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Marginal analysis of a distribution model designed to increase the social welfare function of Medicare-funded diagnostic services

Keith McDonald
University of Wollongong

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“Marginal analysis of a distribution model designed to increase the social welfare function of Medicare-funded diagnostic services.”

A thesis submitted in fulfilment of the requirements for the award
of the degree

DOCTOR OF PHILOSOPHY

From

UNIVERSITY OF WOLLONGONG

By

Keith McDonald, M.HSM, B.App.Sc, Dip.Teach.

GRADUATE SCHOOL OF BUSINESS

2008

Certification

I, Keith A. McDonald, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Graduate School of Business, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Keith A. McDonald

18 December 2008

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List of abbreviations

AAPP	Australian Association of Pathology Practices
ABS	Australian Bureau of Statistics
ACR	American College of Radiologists
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AusDiab	Australian Diabetes, Obesity & Lifestyle Study
Aust.	Australia
BEACH	Bettering the Evaluation and Care of Health
BMA	British Medical Association
BMI	Body Mass Index
CIN	Cervical Intraepithelial Neoplasia
COPD	Chronic Obstructive Pulmonary Disease
CPI	Consumer Price Index
CT	Computer Tomography
CVA	Cerebrovascular Accident (or stroke)
CVD	Cardiovascular Disease
DALY	Disability-Adjusted Life Year
DCIS	Ductal Carcinoma in-situ
DEXA	Dual-energy x-ray absorptiometry
DoHA	Department of Health and Ageing
EDQUM	Enhanced Divisions Quality Use of Medicine
EPC	Enhanced Primary Care
EUC	Electrolytes, urea & creatinine
FBC	Full blood count
GDM	Gestational Diabetes Mellitus
GDP	Gross Domestic Product
GP	General Practitioner
HbA1c	Glycosylated haemoglobin
HIC	Health Insurance Commission (Medicare Australia)
HIV	Human Immuno-inefficiency Virus
HMO	Health Maintenance Organisation
HMR	Home Medication Reviews
HPV	Human Papilloma Virus
IFG	Impaired Fasting Glucose
IGT	Impaired Glucose Tolerance

IHD	Ischaemic Heart Disease
IPA	Independent Practice (or Practitioner) Association
LFT	Liver function test
MAHS	More Allied Health Services
MC&S	Microscopy, culture & sensitivity
MRI	Magnetic Resonance Imaging
NH&MRC	National Health and Medical Research Council
NHS	National Health Service (UK)
NIDDM	Non-Insulin Dependent Diabetes Mellitus
NSW	New South Wales
OECD	Organisation of Economic Cooperation and Development
OMP	Other Medical Practitioner
PCP	Primary Care Physician
PHCRIS	Primary Health Care Research and Information Service
PIP	Practice Incentive Payment
POS	Point-of-service plan
PPO	Preferred Provider Organisation
PPP	Purchasing Price Parity
PSA	Prostate-specific antigen
QALY	Quality-Adjusted Life Year
QOF	Quality and Outcomes Framework
RACGP	Royal Australian College of General Practice
RANZCR	Royal Australian and New Zealand College of Radiology
RAWP	Resource Allocation Working Party
RDF	Resource Distribution Formula
RCPA	Royal College of Pathologists of Australasia
SIP	Service Incentive Payment
SIQ	Semi-Inter-Quartile range (25-75%)
STARDS	Standards for Reporting of Diagnostic Accuracy
SWPE	Standardised Whole Patient Equivalent
TIA	Transient Ischaemic Attack
TRUS	Trans-rectal ultrasound-guided needle biopsy
UK	United Kingdom
US	United States (of America)
VR	Vocational Registration
WHO	World Health Organisation

Abstract

The pursuit of a more beneficial service mix in primary medical care is a worthwhile public goal. Public expenditure on diagnostic testing referred from general practice is a matter of public interest because of its potential benefit to the social welfare function.

To realise this potential, interventions must first reflect the evidence-base for enhancing clinical quality and promote discretionary increases in certain interventions (Eddy 1994[b] p.817; Rodwin 2004 p. 1328; Starfield 1998 p.406; Van Weel & Del Mar 2004 p.99). The effectiveness of primary care however is stratified by social class (Macinko, Starfield & Shi 2007 p.121; Starfield 1998 p.411). Therefore, services must also take into consideration any access barriers for vulnerable social groups and demonstrate a positive commitment to addressing the imbalance (Starfield 1998 p.406).

In practice, good clinical or scientific evidence alone is insufficient to achieve the optimum distribution of health services. The evidence must be matched by economic viability and sensitivity to the prevailing socio-political imperatives (Haas 2001 p.228; Van Der Weyden & Armstrong 2004 pp.607-608). Planning should explicitly consider marginal opportunities for changes in the balance of costs and benefits (Haas et.al. 1997 p.81).

The purpose of this study is to derive a model that levers redistribution of general practitioner-referred diagnostic services in favour of vulnerable social groups within Australia. The study operates within the boundaries of the dominant disease-state paradigm, because it focuses on systematically addressing nationally-prioritised epidemiological indicators for targeted populations.

The derived model relies on intermediaries representing groupings of general practices to drive the redistribution. It establishes an environment of nominal risk for the Divisions of General Practice network, acting as intermediaries. In turn, the actual risk to the Australian Government as the purchaser is limited to public funding through the Medicare Benefits Schedule of general practitioner-referred medical imaging (Category 5 [excluding Group I5]) and pathology tests (Category 6).

This is achieved by introducing a credit reserve ledger as a novel mechanism to track and reward Division performance. The ledger is a tool for the Australian Government to map the balance of benefits claimed on diagnostic services referred by general

practitioners enrolled with each Division. Ledger balances depend on a separation of medical imaging and pathology items into three streams. The systematic streaming of items is according to whether they are over-, appropriately- or under-referred, according to the available evidence.

The key for Divisions to draw on their credit reserve ledger is the proportionate uptake of the evidence-based target items by identified vulnerable social groups within their catchment. This is compared with a target level of activity set for these groups to establish a specific performance ratio for each financial period.

The research design of this study tests the model's effectiveness in the current health care environment, rather than its theoretical efficacy. The model acknowledges Australia's current legislative and policy framework and its communities' over-arching socio-political imperatives. No presumptions are made about changing the Medicare Benefits Schedule or its predominant fee-for-service mode of delivery.

The redistribution model is tested using a series of scenarios, and analysed in three parts. In the first part a macro-level analysis examines the net implications of the redistribution for the Australian Government, Divisions of General Practice and diagnostic providers as a whole across four different scenarios. In the second part, a meso-level analysis uses the existing Divisions' network in a further three scenarios. Normative projections are developed across categories of geographic dispersion for each of the given scenarios. Thirdly, a micro-level analysis examines the absolute values of projected credit reserves within the same scenarios as the meso-level analysis for each of the Divisions.

The model results in a 0.02% increase in total tests with a 2.2% reduction in the total of benefits claimed. Within this ideal redistribution, there is an 18.4% reduction in uptake of over-referred items, a modelled 0.8% growth in uptake of appropriately referred items, and a substantial growth in uptake of the targeted, under-referred items (activity by 84.9% and benefits claimed by 94.2%).

The meso-level analysis demonstrates that the model has a defining normative bias in favour of increasing rurality and remoteness. This is consistent with the model's aim of delivering supply-side incentives to service vulnerable social groups.

The meso-level results also indicate that a staged implementation of the model is required. This is because the overwhelming majority of Australia's population live within the more metropolitan and regional Divisions that require the greatest effort to glean benefit from the model. Initially, they may be the most difficult to engage.

At the micro-level, the model is tested on estimated parameters matched to one-hundred and nineteen Divisions of General Practice. The result is that all the Divisions of General Practice within the existing network have sufficient critical mass to accumulate a material benefit from participation.

The study acknowledges that limitations in the model design may risk perverse incentives and unintended aberrations. For this reason, the model requires the protection of a regulatory framework to ensure its proper application in the field. Based on implementation experience, refinements may be required over time to reduce any unintended consequences.

There are limitations to the study design which give cause for further investigation and testing in the field. The analyses rely on secondary data, which risks artefacts within the results. Further, this is a study of marginal costs and benefits, rather than a true cost-effectiveness analysis because the utilisation targets used are interim measures of process, and not definitive measures of change in health status. Finally, this study is also limited by its inability to test the model against the actual parameters from identified Divisions of General Practice.

The study concludes that the model undergo further investigation and field testing in order to derive empirical results. It is also recommended that future studies test the generalisability of the model, with research into the redistribution modelling of general practice prescriptions and referrals to specialists for elective procedures. The consistent aim is to achieve marginal redistribution in the pursuit of an enhanced social welfare function.

Acknowledgments

I wish to acknowledge the extensive support I have received from numerous people over time whilst undertaking this study.

I unequivocally acknowledge my supervisors Pr. Kathy Eagar and Pr. Don Lewis, University of Wollongong, for their ongoing guidance and constructive feedback throughout the research and preparation of this thesis.

Thank you to the academic and administrative staff from the Centre for Health Service Development, University of Wollongong, for their frequent clerical support, professional encouragement and camaraderie.

My employer, the Murrumbidgee General Practice Network, must be acknowledged for providing paid study leave and flexibility in work conditions over an extended period. This has proved critical in enabling me to undertake this higher degree part-time.

To my family, I am truly grateful. I wholeheartedly thank my wife, Ms. Vincenza McDonald, for her resilience and understanding over the years. Our children, Amy and James, have grown to accept my commitment to study as part of their young lives, which I will always appreciate.