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Electronic Clinical Decision Support (eCDS) in Primary Health Care: A Multiple Case Study of Three New Zealand PHOs

A thesis presented in partial fulfilment of the requirements for the degree of

Doctor of Philosophy
in
Information Systems

at Massey University, Palmerston North
New Zealand

Judith Merrylyn Engelbrecht

2009
Dedication

In loving memory of my parents, Josey and James Albert Phillips.
Abstract

Health care providers internationally are facing challenges surrounding the delivery of high quality, cost effective services. The use of integrated electronic information systems is seen by many people working in the health sector as a way to address some of the associated issues. In New Zealand the primary health care sector has been restructured to follow a population based care model and provides services through not-for-profit Primary Health Organisations (PHOs). PHOs, together with their District Health Boards (DHBs), contributing service providers, and local communities, are responsible for the care of their enrolled populations. The Ministry of Health (MoH) is streamlining information sharing in this environment through improvements to computer based information systems (IS). By providing health professionals with improved access to required information within an appropriate time frame, services can be targeted efficiently and effectively and patient health outcomes potentially improved. However, the adoption of IS in health care has been slower than in other industries. Therefore, a thorough knowledge of health care professionals’ attitudes to, and use of, available IS is currently needed to contribute to the development of appropriate systems.

This research employs a multiple case study strategy to establish the usage of IS by three New Zealand PHOs and their member primary health care providers (PHPs), with a focus on the role of IS in clinical decision support (CDS). A mixed method approach including semi-structured interviews and postal surveys was used in the study. Firstly, the research develops and applies a survey tool based on an adaptation of an existing framework, for the study of IT sophistication in the organisations. This provides the foundation for an in-depth study of the use of computerised CDS (eCDS) in the PHO environment. Secondly, a conceptual model of eCDS utilisation is presented, illustrating the variation of eCDS use by member general practitioner (GP) practices within individual organisations. Thirdly, five areas of importance for improving eCDS utilisation within PHO’s are identified, contributing information of use to organisations, practitioners, planners, and systems developers. Lastly, the research provides a structure for the study of the domain of eCDS in PHOs by presenting a research approach and information specific for the area.
Acknowledgements

Many friends and associates have contributed to this research journey, and I thank them all for the various types of support they have given me. I am particularly grateful for the invaluable input and guidance provided by my supervisors Dr. Richard Whiddett and Dr. Inga Hunter. Their wisdom, advice and vigilance sustained me throughout the project and ensured the process was as fruitful and pleasant as possible.

I thank the case study PHOs for their participation in this research, and the staff of the management organisations and GP practices for their generosity in sharing their knowledge and time. My thanks also go to Te Mauri O Rangitaane O Manawatu (Council of Elders), and Ms. Danielle Harris of Te Hotu Manawa O Rangitaane O Manawatu Marae, for their support, and to the Tertiary Education Commission for funding provided by a Bright Future Top Achiever Doctoral Scholarship. The support of a travel grant from the Maurice and Phyllis Paykel Trust is also gratefully acknowledged as is the approval given for the research by the Massey University Human Ethics Committee, and the Central Regional Health and Disability Ethics Committee. I am grateful to Dr. Jacqui Virtue for constructive comments on my questionnaire design, and to Professors Guy Paré and Claude Sicotte for inspiration provided by their work and the communication from Professor Paré.

Thanks go to members of the Massey University community, including Dr. John Waldon of Te Pūmanawa Hauora, for guidance early in the study, Dr. Alasdair Noble for advice on statistics, and past staff and students of the now disestablished Department of Information Systems and my current associates in the Department of Management for their collegiality. I appreciated the constructive criticism of the thesis by Professor Tony Vitalis, and helpful comments from Mr. Barry Jackson. My friend Jia (Carol) Zhou and I have shared various office locations throughout our individual studies, and our friendship has enriched my research journey beyond measure.

My final expressions of gratitude are for my family: My husband Hans-Jürgen Engelbrecht, daughter Stephanie, son Michael, sister Dawn and brother-in-law Colin. I deeply appreciate their enthusiasm and constant encouragement for my endeavours, which have been invaluable. Of paramount importance to me is the loving support provided by my husband and inspiration, Hans-Jürgen, without which this research would not have taken place.
Publications

Results from the pilot study were presented by the author of this thesis at three conferences and resulted in the following publications, the work being that of this author, with supervisory and editorial input provided by Drs. Whiddett and Hunter:

Refereed journal publications:


Conference proceedings:


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<th>Description</th>
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<tbody>
<tr>
<td>AI/ES</td>
<td>Artificial Intelligence/Expert Systems</td>
</tr>
<tr>
<td>CDM</td>
<td>Clinical Decision Making</td>
</tr>
<tr>
<td>CDS</td>
<td>Clinical Decision Support</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CIS</td>
<td>Clinical Information Systems</td>
</tr>
<tr>
<td>CPOE</td>
<td>Computerised Physician/Provider Order Entry</td>
</tr>
<tr>
<td>CREC</td>
<td>Central Regional Ethics Committee</td>
</tr>
<tr>
<td>DHB</td>
<td>District Health Board</td>
</tr>
<tr>
<td>DHBNZ</td>
<td>District Health Boards New Zealand</td>
</tr>
<tr>
<td>DSS</td>
<td>Decision Support System</td>
</tr>
<tr>
<td>eCDS</td>
<td>Electronic/Computerised Clinical Decision Support</td>
</tr>
<tr>
<td>EMR</td>
<td>Electronic Medical Record</td>
</tr>
<tr>
<td>FTE</td>
<td>Full-Time Equivalent</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>HIS</td>
<td>Health Information Systems</td>
</tr>
<tr>
<td>HIT</td>
<td>Health Care Information Technology</td>
</tr>
<tr>
<td>IPA</td>
<td>Independent Practitioner Association</td>
</tr>
<tr>
<td>IS</td>
<td>Computer Based Information Systems*</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology*</td>
</tr>
<tr>
<td>IT/S</td>
<td>Information Technology/Systems*</td>
</tr>
<tr>
<td>MDO</td>
<td>Māori Development Organisation</td>
</tr>
<tr>
<td>MHEC</td>
<td>Massey Human Ethics Committee</td>
</tr>
<tr>
<td>MIS</td>
<td>Management Information Systems</td>
</tr>
<tr>
<td>MoH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MSO</td>
<td>Management Service Organisation</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Government Organisation</td>
</tr>
<tr>
<td>NHI</td>
<td>National Health Index</td>
</tr>
<tr>
<td>PHARMAC</td>
<td>Pharmaceutical Management Agency of New Zealand</td>
</tr>
<tr>
<td>PHO</td>
<td>Primary Health Organisation</td>
</tr>
<tr>
<td>PHO-MS</td>
<td>Primary Health Organisation Management Service</td>
</tr>
<tr>
<td>PHP</td>
<td>Primary Health Care Provider</td>
</tr>
<tr>
<td>PMS</td>
<td>Practice Management System</td>
</tr>
<tr>
<td>RNZCGP</td>
<td>Royal New Zealand College of General Practitioners</td>
</tr>
<tr>
<td>TPS</td>
<td>Transaction Processing Systems</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
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</table>
* Within the literature there is a great deal of overlap in the use of the terms IS, IT and IT/S. This thesis will use the term IS to embrace the use of systems and their supporting technologies, but when discussing the work of others it will follow the usage of the original author.