MEDICAL INFORMATICS AROUND THE WORLD:

AN INTERNATIONAL PERSPECTIVE FOCUSING ON TRAINING ISSUES

Andrew Steele, M.D., M.P.H.

MEDICAL INFORMATICS AROUND THE WORLD:

AN INTERNATIONAL PERSPECTIVE FOCUSING ON TRAINING ISSUES

Andrew W. Steele, M.D., M.P.H

Medical Informatics Around The World:

An International Perspective Focusing On Training Issues

This publication is designed to provide accurate information in regard to the Subject Matter covered. It is sold with understanding that the publisher is not engaged in rendering legal, accounting, or other professional serice. If legal advice or other expert assistance is required, the service of a competent professional person should be sought. (From a delcaration of Principles joointly adopted by a Committee of the American Bar Association and a Committee of Publishes and Associations.)

Table of Contents

Acknowledgements

This book is collaboration, and I want to publicly thank those who have helped bring it to reality. First, all of the contributing authors provided extra hours to submit, read, and revise their chapters. They all have busy professional lives in addition to being students in medical informatics.

Second, I would like to acknowledge the vision of Dr. Paul Whatling and his staff at the Royal College of Surgeons of Edinburgh in the United Kingdom. It is through their inspiration that this work has grown. Their dedication and hard work led to the development of the Postgraduate Medical Informatics Course (www.informatics.rcsed.ac.uk) which all of the authors are attending.

Third, to all of the tutors, who also lead very busy lives, for their support, encouragement, and professional review of all of the students' original assignments.

Fourth, I would like to thank my spouse, Amy, and our children, George, Allison, and Suzanne for their unwavering support and encouragement.

I welcome any feedback on the content and suggestions for improvement. You may email me at medin4matics@yahoo.com.

Andrew W. Steele, M.D., M.P.H.

List of Authors

Name	Country	Information
Ian Gilfillan	Australia	Diploma in Medical Informatics: October, 2000 Cohort Ian Gilfillan MbChB FRCS(Ed) & C/th FRACS Consultant Cardiothoracic Surgeon Fremantle and Mount hospitals Perth Western Australia
Pin Cai	China	Diploma in Medical Informatics: October, 2000 Cohort
Ian Tsz Fung Cheung	Hong Kong	Diploma in Medical Informatics: October, 2000 Cohort
Dileep Bhale	India	Diploma in Medical Informatics: February, 2001 Cohort
M Bhat	India	Diploma in Medical Informatics: February, 2001 Cohort
Krishnan Ganapathy	India	Diploma in Medical Informatics: October, 2000 Cohort K.Ganapathy MS(Neurosurgery) FACS Ph.D, Adjunct Professor Anna University Senior Consultant Neurosurgeon, Head Division of Stereotactic Radiosurgery Apollo Hospitals, Madras, India Hon. Consultant and Advisor in Neurosurgery Armed Forces Medical Services, India Secretary, Neurological Society of India Secretary General Asian Australasian Society of Neurological Surgery
Cheruvalli Raghu	India	Diploma in Medical Informatics: February, 2001 Cohort
Terry Irwin	Ireland	Diploma in Medical Informatics: October, 2000 Cohort
Ravi Nagubandi	Ireland	Diploma in Medical Informatics: October, 2000 Cohort
Sarwan Singh	Malaysia	Diploma in Medical Informatics: February, 2001 Cohort
Kristina Maria Barker	New Zealand	Diploma in Medical Informatics: October, 2000 Cohort Kristina Barker NZRcomp.N Business Alliances Southern Cross Healthcare New Zealand

Ashwani Dhar	Oman	Diploma in Medical Informatics: February, 2001 Cohort
Peter Corr	South Africa	Diploma in Medical Informatics: October, 2000 Cohort
Muhammad Suhail Arif	Saudi Arabia	Diploma in Medical Informatics: October, 2000 Cohort Dr. M. Suhail Arif, MBBS(Pb), MScOrth(Lond), FRCS(Ed), Senior Consultant Orthopedic Surgeon, Chief Department of Orthopedics and Trauma, Armed Forces Hospital, King Abdul-Aziz Airbase, Dhahran, Saudi Arabia
Shona Forbes	Saudi Arabia	Diploma in Medical Informatics: October, 2000 Cohort
Wing Hung Leung	Singapore	Diploma in Medical Informatics: October, 2000 Cohort
Richard Adamson	United Kingdom	Diploma in Medical Informatics: October, 2000 Cohort Richard M. Adamson MB.BS FRCSEd Specialist Registrar in E.N.T. Surgery, Edinburgh, Scotland
Ross Boardman	United Kingdom	Diploma in Medical Informatics: October, 2000 Cohort
John Coia	United Kingdom	Diploma in Medical Informatics: February, 2001 Cohort John E. Coia B.Sc., M.D., F.R.C.Path. Consultant Clinical Microbiologist Department of Clinical Microbiology Western General Hospital Lothian University Hospitals NHS Trust Edinburgh, SCOTLAND
Andrew Dyson	United Kingdom	Diploma in Medical Informatics: October, 2000 Cohort
Tom Faichen	United Kingdom	Diploma in Medical Informatics: February, 2001 Cohort Tom Faichen FIBMS Bsc Biomedical Scientist Clinical Laboratory System Manager Monklands Hospital Airdrie, Lanarkshire, Scotland
Boules Morcous	United Kingdom	Diploma in Medical Informatics: October, 2000 Cohort
Martin Hill Morse	United Kingdom	Diploma in Medical Informatics: October, 2000 Cohort

Philip Segar	United Kingdom	Diploma in Medical Informatics: February, 2001 Cohort Philip Segar, MBChB, DCH, FRCA Clinical Fellow in Anaesthesia Hospital for Sick Children, Toronto, Canada
Francis Abraham	United States of America	Diploma in Medical Informatics: February, 2001 Cohort
Richard Buckley	United States of America	Diploma in Medical Informatics: October, 2000 Cohort
Andrew Steele	United States of America	Diploma in Medical Informatics: February, 2001 Cohort Andrew Steele, MD, MPH Associate Professor in Medicine Division of General Internal Medicine Denver Health and University of Colorado Health Sciences Center Denver, Colorado, USA

Preface

The chapters of this book were essay assignments submitted by students in the Diploma of Medical Informatics course at the Royal College of Surgeons of Edinburgh in Scotland, United Kingdom. As stated in the course material:

> *"The Diploma in Medical Informatics course (DMI) is a post-graduate, modular, online course which was first launched in October 2000. It was perceived that there was a need for systematic and comprehensive training opportunities in the management of information in the healthcare setting, not only for surgeons but for everyone involved in healthcare worldwide. The DMI curriculum has been drawn up to reflect this need and has involved a number of people, all of whom are experts in their own fields of Medical Informatics."*

The assignments contained in this book were final projects for the first module in the DMI program titled: *An Introduction To Medical Informatics*. Students were expected to spend about 100 hours on the first module. For the final assignment, it is estimated that 15 hours were needed for background research, and 5 hours for actually writing the assignment.

The specific assignment was as follows:

> ***In order to facilitate forwards movement in information management in healthcare, it is essential to educate all of those working within the organization.***
>
> - ***Briefly review and summarize the strategies that are in place at a regional and national level in your country to train staff in informatics***
>
> - ***You should give your opinion on whether they are likely to be effective and make your own suggestions for further changes.***
>
> - ***We recognize that there is very much more information available in some countries than in others and that some countries will have well-developed strategies in place. Where there is little information, you should concentrate on what should be done.***

The assignments are included in this book as the students wrote them. The actual content of the contributions has not been edited except to conform to the page layout for this book. As such, the content and ideas of the authors are solely their own, and does not necessarily represent the views or opinions of the editor or of the Royal College of Surgeons.

Introduction

In the last ten years there has been an explosion in the use of computer technology in many facets of our lives. Many industries such as finance, manufacturing, and retail have embraced modern technological advances through the use of advanced computer and telecommunication technology. The rapid growth and adoption of technology has surprised even the Internet pundits of the 1980's.

Unfortunately, the international health care community has been quite slow to effectively integrate new computer technology into the daily care of patients. While isolated examples of success stories exist, few industry wide advances are in evidence. It is often stated that health care is too complicated, too individualized, and too private to effectively impose the inherent limitations of computer technology.

Nevertheless, governments across the world are developing strategic plans and allocating financial resources to support the use of technology in healthcare. A new burgeoning field in health care, *medical informatics*, specifically attempts to deal with the "storage, retrieval, and optimal use of biomedical information, data, and knowledge for problem solving and decision making."[1] In addition to grappling with how best to use technology in health care, governments, institutions, and clinicians are attempting to develop appropriate educational and training opportunities in the field of medical informatics to better prepare our populations and clinicians as technology advances.

This book provides a global snapshot into such activities in 13 different countries (Australia, China, Hong Kong, India, Ireland, Malaysia, New Zealand, Oman, South Africa, Saudi Arabia, Singapore, United Kingdom, and the United States of America). Of interest, the perspective is not from recognized leaders in the field, but rather, from health care personnel embarking upon their own post-graduate training in medical informatics. As such, the perspectives provide a fresh, original, and unique view into the individual countries use of information technology in health care as well as the unique approaches to medical informatics training. Despite the variety of countries represented it is apparent that some common themes arise:

- lack of strong national leadership with the exception of efforts in a few countries

- lack of appropriate funding

- an almost universal lack of an organized strategy towards education in medical informatics both for the general population and for the health care professionals

Given the variety of countries represented we can learn from some of the unique issues related to medical informatics in general, and medical informatics training specifically. For instance:

---

[1] Shortliffe, EH & Perreault, LE (Eds.). Wiederhold, G, & Gagan, LM (Assoc. Eds.), 1990, *Medical Informatics: Computer Applications in Health Care*. Mew York: Addison-Wesley Publishing Company, page 20.

- a strong focus on developing an Electronic Medical Record in Australia, Hong Kong, Malaysia, Singapore, and in the United Kingdom

- a sense of no clear national strategic plan for medical informatics in India, Oman, S. Africa, and in the United States

- isolated use of smart card technology by patients

- struggles with issues related to developing a unique patient identifier in S. Africa, and the United States

Overall, although stages of development of strong medical informatics strategies and training programs differ greatly among the countries, the areas of focus and identified challenges are remarkably similar. It appears that defining and funding a clear national strategy, developing an integrated electronic medical record, providing access to electronic medical references, and developing appropriate medical informatics training opportunities are common themes for all countries. Of note the International Medical Informatics Association (IMIA- www.imia.org) has developed a detailed medical informatics education curriculum that could provide and excellent starting point for all countries as they embark upon future planning efforts.

In summary, it is clear from these insightful perspectives from all over the world that we are reminded once again, that we have more in common than in difference. It is hoped that that through shared experiences by working together we can all reach our common goal of using technology to improve the health and welfare of our global community.

Chapters

CHAPTER 1

Country: Australia   **Author: Ian Gilfillan**

On my initial reading of this question, I had concerns that I would not find sufficient material to provide a meaningful response. My research commenced with an Internet search, which provided little initial return. However, I have subsequently been overwhelmed with relevant documents having contacted my state health department. Its head of the IT department has forwarded over 1 megabyte of material! Additionally, the librarian at my public hospital has also been most helpful, although the public hospital IT head of department is still to reply to my e-mail! I was surprised at the scope of information on strategies in medical information within Australia. This is of some concern, as despite my interest in the field, I had little knowledge of this body of work. This either reflects poorly on myself, or on the involvement of the end-user of the proposed systems by those planning the changes. However, I have found this section of the assignment has given me the greatest return for my investment of time in the diploma so far.

I have already described some of the geographical features of Australia, and would re-emphasise the population distribution, which makes for unique challenges in our healthcare system. This may explain why Telehealth is reportedly advanced in this country. Health represents a large component of the Australian economy, with a combined expenditure by the public and private sectors of A$43 billion in 1998. This represents 8.5% of GDP, which is slightly below average for the OECD countries. Despite this, Australia ranks highly when compared to these countries in health outcomes. Life expectancy at birth, for example, is now 75 years for males and 81 years for females[1]. 45% of health expenditure is by the federal government (the commonwealth), 23% by the state and territory governments, and the remaining 32% is financed privately. Private health insurance is now carried by 45.8% of the population, a rapid rise from 30.1% two years ago. This is due to two commonwealth initiatives. Firstly, a 30% rebate for health insurance costs was introduced, followed by penalties by way of higher premiums, for those joining a health fund after the age of 30. For state government, healthcare is the largest part of their expenditure, representing 25% of total revenue. In the forthcoming Western Australian state elections, healthcare is the primary area of concern of the electorate. In common with many other countries, there are significant challenges to health-care systems in Australia. We have an ageing population, increasing demand from consumers, rapid development of expensive technologies and inequalities in access and outcomes for sections of the population, especially indigenous Australians. Therefore, a balance between cost control and these increasing demands need to be found, and health information systems are seen to be part of the solution. Consequently, the National Health Information Advisory Council (NHIMAC) was established in July 1998 to advise health ministers in the implementation of information technologies in health. They have published "Health Online: A Health Information Action Plan for Australia"[2] which is a major source of information for this review.

The Current Situation

The Collaborative Health Informatics Centre[3] has recently studied health information technology in Australia. I do not have access to the entire report, as subscription is required ($412). However, the summary supplies a useful overview. The review was conducted in November 1999 by a survey of IT professionals in the health sector. Australian health services overall commit 1.5% of budget to IT&T. This figure lags the UK's 2% and the USA's 3.5%. In comparison to other industries, health spending is low. Finance and insurance spend 9.96% in this area, and the retail trade 2.72%. Western Australia notably, in a different review by the Gartner Group spent 3.43% of budget in 1997 on IT. See chart below.
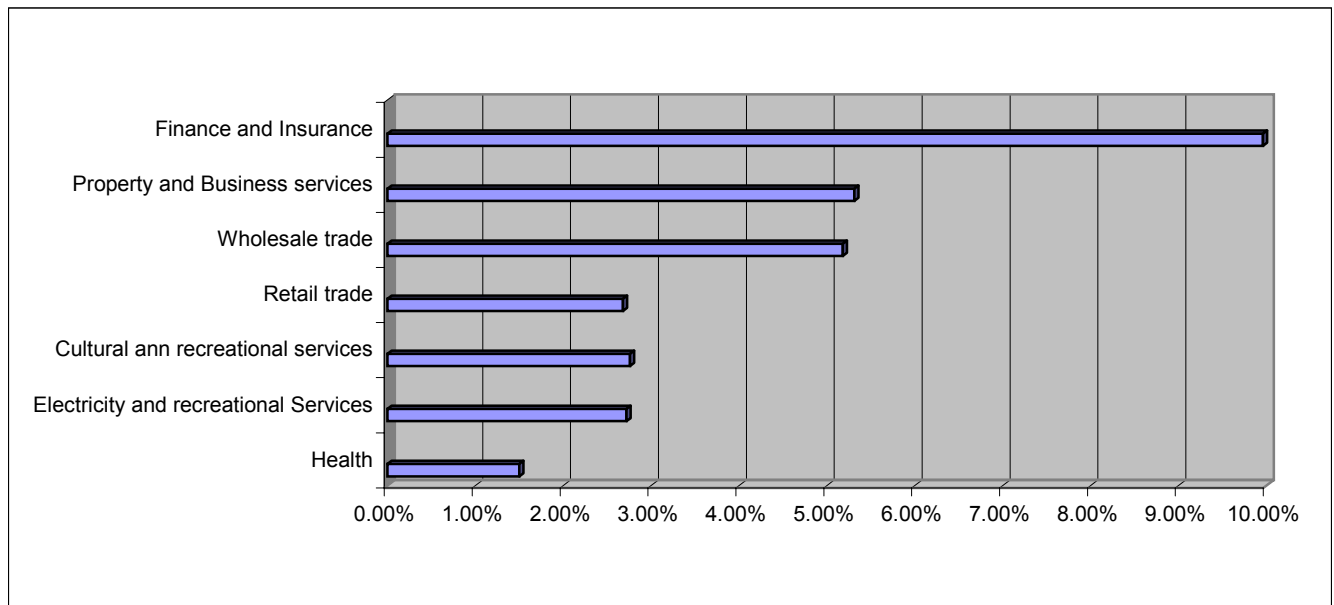
Per cent of Total Budget Spent on IT&T

The average number of staff employed in IT is shown below. 40% of respondents to the survey expected an increase in staff, whilst 52% expected a decrease. The main reasons for loss of staff were lack of adequate funding and sourcing of IT skills. This is an area for concern. I have found personally, that commitment to IT is poor in the private hospital were I work, and establishing the infrastructure for cardiac audit has been difficult despite the relatively small costs incurred.

Average No of IT staff by health organisation type.	
Private Hospital	7
Public Hospital-Metro	21
Public Hospital-Rural	19
Health Area Service/Network	57

Regionally and locally, medical information systems have had little impact yet on the bedside practice of clinical medicine. Network delivered applications which are widely used in hospital practice are the Sunrise Clinical Manager system, for delivery of laboratory reports, and e-mail. Also available to the clinician are Harrison's medical textbook, MIMS, a paging system, theatre booking, an outpatient booking system, cardiology system and internet (albeit, usually slow) access. The Emergency department information system (EDIS) has recently been initiated, and initial reports from end-users are favourable. I access the network in an out patient room once per week, and the system displays the last log on ID. Despite 7 other staff using the room during the week, for the last nine weeks, I am the only consultant to have logged on. Many consultants have never used the hospital system. The majority of the IT effort in the region is directed to tactical and strategic management. An ICD-9-CM coding system is used, for financial allocation and reporting of key performance indicators. Many of these remain crude and simplistic. For example, non-risk adjusted mortality figures for open-heart surgery are published for each of the three metropolitan sites, which could lead to error as case mix may vary significantly.

In primary care, the General Practice Computing Group[4] is the main agency for this area. They have recently recommended ICD 10-AM as the preferred coding system for primary care, but consider SNOMED CT will probably become the world standard. Currently, 74% of practices in Australia are computerised, and of these, 65% and 79% qualify for electronic prescribing and data connectivity payments, respectively. The GPCC national coordinator visited Harrogate HC 2000[5] and was able to compare Australian and United Kingdom practice. He reports

> *"My overall view is that while we are still seeking answers for many fundamental questions in GP computing, we are well ahead in so far as we are asking the right questions. The trip did not bring to light any major flaws in the Australian approach, except perhaps that the level of funding provided in Australia appears to be very small relative to the UK. Australia may be well placed to "export" its efforts in GP computing in coming years."*

National Level Strategies

Professor Richard Smallwood, Chair of National Health Information Management Advisory Council, states in his foreword to the health information action plan for Australia of November 1999:

"**Health Online** is a landmark in information management for Australia. It places information at the heart of the health system. It aims to improve information flow, promote continuity of care, support clinical decision-making and empower consumers and communities. It is all about building a more efficient and effective health care system for this country through improved quality of care and patient safety".

This document of 114 pages, gives an excellent overview of the important directions in which information technologies related to health care may move in the future, with a proposed 5 year time frame for the activities proposed. It is somewhat repetitive and overly verbose. Unfortunately, the summary provided on the website does not correct these failings. However, it remains a foundation document, which requires careful review. NHIMAC is tasked to advise the Australian Health Ministers and Health Ministers' Advisory Council in the field of medical informatics. It has relationships with the Ministerial Council for the Information Economy, the Online Council, Standards Australia, the Privacy Commissioner, and the National Health Information Management Group and the Attorney General.

NHIMAC Relationships
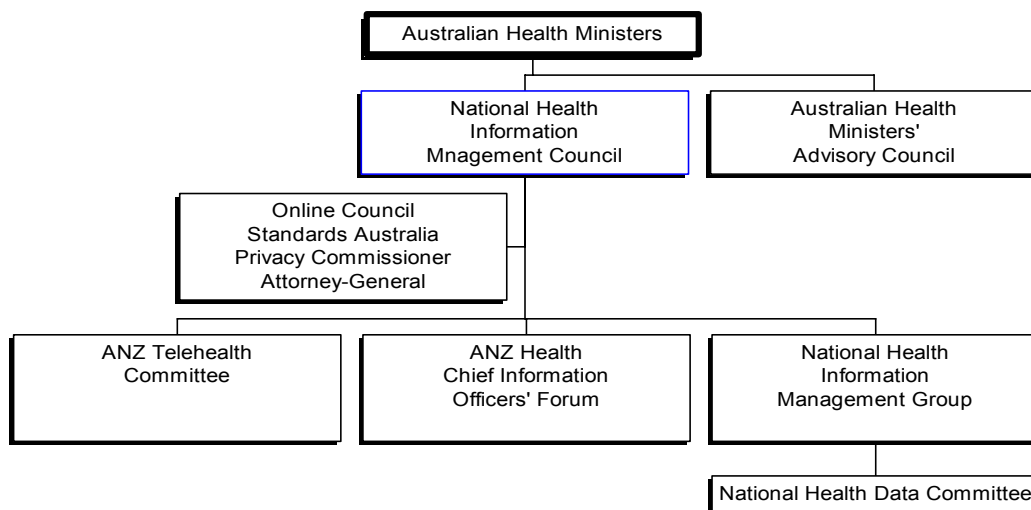
Part one, Vision and Direction, is most at fault for the deficiencies mentioned. Important points raised however are the mission for Health Online: *"To improve the delivery of health care and achieve better quality of care and health outcomes through effective and innovative use of health information."* It states that common standards are required, as seen in the banking industry, both nationally and internationally.

Part two describes measures to achieve national collaboration. Australia must avoid repeating the experience of the railway network in the late 19th century, when States developed multiple railway gauges. It has taken a further century and many changes of bogies at State boundaries, to overcome that lack of foresight and cooperation. An international perspective is also essential, although not emphasised. Coordinating future systems to create integrated networks remains the council's primary task, in my opinion.

Part three is concerned with the building blocks, which must be in place to allow a coherent and successful implementation of the strategies, which are described later in the document. Privacy and legal issues are dealt with well, and based on principles described by the National Principles for the Fair Handling of Personal Information document. The

Privacy Amendment (Private Sector) Bill 1999 has been passed to the Senate this month following it's passage through the lower house. A public key infrastructure is planned. Patient identification is planned to be by a personal health identifier, but concerns about the sensitivity of this matter are raised. This, I think, stems from the failure of the Hawke government in 1984 to introduce the "Australia Card", which was poorly handled and roundly condemned as an infringement of privacy. A set of standards, both for data, (definitional and related) and information technology are proposed. This work is fundamental and much work is currently underway. Proposals for a set of workable incentives to increase the take up of information technology by providers are discussed. They are very basic and require work. Reports into general practice attitudes have been completed[6], but little attention has been paid to hospital providers. Training is dealt with very superficially, both for the general provider and the health informatician. I know of only three Medical Informatics centers in Australia (Monash, Sydney and Queensland), and of these only Monash offers a postgraduate certificate and diploma course[7] (which incidentally is considerably cheaper than this one!). Finally, research proposals are to establish a center for excellence for informatics, and a Clearing House for research projects to avoid duplication, possibly along the guidelines developed by the Australian and New Zealand Telehealth Committee.

Part four discusses improving the consumer's access to health information. The Taskforce on Quality in Australian Healthcare[8], which was generally critical of hospital practice and gained wide media coverage, has stimulated this area. It represents Australia's "Bristol Royal Infirmary Inquiry" for the effects on public confidence in the health system. The taskforce recommended improving access for the consumer to health information in all areas. The Health*Insite*[9] has been developed and is established. My inspection of my area of interest found it to be shallow and unattractive. I think that such a site will quickly be overshadowed by the WHO .health endorsement system. However, it does represent a foundation for development for further accreditation of health websites. The National Health and Medical Research Council are preparing guidelines for consumer information also.

Part five is concerned with supporting clinical care. It primarily discusses the national framework required for the electronic health record (E.H.R.). A structure is proposed, where the community health, general practitioner, hospital and "other practitioner" records transmit summary information to a central record. A taskforce is established to investigate the establishment of such a system, and has reported to the health ministers in August 2000[10]. This large report (the summary is 22 pages long) has recommended a national rather than state based approach, the establishment of a health information network for Australia (HINA), and covers again much of the area reported above re privacy. Coding dictionaries are to be built, and XML and HL7 used as the messaging standard. An initial limited roll out is planned for June 2002, with initial features including provider communication, pathology reports and prescription. Education of the public and providers is emphasised prior to announcements by the health ministers about the project, which I feel is crucial to the proposal. It appears that the taskforce has expanded its remit from the E.H.R. to cover a much larger area! Finally, telehealth is discussed; an area where Australia, due to the geographical and demographics reasons

discussed has a world lead. In 1996, the Australian New Zealand Telehealth Committee was established[11] and is now a subcommittee of NHIMAC. They held a thinktank in Melbourne July 2000. The report generated was lacking in focused, specific recommendations that they admit in their conclusion:

>*"A common theme in discussions at the Think Tank was the lack of current knowledge on which to plan future directions for telehealth. First steps for furthering most identified themes would involve collating existing knowledge and using it to inform vital areas such as the research agenda, options for funding, establishing the benefits of telehealth, and raising provider and consumer awareness and acceptance of health services delivered using telehealth.*
>*Other important outcomes from the day were:*
>
>> *1. the need to strengthen the consumer focus of future telehealth development, with the ANZ Telehealth Committee or the body that replaces it having adequate consumer representation and a strong advocacy role; and*
>>
>> *2. the need to systematically integrate telehealth into e-health and the broader national health reform and health IT agendas, while maintaining a focus on evaluation, funding options and standards for existing and future telehealth programs."*

Efficiency and effectiveness of the health system is the subject of section 6. The two key areas are electronic commerce and aggregation of health data for strategic purposes. In the first area, the PeCC project (Project Electronic Commerce and Communication) has made some progress since 1996, but a new project is proposed to build on this work. PeCC was initially held to be capable of generating up to A$340 million savings per year for hospitals alone. However, by 1999 the venture had attracted only 50 suppliers online, along with the five original manufactures[12]. Only one-fifth of the pharmaceutical industry was involved four years into the project. Invoicing trust by big business of smaller enterprises is a major stumbling block, and collaboration between competitors is required, but not readily forthcoming. The impetus is supported by the purchaser, but resisted by the supplier, despite advantages for both.

Attempts to increase the use of electronic transaction for the pharmaceutical benefits scheme and Medicare billing are outlined, but proposals generally are woolly and not specific. There are many bureaucratic rules to be overcome.

Finally, in this section, an area of great interest to myself is the development of aggregation of health data for research, planning and policy purposes. As stated in section A, Western Australia has already demonstrated many examples of long term follow up by merging data sets, and the document proposes a similar system for the nation with a National Administrative/Clinical Dataset, derived from the E.H.R.

The appendix section lists the projects and timescales discussed in the document, and also the projects currently underway, which are too numerous to discuss individually. The state of Queensland appears to be the most active in the field.

The National Health Information Management Group, not to be outdone by the NHIMAC, have produced a vision report also, published in October 2000[13]. From reading between the lines, this body, which was established in 1993, appears to be piqued at the NHIMAC, and make little reference to them. Their organisational diagram shows an equal relationship with that body, unlike the NHIMAC one, which shows them as subservient. The document is incomplete, and appears hurriedly prepared, and adds little to the document discussed above. I hope that such potential turf battles would be avoided.

In the public sector, outsourcing of information technologies is a current major thrust. A\$4 billion is currently spent by all government agencies. The Australian tax office recently underwent such a change, with the loss of 383 IT staff. No mention of such changes is made in the above documents, although I suspect that health care is a likely next candidate. Indeed, The Australian newspaper reported on October 16th, 2000 that IBM GSA's health group were tendering to the government. It seems that such a change could have major implications for many of the above proposals.

Regional Level Strategies

In Western Australia, due to political pressure applied predominantly through the local branch of the Australian Medical Association, the current centralised Metropolitan Health Board will be replaced with 4 regional management structures. This is the third major change in health care administration that has occurred in the 9 years that I have worked here. Despite such disruption to medium and long-term planning, several projects are proceeding. The most important of these is the InfoHEALTH alliance, a collaborative partnership in health information between the WA Health Department and a consortium of information technology and management organisations led by DMR Australia. The contract was signed on 6 June 2000 and has an allocated budget for 3 years of A\$38 million. Despite this appearing a large sum, this budget is almost fully committed to maintenance and support of the current infrastructure, and innovation will have to seek funds from the very competitive Capital Works Programme. This is has potential for conflict, as capital works are already under funded in the eyes of the public, and further pressure on these funds is, in my opinion, a mistake. Major innovation and expansion appears unlikely, unless the commercial partners can affect significant savings from the recurrent funding. Stakeholders are to work in a culture of "trust, openness, quality, recognition of strengths and weaknesses and non-adversarial relationships". A\$2.6 million is assigned for upgrades offering "Improved application functionality", A\$1 million for infrastructure upgrades and A\$1.5 million for further deployment of the systems mentioned in the introduction. Local operations at hospitals remain under the management of the Stakeholders, and this will again prove problematical. I cannot see how major improvements can be made without access to the "coal face". If the alliance demonstrates it is efficient and effective, then this position will be reviewed, but I still