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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**

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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.

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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:

Engelbrecht, J., Whiddett, R., & Hunter, I. (2006). The use of information systems for clinical decision support by primary health care practices in a medium sized PHO. *Health Care and Informatics Review Online*TM. September 1, 2006. Retrieved from <http://www.hinz.org.nz/journal/2006/9>

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Engelbrecht, J, Hunter I, & Whiddett R. (2007). Further evidence of how technology availability doesn't guarantee usage. In C. Peck & J. Warren (Eds.) *Proceedings - HINZ 6th Annual Forum and Exhibition, Rotorua, 29-31 October 2007*. Health Informatics New Zealand.

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Glossary of acronyms

AI/ES	Artificial Intelligence/Expert Systems
CDM	Clinical Decision Making
CDS	Clinical Decision Support
CEO	Chief Executive Officer
CIS	Clinical Information Systems
CPOE	Computerised Physician/Provider Order Entry
CREC	Central Regional Ethics Committee
DHB	District Health Board
DHBNZ	District Health Boards New Zealand
DSS	Decision Support System
eCDS	Electronic/Computerised Clinical Decision Support
EMR	Electronic Medical Record
FTE	Full-Time Equivalent
GP	General Practitioner
HIS	Health Information Systems
HIT	Health Care Information Technology
IPA	Independent Practitioner Association
IS	Computer Based Information Systems*
IT	Information Technology*
IT/S	Information Technology/Systems*
MDO	Māori Development Organisation
MHEC	Massey Human Ethics Committee
MIS	Management Information Systems
MoH	Ministry of Health
MSO	Management Service Organisation
NGO	Non-Government Organisation
NHI	National Health Index
PHARMAC	Pharmaceutical Management Agency of New Zealand
PHO	Primary Health Organisation
PHO-MS	Primary Health Organisation Management Service
PHP	Primary Health Care Provider
PMS	Practice Management System
RNZCGP	Royal New Zealand College of General Practitioners
TPS	Transaction Processing Systems
VPN	Virtual Private Network

* 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.