joynt KE, Orav EJ, Zheng J, Jha AK. Public reporting of mortality rates for hospitalized Medicare patients and trends in mortality for reported conditions. *Ann Intern Med* 2016;165:153-60. doi:10.7326/M15-1462 pmid:27239794.
- DeVore AD, Hammill BG, Hardy NC, Eapen ZJ, Peterson ED, Hernandez AF. Has Public Reporting of Hospital Readmission Rates Affected Patient Outcomes?: Analysis of Medicare Claims Data. *J Am Coll Cardiol* 2016;67:963-72. doi:10.1016/j.jacc.2015.12.037 pmid:26916487.
- Boyd CM, Darer J, Boult C, Fried LP, Boult L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. *JAMA* 2005;294:716-24. doi:10.1001/jama.294.6.716 pmid:16091574.
- NHS England. Seven day services clinical standards. 2016. <https://www.england.nhs.uk/ourwork/qual-clin-lead/seven-day-hospital-services/the-clinical-case>.
- NHS England. NHS services, seven days a week forum: levers and incentives. 2013. <https://www.england.nhs.uk/wp-content/uploads/2013/12/levers-and-incentives1.pdf>.
- Pronovost P, Needham D, Berenholtz S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med* 2006;355:2725-32. doi:10.1056/NEJMoa061115 pmid:17192537.
- Huang SS. Catheter associated urinary tract infections—turning the tide. *N Engl J Med* 2016;374:2168-9. doi:10.1056/NEJMe1604647 pmid:27248624.

Key messages

- Data analysis and quality metrics do not take into account the inherent complexity of medical ward care
- Organisational grades and scores mask important ward variation
- Ward improvement strategies should be focused on complex decision making, not just the management of specific diseases
- Ward based teams, physician and nurse co-leadership, structured interdisciplinary rounds, and ward level performance feedback may improve care

- 52 Casalino LP, Gans D, Weber R, et al. US physician practices spend more than \$15.4 billion annually to report quality measures. *Health Aff (Millwood)* 2016;35:401-6. doi:10.1377/hlthaff.2015.1258 pmid:26953292.
- 53 Berwick DM. Era 3 for medicine and health care. *JAMA* 2016;315:1329-30. doi:10.1001/jama.2016.1509 pmid:26940610.
- 54 Pannick S, Sevdalis N, Athanasios T. Beyond clinical engagement: a pragmatic model for quality improvement interventions, aligning clinical and managerial priorities. *BMJ Qual Saf* 2016;25:716-25. doi:10.1136/bmjqs-2015-004453 pmid:26647411.
- 55 Tucker AL, Heisler WS, Janisse LD. Designed for workarounds: a qualitative study of the causes of operational failures in hospitals. *Perm J* 2014;18:33-41. doi:10.7812/TPP/13-141 pmid:25102517.
- 56 Tucker AL. The impact of operational failures on hospital nurses and their patients. *J Oper Manage* 2004;22:151-69. doi:10.1016/j.jom.2003.12.006.
- 57 Zheng S, Tucker AL, Ren ZJ, et al. The impact of internal service quality on nurse inefficiency and medical errors. 2016. doi:10.2139/ssrn.2784503. <http://ssrn.com/abstract=2784503>.
- 58 Hughes AM, Gregory ME, Joseph DL, et al. Saving lives: A meta-analysis of team training in healthcare. *J Appl Psychol* 2016;101:1266-304. doi:10.1037/apl0000120 pmid:27599089.
- 59 McIntosh N, Meterko M, Burgess JF Jr, et al. Organizational predictors of coordination in inpatient medicine. *Health Care Manage Rev* 2014;39:279-92. doi:10.1097/HMR.000000000000004 pmid:24378402.
- 60 Deneckere S, Robyns N, Vanhaecht K, et al. EQCP-studygroup. Indicators for follow-up of multidisciplinary teamwork in care processes: results of an international expert panel. *Eval Health Prof* 2011;34:258-77. doi:10.1177/0163278710393736 pmid:21190951.
- 61 Kara A, Johnson CS, Nicley A, Niemeier MR, Hui SL. Redesigning inpatient care: Testing the effectiveness of an accountable care team model. *J Hosp Med* 2015;10:773-9. doi:10.1002/jhm.2432 pmid:26286828.
- 62 Stein J, Payne C, Methvin A, et al. Reorganizing a hospital ward as an accountable care unit. *J Hosp Med* 2015;10:36-40. doi:10.1002/jhm.2284 pmid:25399928.
- 63 McAlister FA, Bakal JA, Majumdar SR, et al. Safely and effectively reducing inpatient length of stay: a controlled study of the General Internal Medicine Care Transformation Initiative. *BMJ Qual Saf* 2014;23:446-56. doi:10.1136/bmjqs-2013-002289 pmid:24108415.
- 64 Kim CS, King E, Stein J, Robinson E, Salameh M, O'Leary KJ. Unit-based interprofessional leadership models in six US hospitals. *J Hosp Med* 2014;9:545-50. doi:10.1002/jhm.2200 pmid:24799385.
- 65 Valentine MA, Edmondson AC. Team scaffolds: how mesolevel structures enable role-based coordination in temporary groups. *Organ Sci* 2015;26:405-22. doi:10.1287/orsc.2014.0947.
- 66 Pannick S, Davis R, Ashrafian H, et al. Effects of interdisciplinary team care interventions on general medical wards: a systematic review. *JAMA Intern Med* 2015;175:1288-98. doi:10.1001/jamainternmed.2015.2421 pmid:26076428.
- 67 Bhamidipati VS, Elliott DJ, Justice EM, Belleh E, Sonnad SS, Robinson EJ. Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *J Hosp Med* 2016;11:513-23. doi:10.1002/jhm.2575 pmid:26991337.
- 68 O'Leary KJ, Johnson JK, Auerbach AD. Do interdisciplinary rounds improve patient outcomes? only if they improve teamwork. *J Hosp Med* 2016;11:524-5. doi:10.1002/jhm.2587 pmid:27149426.
- 69 O'Leary KJ, Killarney A, Hansen LO, et al. Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Qual Saf* 2015; published online 1 December 2015. doi:10.1136/bmjqs-2015-004561.
- 70 Auerbach AD, Kripalani S, Vasilevskis EE, et al. Preventability and causes of readmissions in a national cohort of general medicine patients. *JAMA Intern Med* 2016;176:484-93. doi:10.1001/jamainternmed.2015.7863 pmid:26954564.
- 71 Herzog SJ, Schnipper JL, Doctoroff L, et al. Physician perspectives on factors contributing to readmissions and potential prevention strategies: a multicenter survey. *J Gen Intern Med* 2016; published online 9 June. doi:10.1007/s11606-016-3764-5.
- 72 Kripalani S. Clinical summaries for hospitalised patients: time for higher standards. *BMJ Qual Saf* 2016; published online 19 July. doi:10.1136/bmjqs-2016-005826.
- 73 Powers BW, Milstein A, Jain SH. Delivery models for high-risk older patients: Back to the future? *JAMA* 2016;315:23-4. doi:10.1001/jama.2015.17029 pmid:26746451.
- 74 Macinko J, Harris MJ. Brazil's family health strategy--delivering community-based primary care in a universal health system. *N Engl J Med* 2015;372:2177-81. doi:10.1056/NEJMp1501140 pmid:26039598.
- 75 Jenq GY, Doyle MM, Belton BM, Herrin J, Horwitz LI. Quasi-experimental evaluation of the effectiveness of a large-scale readmission reduction program. *JAMA Intern Med* 2016;176:681-90. doi:10.1001/jamainternmed.2016.0833 pmid:27065180.
- 76 Mosher HJ, Kaboli PJ. Inpatient interdisciplinary care: can the goose lay some golden eggs? *JAMA Intern Med* 2015;175:1298-300. doi:10.1001/jamainternmed.2015.2430 pmid:26075885.

Contributors and sources: All authors are engaged in academic research on healthcare quality improvement. RMW has extensive experience in healthcare policy internationally, and is credited as the founder of the hospitalist specialty in medicine. SP and RMW are practising physicians. CV has written widely on patient safety and healthcare quality, and has advised numerous governmental bodies on how to improve healthcare systems. NS has worked for over a decade on the team skills that underpin high quality care in the hospital setting, and how best practice is implemented. SP and NS wrote the first draft; all authors contributed to subsequent drafts. SP is the guarantor.

Competing interests: We have read and understood BMJ policy on declaration of interests and declare the following interests: RMW and CV report that they are members of the Lucian Leape Institute of the National Patient Safety Foundation (for which they receive no compensation). RMW has a contract with UCSF from the Agency for Healthcare Research and Quality to edit a patient safety website; receives compensation from John Wiley and Sons for writing a blog; receives royalties from Lippincott Williams & Wilkins and McGraw-Hill for writing/editing several books; received a stipend and stock/options for having previously served on the board of directors of IPC Healthcare; serves on the scientific advisory boards for Amino.com, PatientSafe Solutions, QPID Health, Twine, and EarlySense (for which he receives stock options); and holds the Benioff endowed chair in hospital medicine from Marc and Lynne Benioff. CV is supported by the Health Foundation, carries out consultancy work for the Swiss Federal Office of Health, and receives book royalties from Wiley Blackwell. NS is the director of London Training & Safety Solutions Ltd, which consults on team assessment and training and patient safety. NS's research is supported by the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care South London at King's College Hospital NHS Foundation Trust. NS is a member of King's Improvement Science, which is part of the NIHR CLAHRC South London and comprises a specialist team of improvement scientists and senior researchers based at King's College London. Its work is funded by King's Health Partners (Guy's and St Thomas' NHS Foundation Trust, King's College Hospital NHS Foundation Trust, King's College London and South London and Maudsley NHS Foundation Trust), Guy's and St Thomas' Charity, the Maudsley Charity and the Health Foundation. SP is supported by the NIHR Imperial Patient Safety Translational Research Centre and Imperial College Healthcare Charity. This paper represents independent research. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, or the Department of Health.

Provenance and peer review: Not commissioned; externally peer reviewed

Accepted: 04 10 2016

Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://group.bmj.com/group/rights-licensing/permissions>

Table

Table 1 | Improvement strategies

Strategy	Factors underpinning success in structured clinical settings	Challenges for medical wards
Safety checklists	Adaptation to specific patient group or workflow Consistent leadership and accountability ¹⁸	Heterogeneity of patients Teams are fluid and dispersed Responsibility divided between multiple teams
Specific harm reduction programmes	Strong evidence base for technical interventions to reduce hospital acquired harms, such as central line associated infections Implementation efforts tackle a limited set of products and critical events, occurring primarily in closely monitored settings ¹⁹ Alignment of clinical priorities, national patient safety initiatives, and influence of regulators/payers	Weaker evidence base for technical interventions to reduce common ward harms, such as pressure ulcers and falls ^{20 21} Successful implementation requires constant vigilance throughout long admissions with collaboration between teams Frontline perspectives on ward care are not prioritised in national initiatives ²²
Outcomes monitoring and feedback	Defined surgical outcomes directly reflect quality of inpatient care ^{23 24} Single episode of care on which performance is reliably assessed	Many outcomes for medical patients are determined by socioeconomic status and illness severity and are less representative of quality of care Diffuse episodes of care with shared responsibility, with multiple opportunities to judge performance

Figure

Fig 1 Categories of ward intervention to manage complex medical ward care