

HOSTED BY



Contents lists available at ScienceDirect

International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>



A healthcare quality management system underpinning the 3-E model and its application in a new tertiary hospital in Australia



Qun (Catherine) Li, RN, GradDip Card Nur, GradCert Eco, MHEP^{*,1},
Greg Sweetman, MBBS DipRACOG DA (UK) FRACGP FACEM MClinEd DDU MHSM¹

Fiona Stanley Hospital, Western Australia, Australia

ARTICLE INFO

Article history:

Received 13 October 2016

Accepted 24 February 2017

Available online 28 February 2017

Keywords:

Audit

Culture

Quality improvement

Engagement

ABSTRACT

Objectives: Engaging, enhancing and embedding clinical audit improvement activities into everyday practice to develop capacity, capability and culture in continuous improvement.

Method: Through the implementation of an electronic quality management system called Governance, Evidence, Knowledge and Outcome (GEKO), the key aspects of governance, evidence knowledge and outcomes were able to be applied to quality initiatives. Implementation of the GEKO system incorporated the principles of total quality control and management to include strategic management control and marketing in parallel with leadership strategies.

The vision was to motivate staff to enable ownership of the quality cycle of continuous improvement of patient care to incorporate underlying systems and processes that impact on patient care.

Results: A continuous improvement pathway was successfully established 4 months post hospital commissioning. Over 890 (approximately 16% workforce) multidisciplinary and multi-professional staff received training and support for QIs in 12 months; over 535 quality proposals were received on GEKO. Submissions by profession: nursing and midwifery 46% (246), medical 33% (177), allied health 9% (48), pharmacy 5% (27), and non-clinical staff 7% (37). Average new submissions per month were 42. Reviews demonstrated the application of a rapid cycle approach to develop, test, modify and refine improvements and enhanced clinical care.

Conclusion: Appropriate governance structure, processes, extensive education and training together with collaborative relationships are the keys to embed clinical audit improvement into everyday practice. The availability of a quality management system like GEKO is very useful to make QI accessible to all staff.

© 2017 Chinese Nursing Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Achieving and sustaining quality and performance improvement in complex health care environments is challenging [1]. Many health care organisations have sought to create internal performance improvement capabilities as a strategy to enable system sustainability [2]. One potentially powerful and widely used method of quality improvement (QI) is to establish the extent to which clinical practice complies with identified review criteria. The degree of compliance, or lack of it, highlights areas where improvements can be made. This is the basis of clinical audit [3].

* Corresponding author.

E-mail addresses: Catherine.Li@health.wa.gov.au (Q. Li), Greg.Sweetman@health.wa.gov.au (G. Sweetman).

Peer review under responsibility of Chinese Nursing Association.

¹ Address: 102 - 118 Murdoch Drive, Murdoch WA 6150, PO Box 404, Bull Creek WA 6149.

Identified barriers for clinical audit include lack of resources, lack of expertise or advice in project design and analysis, problems between groups and group members, lack of an overall plan for audit, and organisational impediments [4]. QI initiatives are impacted by a gap between underlying theory linking a change to an intended outcome. The inability to demonstrate causality hinders widespread uptake [5–7]. Lack of time is a common reason for uncompleted or delayed activities.

Healthcare staff need to be encouraged to have autonomy and ownership of their roles to monitor clinical performance in relation to patient care. Development of organisation wide capability in improvement whereby clinical audit is embedded into everyday practice, will contribute to a positive organisational culture of continual learning where there will be common understanding of QI principles and methodologies by organisation members, which influence how staff perceive, think and act. QI is a culture or philosophy that seeks continuous improvement of the whole system, through normal daily activity [8].

2. Quality management system –employing an electronic database

Having an identifiable infrastructure as the driver has been reported as an effective strategy to cultivate frontline staff engagement in improvement [1,9,10]. In Western Australia (WA) Health, a non-commercial electronic quality management system called Governance, Evidence, Knowledge and Outcome (GEKO) is available for all public hospitals.

This system was first incepted in a WA tertiary hospital in early 2000 to register information about clinical governance and QI activities. It allows for electronic completion, submission and review of forms and tasks, maintaining records of past and current activities. Several enhancements have been made to the system in the last ten years to facilitate closing the loop for quality initiatives. QI governance structures can be built on the system by setting up visual governance committees to facilitate the review of submissions and reporting.

Each activity on GEKO needs to go through three phases: proposal, report and recommendation, and outcome of recommendation to close the loop. The design of the GEKO templates for each phase aligns with the QI principles in the PDSA model (Appendix A, GEKO proposal template). It is therefore educational to promote good practice in QI project planning and execution. All employees can access the system to create and submit proposals which makes QI accessible.

However, success in the implementation of GEKO in WA public hospitals varied significantly due to different levels of staff engagement and governance structures and processes that have been applied. Fiona Stanley Hospital (FSH) as a newly commissioned tertiary hospital in WA, presented the opportunity to learn from the lessons and design a QI governance system that would suit the needs of the organisation, clinical departments and staff.

A strategic 3-E (Engaging, Enhancing, and Embedding) model was developed for this purpose. This model acknowledges the learning curve that staff need to go through and the evolving process required to embed clinical audit improvement into everyday practice. The model incorporates the System of Profound Knowledge (developed by Dr W Edwards Deming) to include the elements of system, variation, knowledge and psychology [11]. The long term objective of the model is to have organisation wide understanding of the Plan-Do-Study-Act (PDSA) model. Implementation of the model was largely dependent on the successful deployment of GEKO in this hospital as the identifiable infrastructure. Fig. 1 outlines the key elements of the model.

3. 3-E model and its clinical meaningfulness

3.1. Engaging – opportunities for engagement

The value of engaging frontline staff in improvement is well reported. Highly engaged staff – and by this we mean individuals who are committed to their organisations and involved in their roles – are more likely to bring their heart and soul to work, to take the initiative, to 'go extra mile' and to collaborate effectively with others [12].

The changing nature of the healthcare profession and growing desire by healthcare workers to engage in quality activities provides an excellent opportunity for the workforce from all levels to participate in the improvement process and leverage available resources for clinical auditing. In WA Health, QI is becoming a core element of professional development for all clinicians. However, universities are only starting to include clinical audit as part of the curriculums in recent years.

Multiple opportunities exist for engagement. First of all, the

hospital's vision for a culture of QI is clear, the departments' desire to engage for continuous improvement is evident, and staff motivation to develop skills and profile in QI is compelling as it is part of their professional development. Second, hospitals need to go through various external and internal reviews for funding and accreditation. Hospitals need to undertake quality activities as part of evidence preparation. The alignment of staff intrinsic motivation to undertake improved patient care and alignment with identified goals is beneficial. When motivation is intrinsic, satisfaction comes from the activity itself and the fulfilment of social and personal needs [13]. Clinical engagement, then, involves staff actively contributing 'within their normal working roles to maintaining and enhancing the performance of the organisation, which itself recognises this commitment in supporting and encouraging high quality care' [14].

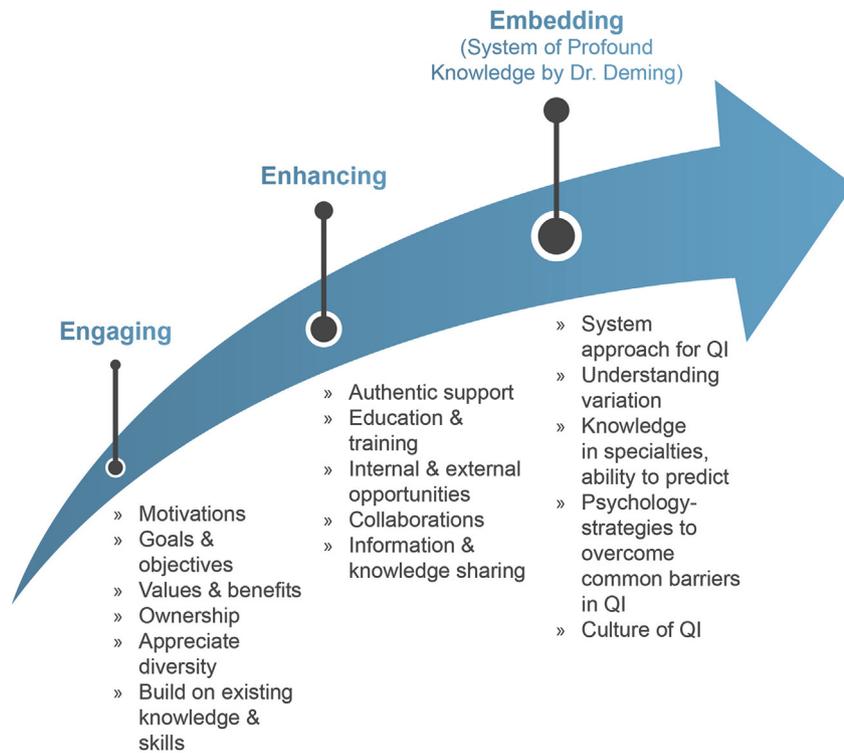
Both Dr. Deming [15] and Kotter [16] emphasised that the first step in successful change management is to convey its need and purpose, which should be communicated along with the benefits associated with the change. This step is critical to successfully engage busy clinicians and management teams who are dealing with competing priorities every day to promote a shared understanding of the needs, goals and objectives of the organisation, along with partnering with clinical departments and staff. High value projects that are important to business leaders may not be easily linked to the daily work of those who will have the task of executing them [17], thus the perceived priorities won't always be the same by the organisation (senior management), departments (middle management) and staff (frontline) for the same defined period. This leads to the point that leaders need to understand that change involves more than just the tangible results and technical aspects. Allowing people to try and test the new change is more important. Skilfully building knowledge by making changes and observing or measuring the results is the foundation of improvement [13].

3.1.1. Governance structure and processes

Successful integration of The Influence Equation as described by the Triad Consultancy (Interests, Reasons, Relationship, Status, Affiliation, Fear) [18] and the SCARF model (Status, Certainty, Autonomy, Relatedness, Fairness) in NeuroLeadership [19] have a focus on persuading effectively and mitigating resistance to collaboration. Health care is a people business. Translating engagement into tangible terms for QI should mean opportunities, support, ownership, autonomy and trust. Staff need to feel empowered to initiate and implement necessary changes by building on existing knowledge and skills. The QI governance structure on GEKO was therefore designed into 3-tiers (Hospital Executive, Service, and Department) to encourage a bottom-up approach, while both senior management and middle management have oversight and opportunities to intervene.

Visual QI committees were set up on GEKO to facilitate review of submissions. Clinical areas with high interaction and dependency such as Haematology and Oncology nursing share the same committee to facilitate information and knowledge sharing. The final decision on quality proposals, reports and recommendations rests with relevant services. The chair of the committee is usually the respective Nurse Director (for nursing ones), or Head of Service (HoS) (for medical ones) who have authority for approval or rejection. All senior staff such as Nurse Unit Managers (NUMs), Clinical Nurse Specialists (CNSs) and consultants have review access to provide feedback. The same principle applies for other professions.

Medical engagement is critical to organisational performance [20]. Empirically, there are often high value clinical audits that are undertaken by medical staff but not internally reported or used to drive improvements. Building trust relationships with the



3-E Model by Catherine Li, Performance Review and Audit Coordinator, FSH, WA

Fig. 1. 3-E (Engaging, Enhancing, Embedding) Model to drive continuous improvement.

medical workforce through empowering ownership and autonomy was therefore part of the vision. Each medical specialty has its own QI committee on GEKO considering the uniqueness of specialty focused activities such as management of patients with diabetes mellitus. This structure was developed to address the observed history of lack of consistent means of reporting quality initiatives and under reporting by medical staff. In addition it serves to address frustrations expressed by medical staff that submissions reviewed by committee members who it was felt did not necessarily have the depth of knowledge to understand the need, resulting in delays and feedback that was irrelevant.

All reviews are guided by a set of agreed criteria (Appendix B). The GEKO system administrator monitors the quality and progress of all submissions. In some cases, the coordinator also acts as an advocate for staff to gain management support for improvement initiatives. Regular audits are undertaken to monitor quality of submissions and reasons for rejections. The decision making process is accessible by the online system which allows open and transparent information transfer.

3.1.2. Collaboration, communication, escalation and reporting

QI interventions are typically interdisciplinary, and securing greater engagement of a single group is not an end in itself, only a step towards an 'organisational culture where all staff feel valued and involved' [21]. There are two ways for collaborating on GEKO: firstly by inviting all key relevant stakeholders as investigators; secondly by including areas where the activity would impact on as secondary committees. In such ways, all key stakeholders receive automatic GEKO emails and have access to details of the activity on the system, creating an open and transparent dialogue between departments. Significant findings can be escalated on GEKO when necessary. Activities then can be tabled on relevant committees

such as the Clinical Governance Committee (CGC) for discussion, so are hospital-wide activities. Monthly hospital wide QI reports are presented to the Hospital Executive Committee (HEC).

The 3-tiers governance structure and associated standardised processes engages both frontline staff and middle management teams. Meaningful inputs are sought from managers for the design, monitoring and evaluation of QI interventions. Middle management have an important role to play in navigating cross-departmental obstacles [22]. Without more senior support, front-line staff are unable to marshal the resources required to spread the change [23].

3.2. Enhancing

3.2.1. Education and training

Professional coaching for staff was found to be a key factor in generating staff confidence to directly work with patients to plan and execute QI projects [24]. In the first two months of hospital commissioning, a baseline survey (Appendix C) of 67 staff (nursing, medical, non-clinical) was distributed during formal and informal education sessions to gauge staff interest and understand their needs. Staff appreciated flexible practical sessions that were tailored to fit the needs of the relevant areas.

Messages on a patient centred approach to include collaboration between teams and early involvement of key stakeholders have been kept consistent during education sessions. Staff are required to formulate objectives and recommendations by following the Specific, Measurable, Achievable, Related, Theoretically-sound and Time-bound (SMARTT) standards.

Apart from ward based flexible education sessions, monthly computer laboratory education program was commenced 7 months post hospital commissioning. During the sessions, staff are introduced to the PDSA model, QI principles and the System of Profound

Knowledge. Staff are then challenged to relate these theories to a current project or improvement idea, and discuss possible appropriate measures, benchmarks, sample sizes as well as strategies for stakeholder engagement. Certificates of attendance are issued for the validation of continual professional development activity. Staff feel much more confident in undertaking quality activities post the sessions.

3.2.2. Feedback strategies

Multiple feedback strategies have been applied to avoid the possible feeling of “rejection” for submissions that are deemed as either inadequate or incomplete, particularly for staff who did not have much experience in QI. All rejections must be made with specific reasons and recommendations with the opportunity to amend and resubmit wherever appropriate. In some cases, this involved an individualised approach to refine a project. In general, open and transparent communication was effective. However, it does depend on the level of trust that staff hold in the system. Such trust is built through the genuine support that staff can receive.

3.2.3. Annual IMPROVE conference

Forums for staff to showcase their improvement work were considered as an important incentive to encourage interdisciplinary learning. Commitment to change is built through sharing of information [13]. Staff have been provided with opportunities present their improvement work on department meetings and annual hospital wide QI forums. A half day trial forum was successfully held six months post hospital commissioning with ten presentations delivered by medical, nursing and pharmaceutical staff. Staff appreciated the opportunity to share and learn.

The forum has evolved into an annual whole day on-site IMPROVE conference twelve months later with the theme of “Information, Knowledge and Innovation”. The focus was to promote the application of a rapid cycle approach for improvement and awareness of other practical improvement sciences such as Lean Six Sigma and Define-Measure-Analyze-Improve-Control model (DMAIC).

External guest speakers on the subject were invited. A multi-professional working group was formed to plan and organise the conference which attracted over 125 staff for a day of learning and discussion. Prizes and certificates were issued for best poster and presentations. A multi-professional panel of experts were involved in the assessment process.

3.3. Embedding

The long term goal of the 3-E Model is to have organisation wide education coverage for QI principles to establish a healthcare management system. An understanding of the interactions and interdependencies in the healthcare system is the key point. This will impact on the effectiveness of any changes introduced for improvement work. It is often easier to blame people rather than take a hard look at how the system affects people's behaviours [13].

During education sessions, demonstrations are made to develop SMARTT objectives to help identify relevant standards for comparison and determine the key measures (data) for a particular problem. The SMARTT criteria are also applicable for deriving recommendations based on analysed data. Each recommendation needs to clearly outline what needs to be done, who needs to do it and a timeframe for completion. A minimum requirement for recommendation is communication of how the findings have been shared and discussed with relevant teams and stakeholders. Conveying the messages about taking a system approach and understanding the psychology during improvement work seemed to be relatively straightforward where staff could easily identify practical examples. However, understanding of complex issues

required further detailed explanation.

4. Outcomes

Despite 87% (67) of the surveyed staff not having previous experience with GEKO, a continuous improvement pathway was established through the system 4 months post hospital commissioning with associated governance structure, procedure and processes that have gradually gained momentum in established committees. QI becomes part of the regular meeting agenda. Over 890 (approx.16% workforce) multidisciplinary and multi-professional staff received training and support for QI in 12 months. As a result, over 535 quality proposals were received on GEKO. Participation was multidisciplinary and multi-professional. Submissions by profession: nursing and midwifery 46% (246), medical 33% (177), allied health 9% (48), pharmacy 5% (27), and non-clinical staff 7% (37). Average number of new submissions per month were 42, demonstrating active monitoring of clinical practice and multidisciplinary involvement in QI.

Over 100 rejections (95% of all rejections) were made on proposals, reports and recommendations by the GEKO system administrator in the first 12 months. Staff and departments have been compliant with suggestions for which staff appreciated the opportunities to refine their project plans. In this process, intensive structured education and training were delivered to staff at department level, and to individual clinicians. Review of completed activities demonstrates the application of a rapid cycle approach to develop, test, modify and refine improvement strategies for enhanced clinical care.

A random audit on 64 GEKO submissions suggested that 84% followed the SMARTT criteria for defining objectives, 92% provided rational for sample size, 92% had clear inclusion and exclusion criteria for sampling, and 86% of reports contained at least one recommendation. The results were consistent with feedback received from staff (97) post the computer laboratory training sessions that 98% of them felt better understanding the QI principles and SMARTT criteria.

Only 1% (3) of the 535 activities registered on GEKO had dedicated resources as part of the Medical Service Improvement Program through the Department of Health. The remaining 99% of activities were integrated into everyday business by staff.

5. Discussion

All deployments, no matter what their size, take effort and commitment if they are to become established and to be sustained overtime [17], in particular to genuinely engage busy clinicians and management teams. It is a process that needs to be strategic and systematic, and congruent to clinical teams and professions to attract attention and generate interest.

Staff (and leader) comfort with the PDSA process has been variable, and encouraging and teaching the scientific method behind the PDSA cycle is a continuing need [12]. The ability to manage and meet such need is a key success factor to build trust relationships, as reflected in the significant number of staff who have received support for QIs in just 12 months.

Extensive consultation were undertaken to have the buy-ins from management teams for the governance structure and processes. It is through those consultations, trust relationships were built with departments and staff, followed by invitations and requests for education. There are interdependencies between good governance structures, procedure, processes and education. When designed well, they facilitate each other. Embedding the procedure and processes requires ongoing efforts and persistency. This is the philosophy of the 3-E model.

6. Conclusions

Opportunities and challenges coexist in developing capacity, capability and culture in quality improvement in a new hospital. Embedding clinical audit improvement into everyday practice involves the establishment of appropriate governance structure, processes, extensive education and training and developing trust and collaborative relationships with departments and staff at all levels. The availability of a quality management system like GEKO is very useful to make QI accessible to all staff.

Education and training is an effective strategy for engagement. Support must be authentic, in a non-threatening manner. Leadership remains the key for ongoing development of a culture of continuous improvement in the organisation.

Acknowledgement

The authors would like to thank all staff, Managers, Heads of Services and Directors at FSH for their support in driving clinical audit improvement activities through the application of GEKO at FSH. Of particular Dr Simon Towler, Service 4 Medical Co-director for his encouragement and support at the Executive level.

The development of the 3-E Model did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.ijnss.2017.02.003>.

References

- [1] Needleman J, Pearson ML, Upenieks VV, Yee T, Wolstein J, Parkerton M. Engaging frontline staff in performance improvement: the American organization of Nurse executives implementation of transforming care at the bedside collaborative. *Jt Comm J Qual Patient Saf* 2016;42:61–9.
- [2] McGrath SP, Blike GT. Building a foundation of continuous improvement in a rapidly changing environment: the Dartmouth – Hitchcock value institute experience. *Jt Comm J Qual Patient Saf* 2015;41:435–44.
- [3] Hearnshaw HM, Harker RM, Cheater FM, Baker RH, Grimshaw GM. Are audits wasting resources by measuring the wrong things? A survey of methods used to select audit review criteria. *Qual Saf Health Care* 2003;12:24–8.
- [4] Johnston G, Crombie IK, Davies HT, Alder EM, Millard A. Reviewing audit: barriers and facilitating factors for effective clinical audit. *Qual Health Care* 2000;9:23–36. Retrieved from: <http://qualitysafety.bmj.com/content/9/1/23.full.pdf+html>.
- [5] Davies P, Walker AE, Grimshaw JM. A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluation. *Implement Sci* 2010;5:14.
- [6] Shojania KG, Grimshaw JM. Evidence-based quality improvement: the state of the science. *Health Aff (Millwood)* 2005;24:138–50.
- [7] Foy R, Ovretveit J, Shekelle PG, Pronovost PJ, Taylor SL, Dy S, et al. The role of theory in research to develop and evaluate the implementation of patient safety practices. *BMJ Qual Saf* 2011;20:453–9.
- [8] New Zealand Ministry of Health. Toward Clinical Excellence: an introduction to clinical audit, peer review and other clinical practice improvement activities. Retrieved from: http://www.health.govt.nz/system/files/documents/publications/moh_tce_2002.pdf; 2002.
- [9] Destino LA, Kahana M, Patel SJ. Engaging pediatric resident physicians in quality improvement through resident-led morbidity and mortality conferences. *Jt Comm J Qual Patient Saf* 2016;42:99–106.
- [10] Phillips J, Heblish LJ, Mann S, Ching JM, Blackmore CC. Engaging frontline leaders and staff in real-time improvement. *Jt Comm J Qual Patient Saf* 2016;42:170–8.
- [11] The system of profound knowledge, The W Edwards Deming Institute, <https://www.deming.org/theman/theories/profoundknowledge>, (Accessed 29 January, 2016).
- [12] The King's Fund. Staff Engagement-Six building blocks for harnessing the creativity and enthusiasm of NHS staff. Retrieved from: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/staff-engagement-feb-2015.pdf; 2015.
- [13] Langley GJ, Moen RD, Nolan KM, Nolan TW, Norman CL, Provost LP. The improvement guide: a practical approach to enhancing organisational performance. *secnd ed*. San Francisco: Jossey-Bass; 2009.
- [14] Spurgeon P, Mazelan PM, Barwell F. Medical Engagement: a crucial underpinning to organisational performance. *Health Serv Manage Res* 2011;24:114–20.
- [15] Neave, H.R. (1987), Deming's 14 Points for Management: Framework for Success, *Journal of the Royal Statistical Society. Series D (The Statistician)*, Vol. 36, No. 5, Special Issue: Industry, Quality and Statistics (1987), 561–570 Published by: Blackwell Publishing for the Royal Statistical Society. Retrieved from: <http://www2.fiu.edu/~revellk/pad3003/Neave.pdf>.
- [16] Kotter J. Transform Leadersh Excell 2006;23(1):14–5.
- [17] Watson-Hemphill K, Bradley KN. *Innovating Lean Six Sigma; a strategic guide to deploying the world's most effective business improvement process*. McGraw-Hill Education; 2016.
- [18] <http://documents.mx/engineering/the-influence-equation.html>, (Accessed 20 May 2016).
- [19] Ringleb AH, Rock D, Conser J. NeuroLeadership in 2010. *NeuroLeadersh J* 2010; 3. Retrieved from: http://www.davidrock.net/files/NeuroLeadership_in_2010.pdf.
- [20] Spurgeon P, Mazelan PM, Barwell F. Medial Engagement: a crucial underpinning to organisational performance. *Health Serv Manag Res* 2011;24:114–20.
- [21] Clark J. Medical engagement: too important to be left to chance. *The King's Fund*; 2012.
- [22] Parand A, Dopson S, Renz A, Vincent C. The role of hospital managers in quality and patient safety: a systematic review. *BMJ Open* 2014;4:e005055.
- [23] Stewart GL, Manges KA, Ward MM. Empowering sustained patient safety: the benefits of combining top-down and bottom-up approaches. *J Nurs Care Qual* 2015;30:240–6.
- [24] Lin GA, Bardach NS, editors. *Moving Patients from Consultants to Partners in Health Care System Redesign Achieving Meaningful Engagement*. *Jt Comm J Qual Patient Saf* 2014;40:531–2.