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Empirical Investigation of the Factors Influencing Data Completeness in Electronic Medical Records

by

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Certificate of Original Authorship

I, Caihua Liu declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Engineering and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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Dedications

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List of Papers

Journal papers:

J-1: **Liu, C.**, Talaei-Khoei, A., Zowghi, D. & Daniel, J. 2017, 'Data completeness in healthcare: A literature survey', *Pacific Asia Journal of the Association for Information Systems*, vol. 9, no. 2, pp.75-100. (Published)(Section 2.1)

J-2: **Liu, C.**, Zowghi, D. & Talaei-Khoei, A. 2019, 'An empirical study of the antecedents of data completeness in electronic medical records', *International Journal of Information Management*. (Published)(Section 6.2)

J-3: **Liu, C.**, Zowghi, D., Talaei-Khoei, A. & Jin Z. 'Empirical study of Data Completeness in Electronic Health Records in China'. (Submitted to the *Pacific Asia Journal of the Association for Information Systems*) (Chapter 7)

J-4: **Liu, C.**, Zowghi, D., & Talaei-Khoei, A. 'Factors influencing data completeness in electronic medical records: A cross-country comparison'.(Will be submitted to a relevant journal) (Chapter 8)

Conference papers:

C-1: **Liu, C.**, Zowghi, D., Talaei-Khoei, A., & Daniel, J. 2018, 'Achieving data completeness in electronic medical records: A conceptual model and hypotheses development', *51st Hawaii International Conference on System Sciences,* University of Hawaii at Manoa, Association for Information Systems IEEE Computer Society Press, Waikoloa Village, Hawaii, pp. 2824-2833. (Published) (Chapter 5)

C-2: **Liu, C.**, Talaei-Khoei, A. & Zowghi, D. 2018, 'Theoretical support for enhancing data quality: Application in electronic medical records', *24th Americas Conference on Information Systems*, Association for Information Systems, New Orleans, LA, pp. 1-10 (Published)(Chapter 4)

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Abstract

Recent advances in electronic medical records (EMR) in healthcare highlight the role of high-quality data, because poor data quality can destabilise clinical decision-making that in turn may impact on the quality of care. Data completeness as an essential dimension of data quality has been the subject of much research in the last three decades, while addressing data completeness in EMR is still a significant challenge in healthcare.

Exploring the factors that influence data completeness could be a starting point to address data quality issues in EMR. Constructing a conceptual model can be an effective exercise for studying complex phenomena such as data completeness in EMR. We do not have a conceptual model of factors influencing data completeness in EMR and specific relationships between these factors remain unclear. This study presents a novel conceptual model of the factors influencing data completeness in EMR and investigates the relationships between them.

This thesis begins with presenting the first literature review of data completeness in healthcare and provides a novel synthesis of the identified challenges that has led to a categorisation of the factors influencing data completeness in electronic records from human, managerial, technical, and external perspectives. The thesis also presents a taxonomy of factors influencing data quality using breadth, depth, and interaction dimensions, and suggests guidelines for developing and comparing the factors influencing data quality.

The empirical evaluation of the proposed conceptual model is carried out by surveying clinical practitioners in Australia, China, and USA. The results of data analysis reveal that the priority of the included factors is different among the three countries. Moreover, cultural differences are identified and highlighted in the relationships between these factors. The findings of this study draw specific attention to the important factors and help clinical practitioners identify which of these areas need to be addressed in order to improve EMR data completeness. In addition, the conceptual model proposed in this thesis can serve as the basis for the development of tools, methods and techniques for addressing data completeness in EMR.