

COMPLETION REPORT

Evaluation of Lean Intervention in managing medical error related to Health Information Systems:
A Comparative Study between Japan and Malaysia

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Health Information Systems (HIS) and clinical workflow generate medication errors that affect the quality of patient care. Rigorous and comparative evaluation of medication error management in clinical practices enable the understanding of management role and its effect in reducing or eliminating error that occurs from clinical workflow and HIS. A comparative case study was conducted in a 1000-bed Japanese secondary care teaching hospital and a 300-bed Malaysian secondary care hospital. The two hospitals differ in terms of size, age, culture, and infrastructure but they shared common attributes in ensuring patient safety through the use of technology. Both hospitals adopted full HIS that were designed to minimize medication error but the Japanese hospital is much more advanced in technology utilization. Positive impact on reducing medication error were associated with technical factors, including user interface, system alert, notification, and input constraint; automated checking, dosing and calculation; and information completeness and accuracy; human factors, particularly user awareness and attitude; and organisational factors, namely policy, top management support, clinical process-technology alignment and champion. However, Computerised Physician Order Entry (CPOE) has a number of limitations in guiding physician to choose the right medication and prompting excessive alerts without additional information to aid in decision making. Tedious system use, limited screen view and number of computer, inconvenient, nondurable and insufficient number of personal digital assistant (PDA) led to user resistance. Organisational factors such as planning, training, technology support, turnover rate, clinical workload, and communication were barriers to system implementation and use that subsequently affect medication error.

A number of fit and misfit between the three factors, “waste” from Lean perspective and lesson learned were identified. Overview of HIS and technology involved in medication process, clinical process, pharmacist interventions, medication error reporting system and significant medication safety issues were compared. Recommendations to improve the current medication error issues were also identified. Continuous, systematic program of quality improvement and peer review that include mechanism for monitoring, reviewing, and reporting medication error had positive impacts on error reduction and clinical workflow. Clinical staff positively perceived the program in managing and minimizing medication error.

HIS was designed to minimize error but it also creates new risk in medication process. Error occurrence is inevitable but it can be minimized with pre-emptive endeavor. Managing medication error is crucial and benefits greatly in minimizing error and enhancing patient safety. This cross cultural study shows that specific, tailored management approaches works well in a specific, contextual setting but they may also be applied to different settings. The role of socio-technical factors and their fit in realizing the potential of HIS and management approaches in minimizing error requires continuous, in-depth evaluation. Evaluation could provide the

understanding for managing error incidents as a learning process in continuous process improvement.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

- 1) 10-11 August 2015, Bali, Indonesia. International Conference on Electrical Engineering and Informatics (ICEEI), Putra, Y. & Yusof, MM. Title: A review of technology-induced error and waste in medication reconciliation (also accepted by Medinfo2015). Presenter: Yudha Putra
- 2) 12-14 April 2016, Riyadh, Saudi Arabia. 1st International Saudi Health Informatics Conference. Keynote speech. Title: The multi-faceted dimensions of HIS Evaluation. To be presented by Maryati Mohd. Yusof
- 3) 12-14 April 2016, Riyadh, Saudi Arabia. 1st International Saudi Health Informatics Conference. Arifin, A. & Yusof, MM. Towards a Framework for Laboratory Information System (LIS) Evaluation (focus on lab testing and reporting error). (Accepted) To be presented by: Maryati Mohd. Yusof (Nominated for best poster competition and full paper writing is in progress)
- 4) 28 August – 2 September 2016, Munich, Germany. Health – exploring complexity (Medical Informatics Europe 2016 under HEC2016). Yusof, MM, Matsumura, Y, Takeda, T, Mihara, N, Rahman, RA. Title: Managing Health Information Systems-induced Medication error: Comparison between Hospitals in Japan and Malaysia (submitted). To be presented by Maryati Mohd. Yusof

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

- 1) Sahroni, MN & Yusof, MM. Evaluation medical errors related to Health Information Systems and its management practice. To be re- submitted.
- 2) Yusof, MM, Matsumura, Y, Takeda, T, Mihara, N, Ariffin, NF. A cross cultural study between Japanese and Malaysian hospitals on medication error management related to health information systems: a Lean perspective. To be submitted to Journal of Medical Internet Research or Int J of Medical Informatics (Q1)

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)