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Implementing an Electronic Medical Record System

successes, failures, lessons

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Foreword By Jos Aarts

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Foreword

Books about the implementation of information systems in health care organizations are rare. Tim Scott and his colleagues have written such a rare book. It is easy to write a report about the failure of a technology and identify culprits. In terms of such a report the implementation of the information system that the author describes is a failure. It never got to work in the medical work practices that it was supposed to support. But Dr. Scott and his co-authors refrain from identifying culprits. They even posit that the failed implementation was a success because it prepared the organization for how to deal with the introduction of new technologies that are so pervasive. In their view essential to the success of an implementation is the degree of organizational learning that occurs.

Dr. Scott and his colleagues carefully researched and documented the history of the implementation of an electronic medical record system in a US health maintenance organization. They have spent enough time to become sensitive to its specific organizational and cultural context and yet remained careful observers enabling them to describe and analyze their findings.

Their observations and findings are important for both researchers and practitioners. They do not offer a cookbook on how to implement a clinical information system successfully. Rather they let the facts speak for themselves and leave room for the reader to make her own conclusions. Yet, the authors present interesting conclusions and challenge accepted wisdom. For example, IT makes the invisible visible and they show how the introduction of the electronic medical record made visible the informally accepted scope of practice of nurses and medical assistants and how formal procedures had to be established to align the scope with legal regulations and still make medical work doable. They show that "one size fits all" does not work, because different medical specialties have different ways of dealing with patients and that across the organization even the same medical specialties deal differently with patients depending on their backgrounds and local customs. No one questions the need for proper training when introducing IT, but Dr. Scott and colleagues raise the question whether training should be focused on how to use a system or how to practise medicine better with the new IT tools. This observation highlights a very important aspect of this book: the awareness that the implementation of clinical IT should not just support existing practices but should play a crucial role in the discussion of how to make medical practice better. The fact that the increased workload of using the electronic medical record redefined the necessity of seeing all patients in the office is a case in point. The authors challenge the accepted wisdom that emphasizes the need for organizational leadership to implement IT. They argue that leadership could very well emerge from a largely unconscious response to events, which in hindsight could be labeled as such. Their carefully documented case shows how many events unfolded unexpectedly and required the actors to improvise their

responses in a way that Claudio Ciborra calls 'bricolage'*, a response that helped them to appropriate a system and is still innovative. I think Dr. Scott and his co-authors are right when they doubt whether a checklist of technical and organizational variables is useful to assess how IT as an innovation will affect an organization.

I recommend this book to everyone who wants to make a serious study of the implementation of IT in complex organizations, not only in the healthcare field but also in the wider community of information systems.

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September 2006

*Ciborra C (2002) The labyrinths of information, challenging the wisdom of systems. Oxford, Oxford University Press

Preface

Ethnography is bound up with travelling, both literally and metaphorically. Travelling to foreign lands has always been both an adventure and a metaphor for adventure – no one can predict what will befall the traveller – it is an inherently unpredictable activity. Few, perhaps, are lucky enough to combine research and travel in such pleasant lands as northern California and Hawaii. But the reader should not be fooled by the exoticness of the setting, nor the workday character of the intervention studied. The wider applicability of the lessons related here is inherently and insolubly problematic, research findings are rarely automatically transferable to different settings. But the successes, failures and lessons do contain important information for health systems planning to introduce new information technology to improve healthcare.

There is, after all, a constant urge to illuminate one's own experience in the light of the experiences of others. This is doubtless one reason why biographies and autobiographies are fascinating. We gain a certain distance between self as observer and self as subject. There is a constant tension between the will to go forth and discover what is strange and unfamiliar for its own sake, and for what it can reveal about ourselves and our culture – which for many of us is so familiar as to seem not to exist. In this double process we begin to see the other in our terms and hopefully ourselves in the others' terms. But whether we can ever see ourselves in our own terms, or the other in the other's terms is yet to be demonstrated as far as we are aware.

Innovation is like travelling in negative. Instead of the familiar entering the foreign system, innovation is the foreign entering the familiar system, like receiving a stranger in one's midst, or a virus into one's body – the traveller as other. The stranger is another constant in literature as in our life world. How does one deal with the stranger, who is always abnormal and disturbing? One begins to see how impossibly complex innovation research can be: an investigator proceeds to study the foreign inserted into the familiar setting, but a familiar setting not necessarily his own. In other words: a foreigner studying a foreign intervention into a foreign familiar. Then one recalls that every study is an intervention in itself. Paradox piled upon paradox.

One can only begin, therefore, at the beginning. One can only write narrative. We heard that a certain process had occurred. We went to see for ourselves, and ask the local people what they had seen. We made some notes and came home to write an account. That is all.

In this case the notes made were recordings of conversations. To the ethnographer a conversation is more than a data collection exercise – it is a beautiful event; an inexhaustible signifier which no writing can truly measure up to or account for. One recalls all such conversations with a poignant mixture of pleasure and regret. One usually sees the best of people in these hours: thoughtful, candid, sympathetic, reflective, articulate, passionate. The research interview is

often and for both individuals a time-out from the urgent, oppressive and conflicting demands of their workaday lives. It is even sometimes therapeutic; an unintended consequence of the conscious mind reviewing events and restoring them in a slightly better order. This is the fundamental human faculty of organisation at work. This account draws on such conversations liberally, reproducing many excerpts. So far as possible, therefore, this book is an account of how Hawaii Kaiser Permanente tried to implement a clinical information system in the participants' own words. As a piece of ethnography it is inevitably partial and may contain biases that we are not aware of. Whatever they are, they are ultimately ours and no one else's.

In Hawaii, the birthplace of surfing, there is a certain phrase – 'Catching a wave' – innovations like electronic information and communication technologies occur in waves not dissimilar to the constant swells running across the surface layers of the Pacific Ocean, rearing up as waves on reaching Hawaii's reefs, and breaking onto its many beaches. The career of CIS in Hawaii is the wave, Hawaii Kaiser Permanente the reef, and the doctors, nurses, administrators and others surfers immersed in the swell off their particular local beaches, waiting to catch the wave. 'It was,' as one respondent commented wryly, 'a wild ride'.

Tim Scott
Thomas G Rundall
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September 2006

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Finally, to Lesline, Kanani, Kathryn, Max, Noe and Brent in Waimanalo, Oahu, who showed us the wider meaning of catching a wave: *Mahalo Nui Loa!*

Chapter 1

Introduction

The international context

Healthcare delivery systems in some countries such, as the USA, UK, Sweden and Hong Kong, have made limited progress with the use of electronic medical records (EMRs). EMRs are also being developed for the Canadian and Australian health systems. However, none of the existing or planned EMRs has the scale envisaged for the EMR currently being implemented by the UK National Health Service.[17,30,59] The NHS National Programme for Information Technology (NPfIT), is currently budgeted at over £6 billion and projected to cost in excess of £20 billion over the next 10 years. It is therefore one of the most expensive civilian programs of any kind to be mounted anywhere. It features a national electronic medical record and integrated functions including documentation, care management, ordering, messaging, analysis and reporting, access to knowledge resources and patient website access. Whilst national and local service provider contracts have been awarded, the task of implementation is still nascent. The risk of failure remains high due to the undeveloped state of the technology and the organisational challenges involved in implementation. The NHS 'has had its share of failed health information systems, wasted millions and disciplinary hearings'.[4,47,55] Other large, integrated healthcare organisations, like Kaiser Permanente, may provide useful insights to help the NHS achieve higher levels of adoption, acceptance and use.

Despite frequent calls in the US for greater use of EMRs,[33,34,36] adoption of such technology has been limited.[53,54] Few large systems have introduced or evaluated an EMR, partly due to the difficulty of the task and the lack of clear 'best practices' for implementation. Most of what is known about the implementation of EMRs comes from five benchmark institutions: the Regenstrief Institute; Brigham and Women's Hospital/Partners Health Care; the Department of Veterans Affairs; LDS Hospital/Intermountain Health Care; and Kaiser Permanente. Based on the experience of these institutions, it is clear that adopting new IT is a major challenge in healthcare organisations.[15] Success appears to be determined more by organisational than technical factors, though research to date is just beginning to identify specific organisational factors that facilitate or impede EMR implementation.[1,41,61] Another reason for the slow uptake is a lack of convincing evidence that EMR adoption improves either the quality or efficiency of care. Though some studies have found positive evidence of the benefits of EMRs on care processes and health and financial outcomes,[17] others have found disappointingly small or no effects on quality or costs.[24,39,47] Healthcare systems already facing significant financial constraints have tended to avoid the high

costs and uncertain returns of implementing an EMR.[20,21] And such projects face complex organisational challenges to integrate the new technology into workflows and redesign care processes to harness its potential.[11,54]

Research context

There are seven main reasons why a new, IT-based medical care paradigm is emerging:

1 A paper-based system to support clinical care is increasingly non-viable.
2 Human memory-based medicine is increasingly unreliable.
3 Clinical data capture has become a business imperative.
4 Consumer expectations for improved care and service are rising.[61]
5 The prevalence of chronic diseases is steadily rising, requiring closer monitoring of patients and greater coordination of care.
6 Public and private sector payers are demanding more accountability from providers for the cost of care, quality of care, and patient outcomes.
7 New technologies make it possible to evaluate and intervene to improve care in ways not heretofore possible.

These points encapsulate a number of important trends witnessed over the past 50 years. Evidence-based medicine (EBM) is supplanting traditional and parochial clinical training and practice. Diagnostic and treatment decisions are increasingly based on the results of clinical trials interpreted in a community medicine context. A parallel development is the increasing demand for epidemiologists to apply statistical methods to study health and illness at the population level to guide healthcare and other agencies. To help to disseminate the exponential growth in medical knowledge, many professional biomedical journals are now published on the Internet, improving accessibility for computer-literate clinicians and consumers. But it has become virtually impossible for clinicians to read and retain all the knowledge available even in their own fields. A new approach to processing information is therefore needed to facilitate access to relevant information for effective and efficient care management at the point of care. Such systems need to help clinicians discriminate between 'signal' and 'noise'. As multiple specialties may be involved in caring for individual patients, it is also likely that the clinical team rather than the individual clinician will be involved in information processing, decision making and other aspects of care management.

Though IT innovations have the potential to improve healthcare quality, integration and efficiency,[7,33,34] they require large capital investments in an industry with significant financial constraints. A clearer understanding of the value of these innovations is essential to inform diffusion of information technology in the current healthcare environment. Understanding how providers actually use each functional component of the systems and which components create value are crucial issues not adequately answered by the literature.[31,34] This type of information may also be crucial to improvements in other critical areas such as patient safety and overall care for vulnerable populations, including patients with chronic disease or members of underserved ethnic groups.

In 1991 the Institute of Medicine (IOM) recognised the potential of a computer-

based record to support evidence-based care, quality improvement and evaluation; and called for the computer-based patient record to become a standard health technology by 2001.[33] Since 1991 further reports have described serious concerns about healthcare delivery, including a high incidence of preventable errors, disparities in care delivery between different ethnic groups, and a need to redesign systems and infrastructure to achieve quality improvements.[5,9,19,21,41,67] In *Crossing the Quality Chasm*, the IOM specifically targeted information technology as a key agent for change, an enabling structural innovation:

> *The committee believes IT must play a central role in the redesign of the healthcare system if substantial improvement in healthcare quality is to be achieved during the coming decade…the importance of a strong information infrastructure in supporting efforts to reengineer care processes…coordinate patient care across clinicians and settings and overtime, support multidisciplinary team functioning, and facilitate performance and outcome measurement for improvement and accountability.*[34]

Designing and implementing an electronic medical record presents social as well as technical and financial challenges. It has been estimated, albeit loosely, that the IT innovation challenge is 20% technological and 80% sociological. Implied changes are far-reaching in terms of revised roles, status, responsibilities and relationships, which all need to be seen as part of a qualitative shift from a closed system model of healthcare, where decisions are traditionally informed by the individual expertise of clinicians, to a more open model, where decision making is informed by a number of sources both inside and outside the consulting room. These are likely to include a clinical team as opposed to a sole provider, the patient and significant others, the health record, alerts, evidence of trials and meta-analyses, and data accessed via the Internet. A well-designed EMR could be the hub of this information, supporting safer, more effective and efficient care management, but only if clinicians are ready and able to integrate it into different models of care and clinical practice. One aim of this book is to reflect on cultural influences on the implementation of an EMR in Hawaii Kaiser Permanente.

Potential benefits of EMR and evidence

Electronic medical record or EMR is a generic term for integrated, computer-based, health information systems, accessible at the point of care. A typical EMR will be multifunctional, including an electronic patient health record updated in real time by information inputted at any workstation or other interface connected to a secure network. An EMR also has information management tools to provide clinical reminders and alerts, review lab results, link with knowledge sources for healthcare decision making, and analysis of aggregate data. An EMR extends the usefulness of patient data by the application of information management tools.[78] Typical electronic medical records include some or all of the components in Table 1.1.

The potential benefits of EMRs correspond to the type and number of functions they can perform. However, there have been relatively few studies of the benefits of IT innovations in healthcare of *any* kind. Most of the tangible evidence on IT relates to computer decision support systems (CDSS). Hunt *et al*.

Table 1.1. Components of electronic medical records

Function/Application	*Description*
Practitioner order entry: • laboratory management • pharmacy management • diagnostic imaging management • referral management • decision support • alerts	To support ordering laboratory tests, drug prescribing, diagnostic imaging or consult requests. Decision support and alerts are typically integrated into order entry capabilities.
Electronic patient record	Integrated storage and presentation of patient information.
Document management	To allow clinicians to record, in code or text, the actions they have taken in diagnosing, managing and treating a patient. This could include physician and nursing progress notes and the medication administration record.
Clinical decision support	Alerts based on current data from the electronic medical record, evidence-based practice guidelines, or more complex artificial intelligence systems for diagnostic support provided at the time the clinician is formulating an assessment of the patient's condition and making ordering decisions.
Administrative data	Access to administrative data such as admission, discharge and transfer records, surgery schedules, demographic data, room assignments, etc.
Integrated communication support	Tools that facilitate effective and efficient communication among team members (including the patient) to support continuity of care among multiple providers.
Access to knowledge resources	Online information, including reference materials, journal articles, guidelines, etc., at the time decisions are being made regarding patient care.

Adapted from Raymond and Dold.[61]

reviewed 68 controlled trials of CDSS and found that drug dosing support and preventative care support both appear to have demonstrable benefits, whereas there is little evidence for diagnostic decision support.[31] The review found a dearth of studies that measured effects on patient outcomes, and instead focused on intermediate factors such as potential medication errors. Most studies were of inpatient settings and did not include outpatient care.

Bates *et al*. assessed the introduction of a computer order entry system for inpatient medication to improve communication between physicians, pharmacists, and nurses.[8] The intervention permitted closer integration of clinical

services between providers, and simplified the clinical processes, e.g. elimination of a medication order transcriber. The study also found a significant decrease in serious medication errors (55%), and a decrease in transcription errors (84%). In a similar study, Evans *et al*. evaluated a computerised antibiotic management program.[20] At post-test, significant decreases in potential errors were found, e.g. allergic contraindications, excess dosages, excessive drug exposure time, adverse events associated with medications, and higher quality of care, e.g. better antibiotic-susceptibility matching. In a study of a computer reminder system, Demarkis *et al*. assessed the use of IT to increase the coherence and uniformity of care across multiple primary care providers.[16] The study found that computer reminders increased adherence with clinical recommendations, but that the adherence rate decreased to the baseline rate within one year.

Robinson reviewed the state of communication studies and described the findings of the Science Panel on Interactive Communication and Health (SciPICH), convened by the Office of Disease Prevention and Health Promotion of the US Department of Health and Human Services.[62] The panel concluded that although interactive health communication has great potential to improve patient learning and health communication, there are also significant potential harms associated with misinformation. However, the panel found few studies that had rigorously evaluated patient communication applications.

In addition to improving the quality of healthcare, IT has significant potential to measure performance. Tracking performance is essential to support continuous quality improvement, and permits more sophisticated purchasing and managerial decisions. However, there is a dearth of empirical data in this area. Measures of physician productivity are crude, e.g. numbers of patients seen per hour, and there have been few studies of the productivity of nursing, pharmacy or ancillary staff. There is also a dearth of studies of the timeliness of care, or the impact of EMRs on decreasing time lapse to diagnosis or effective treatment.

EMRs and chronic disease management

Two recent IOM reports identify the burden of chronic disease on patients and health systems as a US national priority for action.[35,36] Approximately 45% of people living in the United States have some type of chronic illness,[60] including asthma, diabetes, hypertension and ischaemic heart disease, stroke, depression and other severe mental illnesses.[35] Specifically, four chronic conditions affect nearly half of Americans. Asthma, depression and diabetes each affect about 15 million,[12,56,58] while five million have congestive heart failure.[38] In 1999 these four chronic diseases were directly responsible for 140 000 deaths in the United States,[29] and generated at least $173 billion in medical and other costs.[38,57,75,82] Although the effectiveness of care for patients with these and other major chronic illnesses has been improved by the use of guidelines, disease management techniques, case management and patient education,[81] many patients are not benefiting from these advances. Recent studies indicate that fewer than half of US patients with asthma, depression and diabetes receive appropriate treatment.[14,45,84] Organisational characteristics of physician practices associated with effective chronic disease care include the use of patient care teams, supportive information systems and a high volume of patients.[34]

In a US national survey of physician organisations and the management of chronic illness, Rundall *et al*. assessed the extent to which chronic care management processes (CMP) and EMRs were used to care for patients with asthma, congestive heart failure, depression and diabetes in nine large, multidisciplinary practices with national reputations for delivering high quality care (number of physicians = 147 to 2449).[65] The study also identified barriers and facilitators in these organisations that affected their ability to implement CMPs and EMRs. The care management processes studied included practice guidelines, population disease management, case management and health promotion. Information was collected on each medical group's use of seven selected functions of an EMR that support chronic disease care management: electronic patient record, recording of health history, recording of tests and procedures, recording of diagnosis and treatment, computerised entry of drug prescriptions, automated reminders and electronic exchange of information with patients. The study found that:

- 50% of physician organisations used 4 or fewer out of a possible 16 CMPs
- external incentives and information technology were the most strongly associated predictors of CMP use
- 33% of physician organisations reported no external incentives, and 50% no clinical IT capability
- external incentives and EMR technology have the potential to increase CMP use and, thereby, quality of care
- institutional facilitators and barriers to improving quality of chronic care management exist.

The study also found that use of EMR functions varied greatly among the medical groups and no group used all seven functions. The eight groups with some EMR capability used between four and six of the functions. In addition, the study found a wide variation in awareness/implementation of CMPs across chronic diseases, especially in depression. Wide variation was also found in IT capability, with only two out of fourteen sites having high levels of IT capability, of which only one (Kaiser Permanente) regarded the use of two or more CMPs as normal practice. IT capability was found to be one of the key facilitators and barriers to CMP implementation, along with good leadership, a culture valuing quality, physician champions of CMP and capitation (financial risk to provider). The relative importance of facilitators and barriers remains unclear. Hence, there is a need to examine the influence of facilitators and barriers to IT implementation and their effects on clinical care redesign in more detail.

Hawaii Kaiser Permanente

Hawaii Kaiser Permanente is one of eight regions served by Kaiser Permanente – the largest not-for-profit, integrated healthcare delivery system in the United States. Headquartered in Oakland, California, Kaiser Permanente serves over 8 million members across the US. The same general organisational model is used in each region. Doctors join regional exclusive partnerships or professional corporations that contract with the Kaiser Foundation Health Plan and assume full responsibility for providing and arranging necessary medical care for members.

Kaiser Permanente's integrated system provides all healthcare needs for adults and children, including preventative, routine, specialty, emergency, and inpatient care, ancillary testing, pharmacy, rehabilitative services, and home care.

Hawaii Kaiser Permanente has 26 primary healthcare teams in 15 clinics, and one hospital. The health system serves 234 000 members across the three largest islands in the state. The primary care teams include physicians trained in internal medicine and family practice. The healthcare providers are salaried employees of the physician professional corporation; members primarily have prepaid health benefits, i.e. fully capitated care. Nine Kaiser Permanente clinics and a hospital are located on the island of Oahu.

Since the late 1990s Kaiser Permanente has sought to create a system-wide EMR. Prior to EMR implementation in Hawaii, the health system had implemented two other comprehensive EMR systems in other regions. One system was based on a vendor-created, commercially available system. The other EMR was jointly developed between Kaiser Permanente and IBM. Hawaii's EMR was the second-generation version of the jointly developed system. The commercially produced EMR system was adopted five years earlier by Kaiser Permanente in the Northwest region (Oregon and Washington states), where it worked well. The health system experienced a change in its senior leadership. The new chief executive officer (CEO) was previously CEO of another US health system, which recently had successfully implemented the same clinical information system used by Kaiser Permanente in the Northwest.

EMR implementation was halted in Hawaii because of delays in delivering promised capacities and other problems. Hawaii Kaiser Permanente's EMR project provides an opportunity to examine the process of EMR implementation in one region of a large system and to analyse organisational factors relevant to EMR implementation.[1,23,46,48,49,77]

A History of Kaiser Permanente

In this section we present a brief history of the Kaiser Permanente medical care program, including the establishment of its Hawaii region. We have relied mainly on John G Smillie's authoritative history of the Permanente Medical Group.[72] Smillie was a Permanente physician who eventually became physician-in-chief, then assistant to the executive director.

The rise and fall of the Clinical Information System (CIS) in the Hawaii region needs to be seen in context of the Kaiser Permanente medical care program. That national program in turn has to be set in context of the history of American medicine.[76] In briefest terms, there is no comprehensive national health service in the USA. Most working Americans and their dependants are insured against ill health as an employment benefit. Others may insure their health privately with insurance companies or health plans, or even pay healthcare providers directly for their services. Persons aged 65 and older are covered by the federal Medicare health insurance program, and very low income individuals and families are eligible for health insurance benefits under Medicaid, a joint federal-state funded program. A patchwork of many other specialty health insurance programs, funded at the federal, state, and local levels – especially for children – has emerged over the past 50 years, but still many Americans fall through the

cracks of these programs. It has been estimated that about 45 million people in the USA were uninsured and 16 million people aged 19–64 underinsured in 2003 (35% or 61 million in total).[66] While it is possible for an uninsured person to receive care from a private clinic or hospital as a charity patient, most uninsured people receive their medical care from county or city funded public hospitals and clinics.

It is well known that underinsured adults are more likely to delay or forgo needed care than those with adequate coverage. Obtaining healthcare in America is a serious business, not only because it has a strongly commercial character, but also because the 'system' is so fragmented. The process of registering with a physician or physicians, obtaining specific treatments from variable formularies, claiming for healthcare costs or paying for tests and treatments, can all be very complicated, frustrating and ruinously expensive. Moreover, in such a fragmented, largely private, fee-based medical care system, built upon the model of the independent physician working in solo practice, the creation of Kaiser Permanente, a new model of integrated medical care based upon prepaid group practice, was strongly opposed by traditional medical, hospital, and insurance interests. In this sense, from its very origins Kaiser Permanente has been an innovative medical institution, willing to adopt new structures, processes and technology in order to establish its niche in the American healthcare marketplace and promote its reputation as a high quality healthcare system. Kaiser Permanente's involvement with health information technology over the past several decades should be apprehended in this context.

The history of the Kaiser Permanente medical care program is surrounded by water. It was founded and developed at the construction sites of dams, aqueducts and ships; it was intimately involved in the stupendous economic development of California before, during and after World War II into an economy today estimated to be between the fifth and seventh largest in the world. It was through major construction projects to pipe water to the city of Los Angeles, the operation of ports along the US western seaboard, the Allies' dire need for ships during World War II, and the rapid postwar economic expansion of industrial communities and their healthcare needs that Kaiser Permanente emerged to become the largest privately owned health system in the USA. This history has been deeply influenced by two individuals: Sidney Garfield, MD and Henry J Kaiser.

Mojave Desert: 1933–1938

In 1933 Sidney Garfield completed his training in general surgery at Los Angeles County Hospital. He was 27 and intended to establish himself in a typical fee-for-service practice in Los Angeles. But 1933 was the worst year of the Depression and such opportunities were scarce. The ethos of medical practice in Los Angeles in which Garfield and his colleagues were educated characterised the American response to the Depression years. 'Under assault of economic hardship, the social dimension of American experience was asserting itself against an already established philosophy of individualism. These doctors were learning not only from each other and from the team at the Los Angeles County, but also from the philosophy of social responsibility that animated a great public hospital at a time of great economic stress.'[72] Garfield and his peers recognised the exceptional

character of the times and fully expected to enter solo fee-for-service practice careers when the economy recovered. But their experience of group based practice at LA County helped to set a different course.

Unable to open a solo surgical practice, Garfield sought a salaried post. He learned from another Los Angeles County graduate, Gene Morris, that the Metropolitan Water District of Los Angeles was looking for a physician to staff a small medical unit at Indio on the edge of the Mojave Desert, 140 miles east of Los Angeles. The Water District was building an aqueduct from the Colorado River to Los Angeles. Garfield was offered the job but declined as he felt the $125 a month salary to be too low. Garfield and Morris decided instead to build their own small hospital at Desert Center, 60 miles east of Indio. There they would offer fee-for-service industrial medical care for on-the-job injuries and illnesses. They would also offer fee-for-service non-industrial medicine to individuals. Contractors and insurance companies said they would support the project.

Assuming an overall debt of $50 000 to get Contractors General Hospital into operation, Garfield and Morris banked on treating a high volume of insured, on-the-job injuries. They were not short of patients, who presented the full range of conditions, from fractures and infections to heart attacks and snake bites. High numbers of patients with off-the-job health problems also presented themselves, including prostitutes and their clients with syphilis and gonorrhoea. Venereal disease was considered a non-industrial illness and not covered by insurance. Earning 50 cents an hour, few individuals could pay for treatment. As there was no county hospital Garfield felt obliged to admit them, hoping that his income from indemnified injuries would tide him over. The insurance companies, however, disputed and discounted his fees, claiming overtreatment. Within seven months of opening, Contractors General Hospital faced bankruptcy.

Fortunately, the prospect of losing the CGH concentrated the minds of the contractors and insurers. The largest insurance company involved in the construction project was San Francisco-based Industrial Indemnity Exchange, established in 1921 by a group of contractors including Henry J Kaiser. Harold Hatch, chief strategist for IIE, proposed a novel method of financing medical care at CGH, by prepayment. He offered to pay 12.5% of the workers compensation insurance premium to Garfield to care for insured workers. Another 12.5% would be used to cover the costs of transferring patients to Los Angeles. The figure of 12.5% was equivalent to $1.50 per worker per month or a nickel (five cents) a day. (We can only speculate what IIE did with the remaining 75% of the workers' premiums.)

The employers also offered a voluntary pay deduction of another nickel a day for non-industrial coverage. Hence the cost to each worker for prepaid comprehensive coverage was a dime a day. With 5000 workers covered by this plan, $500 a day would be generated in prepayment to GCH. Garfield accepted the deal and CGH was back in business.

Contractors General Hospital was not the first prepayment model plan in America.[72] Paul Starr notes several previous examples, including the Boston Dispensary in 1790 and similar schemes in New York, Philadelphia and elsewhere.[76] The Marine Hospital Service offered comprehensive medical coverage to the American Merchant Marine. In 1868 the Central Pacific Railroad offered comprehensive medical care to its employees. In 1891 the consolidated Edison Company of New York established a prepaid medical care program for its workers. In the

early 1900s the Endicotte-Johnson Company, a shoe manufacturer in Johnson City New York, and the Standard Oil Company of Baton Rouge, Louisiana established healthcare programs for their employees. In 1908 the United States enacted a workers' compensation law for federal employees. Beginning in 1910 many states also began to enact workers' compensation laws that require employers and employees to contribute to the cost of healthcare insurance for job-related injuries. In 1929 the Department of Water and Power of the City of Los Angeles contracted with the Ross-Loos Medical Group in Los Angeles for prepaid medical coverage for its 12 000 employees and 25 000 dependants. The rising cost of hospitalisation also gave rise to the so-called Blue Cross approach, first developed by Baylor University in Dallas, Texas and formally endorsed by the American Hospital Association in 1933. The Mayo Clinic founded in the 1880s in Rochester, Minnesota was an early prototype of the privately owned group practice.

However, the principles of prepayment and group practice contradicted the dominant model of solo fee-for-service practice in America and were bitterly opposed by many state and county medical societies. Prepaid group practice introduced a third party payer between physician and patient in the form of a health benefit plan. The medical societies thought that this compromised the proper physician–patient relationship, particularly in terms of the patient's free choice of physician, and the physician's professional autonomy. For this reason, the group model remained a minor development in early twentieth-century America.

Garfield faced no such opposition in the Mojave Desert as there were no competing doctors. With prepayment Garfield actually gained his autonomy. Seeing no further need to retain the 12.5% earmarked for Los Angeles Hospitals, IIE increased its contribution to Garfield from 12.5 to 17.5%. Prepayment reversed the normal economics of medicine. The economic incentive to treat liberally was replaced by an incentive to prevent the occurrence or advance of conditions. And whereas fee-for-service patients tended to delay seeking medical help, prepaid members presented early, often helping to prevent more serious outcomes.

When the aqueduct reached the Parker Dam construction site, 125 miles from Desert Centre, Garfield resolved to build another hospital at the Dam site. Parker Dam was being built by a consortium of contractors, called the Six Companies, which include the Henry J Kaiser Company. During its previous construction of the Hoover Dam, the Six Companies had supported a medical care program similar to that provided by Garfield for the Metropolitan Water District, though it excluded voluntary deductions for off-the-job illness and injury cover. Garfield offered the Six Companies a similar program to that provided for the aqueduct workers. It was accepted and Garfield built the Parker Dam Hospital. He built a third hospital at the construction site of Imperial Dam 150 miles south of Parker, part of a Six Companies construction project to irrigate the Imperial Valley in southern California. By 1938, having retained $250 000, Garfield planned to invest in the fee-for-service practice in LA that he had deferred for five years. But it was not to be.

Grand Coulee: 1938–1941

In 1938 the Henry J Kaiser Company was awarded the contract to build the

Coulee Dam in the state of Washington. Garfield was asked to establish a prepaid medical program for Kaiser employees and their dependants at the construction site. Although initially intending to decline the offer, Garfield saw its potential to develop the group model. Unlike the aqueduct project, strung out over 242 miles, the Coulee Dam project was contained on one large site. As in the Mojave Desert, Garfield and his associates believed they could achieve high levels of preventative care at Grand Coulee. Once again they noticed a reduction in the severity of conditions presented by workers and their dependants. They saw acute appendicitis instead of peritonitis, earaches instead of mastoiditis, upper respiratory infections and less pneumonia, early lumps in the breast instead of metastatic carcinoma.

World War II and the shipyards: 1942–1945

In September 1942 Great Britain stood alone against the Axis Powers and depended on shipping convoys from the United States. In that month, the British Admiralty sent a Technical Merchant Shipbuilding Commission to the United States to organise the construction of merchant ships in American shipyards. A commission to build 60 freighters was awarded to the Todd-California Shipbuilding Consortium organised by Henry J Kaiser and the Todd Shipbuilding Company of Seattle. The Consortium planned to build 30 of the freighters in Richmond on East San Francisco Bay, a few miles north of Oakland.

In December 1941, Japan bombed Pearl Harbor and the United States entered the War. The US Maritime Commission also then became a Kaiser client. Kaiser and others applied assembly line production methods, developed by Henry Ford for car assembly, to shipbuilding. Prefabricated sections travelled on railroad flatcars from throughout the United States to be put together at the shipyards. Eventually the shipyards mounted a competition to see who could build a Liberty ship quickest. Permanente Metals Corporation (Kaiser) No.2 Yard in Richmond, California won the competition. The keel for the SS Robert E. Peary was laid at 12:01 am on 8 November 1942 and 250 000 parts weighing about 14 000 000 pounds were assembled in 4 days, 15 hours and 29 minutes. She was launched on 12 November 1942. At an average cost of $1.8 million, the 'expendable' Liberty ships had to make just one trip to be considered successful.[80]

During the War, Kaiser shipyards delivered 821 Liberty ships (small freighters), 50 small aircraft carriers, 219 Victory-class cargo ships, 24 freighters of other descriptions, 45 troop transports, 87 combat transports, 45 landing ship tank vessels, 12 frigates, and 147 tankers, for a total of more than 15 million deadweight tons of shipping.* By late 1943, about 90 000 men and women worked in the Kaiser shipyards, 30 000 in Richmond. Garfield was again called upon to organise their medical care. By late 1944 he had 90 physicians and staff at three locations: the Richmond yards, the Vancouver-Portland yards on the Columbia River between Washington and Oregon, and the Kaiser steel mill in Fontana, southern California.

*These figures are from Smillie who does not quote his source. A full list of the 2751 Liberty ships along with their builders is available from the United States Maritime Marine website: www.usmm.org/libertyships.html.

In 1942 Garfield purchased and renovated the unused Fabiola Hospital at the corner of Broadway and MacArthur in Oakland. The renovated 54-bed facility was called the Permanente Foundation Hospital. *Permanente*, Spanish for permanent, was the name given by Spanish settlers to the Ria Permanente, a stream in the Los Altos Hills of Santa Clara County, south of San Francisco. In the late 1930s, Kaiser had built a cement factory on land watered by the Ria Permanente. He gave its name to the cement works, the medical foundation and several other enterprises, including the Richmond shipyards. By 1945 the Permanente Foundation Hospital had grown to 300 beds and the Richmond Field Hospital from 10 to 100 beds.

Two other prepaid group-practice programs were developing in collaboration with Kaiser Industries. One served the Kaiser shipyards on the Columbia River where it passes between Portland, Oregon and Vancouver, Washington; the other was at the Kaiser steel plant at Fontana, southern California. Although both were under the general supervision of Sidney Garfield, the influence of Ernest Saward in Portland-Oregon, and Raymond Kay in southern California, deserves greater recognition than Smillie's northern Californian perspective perhaps allows. Both men were formidable leaders whose influence extended beyond their own regions and into the whole program at key points in its development.

As in California, 'trainloads of workers began to pour into Portland in early 1942, showing the same walking pathological museum characteristics – pneumonia especially – as their Californian counterparts'.[72] Early in 1942, Edgar Kaiser, one of Henry J Kaiser's two sons and manager at the Portland-Vancouver yards, invited Garfield up to Oregon to establish a comprehensive medical care program for his workers, similar to that established at Richmond. Garfield initially wanted to locate the hospital in Portland, which had 50 000 workers, as against 40 000 in Vancouver. But the medical establishment opposed the idea. The leader of the opposition, Dr Thomas Joyce, was also Edgar Kaiser's personal physician. As Edgar Kaiser accommodated Joyce's views, Garfield was reluctantly obliged to follow. Hence the Northern Permanente Foundation Hospital was built on the Vancouver side of the river, where a combined industrial and non-industrial program was offered to shipyard workers. Portland workers were offered only industrial cover, whilst non-industrial care was provided through a plan involving all Portland physicians. The Hospital opened in June 1942 with 75 beds. It expanded continuously, peaking at 330 beds by the end of 1944.

Whereas the Permanente Medical Foundation at Richmond operated through Sidney Garfield and Associates, the Northern Permanente Foundation was incorporated in 1942 as a non-profit charitable Foundation that operated its medical care program directly. There were other notable differences between the Portland-Vancouver and northern California programs. Whereas in Richmond Garfield recruited a core of physicians, under the strong leadership of Cecil Cutting, who were committed to prepaid group practice, the Portland-Vancouver program suffered an initial lack of both these advantages. Allocation of physicians in the northwest region was controlled by the Seattle Medical Society, which imposed severe restrictions in addition to wartime scarcity. 'I had to go to them to get physicians. I would come up to Seattle and tell them I needed doctors. […] They were friendly to me. But they'd say, "This guy is no damn good. You take him. We don't care what you do with him." They gave me a couple of good men

whom they wanted to keep out of the Army because they liked them so much, and felt they wanted them to remain in the Seattle vicinity. But the majority of men they gave us were men they didn't think were worth much, 4Fs. So we had a group of men at Vancouver who really weren't interested in making our plan work. They weren't producing, and they didn't care about the utilisation of the hospital. We just couldn't make the plan pay.'[79]

To improve the situation at Portland-Oregon, Garfield and Edgar Kaiser contrived in 1943 to get Wally Neighbor released from the Army to become chief executive officer and medical director of the Northern Permanente Foundation. Neighbor, a close friend of Garfield's from his Los Angeles Country General Hospital days, took the Portland-Vancouver program in hand. This experience underlined an important lesson to Garfield: 'No matter how the principles of our plan are meant, if they don't have the physician group who have it in their hearts to make it work and who believe in prepaid practice, it won't work. This is the thing that makes me wonder about HMOs all over the country. They aren't going to work unless they get men in those operations who really believe in giving service to the people.'[79]

It happened that another prepaid group-practice program was operating in the Portland-Oregon area, serving a secret project by the DuPont Company at Hartford in central Washington state. The Hartford project was part of the Manhattan Project to build the atomic bomb. Its medical care program was directed by Ernest Saward, an internist specialising in pulmonary medicine – ideal for the high prevalence of pneumonia among the Kaiser shipyard workers. The Hartford project wound down in 1944. Saward was appointed chief of medicine in Northern Permanente in June 1945. Saward would not only lead the post-war development of the Northern Permanente Foundation program, he would also play a key role in overcoming the problems that beset the early years of the Hawaii Permanente Medical Group, as we shall see later in the section.

There was no foundation in Fontana, where Garfield initially provided medical and hospital services as sole proprietor of what was eventually named the Kaiser Fontana Hospital Association. Raymond Kay served his internship alongside Sidney Garfield and Wally Neighbor at Los Angeles County Hospital. Though Kay and Garfield stayed in touch, they did not work together again until the 1940s. It was Kay who had investigated foundation status, and proposed to Garfield that he should establish a foundation to set aside funds for capital to start a prepaid group practice in Los Angeles after the war. Garfield liked the idea and proposed it to Henry J Kaiser, who concurred. Kaiser's lawyer, Paul Marrin, initially disagreed: how, he objected, could a foundation be formed with only operational income and no capital outlay? Kaiser was not to be deterred, so Marrin took the problem to his partner Robert Bridges, a tax specialist. A few days later, the Permanente Foundation, a charitable trust, was established in Alameda County, California, with Mr and Mrs Henry J Kaiser, Edgar Kaiser, Eugene Trefethan Jr, and a number of their attorneys, acting as trustees.

Kay led the southern California program for many years. He was not afraid to argue with Henry J Kaiser over organisational as well as clinical matters. It was Kay who informed Kaiser that the medical group declined a proposal to rename themselves after him, preferring to retain Permanente in their title. Kaiser reacted petulantly to this rebuff: 'Of course, of course, I wouldn't let him (Kay)

use my name. I don't want them to use my name. I wouldn't let them use my name.' 'It is just as if we'd taken candy away from him,' Kay later recalled,[32]

> *By late 1944, 100 physicians and their support staff were caring for 200 000 workers and their dependents in northern California, the Pacific Northwest, and southern California. By the spring of 1945, as World War II drew to a close, the program's facilities consisted of the 100-bed Richmond Field Hospital, the 300-bed Permanente Hospital in Oakland, the 330-bed Northern Permanente Hospital in Clark County near Vancouver, and the 60-bed hospital in Fontana. Kaiser Permanente was already the largest civilian prepaid medical program in American history.*[72]

Yet within a few months, the shipyards were closed. The 90 000 Richmond workforce shrank to 13 000, and the medical group reduced from 75 to 12 physicians. The need for the Permanente medical program seemed to disappear with the War. Doctors left to take up fee-for-service practice. With dissolution on the agenda and many doctors having already left, the medical staff at Vancouver and northern California met. But, instead of closure, they voted to open the health plan to local communities.

Survival and reorganisation in the post-war era: 1946–1951

In September 1945 a non-profit trust called the Permanente Health Plan was established to take the program into the post-war era. Incorporation was avoided, the connotation of corporate medicine being then taboo in the medical profession. The Health Plan enrolled members and collected dues. The Permanente Foundation still owned the hospitals and carried the debts. Sidney Garfield remained sole proprietor of the medical group and ran the whole program as executive director. He leased the hospitals from the Foundation and all staff were his employees. Despite their differing legal and tax identities, Garfield effectively ran all three entities as an integrated unit. The Plan gained from California's post-war boom. There was plenty of work and most shipyard workers, having enjoyed life in sunny California, did not wish to return to their homes in the east and south.

But opposition to the Permanente Health Plan from medical organisations emerged more strongly after the War. From the perspective of traditional fee-for-service physicians, the special need for prepaid group medicine had gone with the return of hundreds of physicians from military service. In northern California the Alameda-Contra Costa Medical Society criticised the Plan, believing, mistakenly, that the Oakland and Richmond hospitals had been built at taxpayers' expense. It argued that the hospitals be turned over to Alameda County for the care of public charges. The Alameda-Contra Costa Medical Society exploited any advantage. In 1946 Henry J Kaiser started an automobile factory at Willow Run, Michigan. Among the returning veterans considered by Garfield for the post of medical director at Willow Run was Lt Col Clifford Keene, an experienced combat surgeon with extensive operating and medical experience in the Pacific. Preferring California to Michigan, Keene joined the surgical staff at Permanente Hospital, Oakland. Keene did not have a California medical licence, so Garfield appointed him temporary resident, even though Keene had finished

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