eHealth Initiatives and Health Care Integration in GP Super Clinics

A mixed methods case study

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Background

> *"Many patients, particularly those with complex needs, have either been left to navigate a complex system on their own or, even when supported by their GP, have been affected by gaps in information flows.*
>
> *A key challenge for primary health care reform is to better integrate and coordinate the range of organisations and service providers operating within primary health care, and to better link primary health care and other sectors.*
>
> *Continuity and coordination of care (will be) improved for those with chronic disease through better targeted chronic disease management programs linked to voluntary enrolment and local integration."*
>
> **National Primary Health Care Strategy (2010)**

Integrated care relies on a connected health system, (across primary, secondary, acute, aged and social care), that patients and carers can not only navigate easily, but which also promotes a better healthcare experience, avoids duplicate tests and unplanned hospitalisations (1). The challenge is to develop models of care, partnerships, funding streams, new workforce models and greater connectivity across settings of care using interoperable eHealth solutions to connect and integrate the information systems to support and sustain required integrated health care by multidisciplinary teams.

We have defined eHealth as,

> "the electronic management and/or integration of health information, through interoperable tools, to deliver safer, more efficient, better quality healthcare".

This definition is consistent with the description used by the National eHealth Transition Authority (NEHTA):

> *"*electronically connecting up the points of care so that health information can be shared securely" (2).

eHealth is one of the five key system-wide building blocks required to underpin a responsive and integrated primary health care (PHC) system for the 21st century (National Primary Health Care (PHC) Strategy (3)). The National PHC Strategy and jurisdictional strategies, such as the NSW State Health Plan (4) and eHealth blueprint (5), South Australian (SA) GP Plus Health Care services (6) and Victorian Primary Care Partnerships (7), have common eHealth initiatives, including those prescribed by the eHealth Practice Incentives Program (PIP), overseen by the NEHTA to support and encourage accredited general practices to adopt and use these eHealth building blocks (8). Despite being a national priority, we are not aware of any systematic study of how eHealth initiatives have facilitated or led to integrated PHC in Australia. Even less is known about the impact of data quality and governance in supporting integration and integrated PHC.

Integrated care (9) has been defined as a

> "coherent set of methods and models on the funding, administrative, organisational, service delivery and clinical levels designed to create connectivity, alignment and collaboration within and between the cure and care sectors".

This approach is patient-centred, multidisciplinary and both top-down and bottom-up. It examines the *what, how and where* of integrated services, in particular the characteristics and needs of specific patient groups and their "fit", or lack of fit, with existing inter-professional systems of care. Minor variations exist across Australian jurisdictions, but integrated care as described by NSW Health reflects the definition adopted by this project:

> "provision of seamless, effective and efficient care that reflects the whole of a person's health needs, from prevention through to end of life, across physical and mental health, in partnership with the individual, their carers and family and across public/private and Commonwealth/State boundaries" (10).

This evaluation is focused on Integrated Primary Health Care Centres (IPHCCs), an umbrella term we have coined to cover GP Super Clinics, Health One, GP Plus and extended General Practices, and how successful IPHCCs have been in adopting and implementing eHealth initiatives to achieve effective integrated care.

Aims

1. To explore the extent to which the eHealth initiatives are implemented and used to support integration by the IPHCCs.
2. To understand how e-Health initiatives and virtual networks are used in the IPHCCs to facilitate integrated care.
3. To understand the underlying mechanisms, barriers, enablers and contextual factors that have influenced the development and use of eHealth tools to support integration and continuity of care.

We have framed these aims as the following research questions:

1. To what extent does the use of eHealth tools, as measured by use of administrative and clinical systems, have a direct relationship with the extent of integration, as measured by organisational systems and arrangements and clinical protocols?
2. What patient, provider, team organisation, maturity of information management and use factors act as enablers and barriers to the use of eHealth tools for integration?
3. To what extent does the use of eHealth tools impact on patient perceptions of these approaches on access and integration of care?

Methods

CONCEPTUAL FRAMEWORK

Our eHealth and integration evaluation framework encompasses the elements of integration (9), dimensions of Informatics Capability Maturity (ICM), multidisciplinary teamwork and data quality (11) within the National PHC Strategic Framework (Figure 1). The integration elements are categorised into system, information and people dimensions that promote or support a team and shared care culture.

The ICM matrix describes how an organisation collects and manages information, shares information in the health neighbourhood, manages information and communications technology (ICT) implementation and change, manages data quality and governance, and uses health "business intelligence" to achieve multidisciplinary integrated care (Figures 2 and 3). Adapted from the "Informatics Capability Maturity Model" (ICMM) used by National Health Service (NHS) in the United Kingdom (UK) (12), the ICM matrix determines the key informatics capability and eHealth elements in an IPHCC that may be linked to integration (Appendix 2). It shows how the senior leadership in any organisation may assess the various aspects of their organisation's ICM as basic, controlled, standardised, optimised or innovative (Figures 2 and 3).

Figure 1. Model incorporating eHealth, integration and PHC elements

PHC strategic framework	Integration and shared care elements	eHealth elements	ICM dimensions
Consumer-focused integrated PHC system	Patient and carer-centred Comprehensive Coordinated Coherent Team work	Integrated and/or interoperable systems Shared eHealth record Personally Controlled eHealth Record (PCEHR) Shared managerial and communication systems	**ICM 1.** Data collection, integration and management **ICM 2.** Information sharing in health neighbourhood **ICM 3.** Managing ICT implementation and change **ICM 4.** Data quality management and information governance **ICM 5.** Using health "business intelligence" to improve care and population health
Improve access and reduce inequity	Community-centred Co-location Hub and spoke Outreach services Bulk billing, MBS items and rebates 5 access dimensions[1](13)	Electronic health service directory Online presence Tele-health eHealth mHealth	
Health promotion, prevention, screening and early Rx	Evidence-based best practice Self-management decision aids Evidence based team protocols Health literacy	Online resources (staff and patients) Systems for care planning, recalls and reminders Clinical decision support tools	
Quality, safety, performance and accountability	Information systems and support Clinical-managerial integration Data, clinical and corporate governance Inter-professional support Clinical handover Team evaluation Continuous professional development (CPD) and quality improvement (QI) programs	Data governance Coding standards Clinical audits Secure systems for internal and external communication Use of clinical, managerial and financial systems for planning and QI	
Data Quality	Fit for purpose: completeness, consistency and correctness.		

[1] 1) Approachability; 2) Acceptability; 3) Availability and accommodation; 4) Affordability; 5) Appropriateness.

Figure 2. Key to assess informatics capability maturity

Informatics Capability Maturity (ICM)	**Basic:** Systems and processes not completely reliable or coordinated.
	Controlled: Systems coordinated, manageable, performs consistently; But knowledge silos still exist.
	Standardised: Standards used to support sharing and collaboration.
	Optimised: Consolidated, efficient, accountable with good governance.
	Innovative: Facilitates innovation and/has enterprise/industry level engagement.

Figure 3. Dimensions of Informatics Capability Maturity

Dimension	Description
ICM 1. Data collection, integration and management in CIS/EHR*	This dimension measures the collection, management and display of high quality information across a health centre to ensure that the right users have the right access to the right information at the right time in a confidential and secure manner.
ICM 2. Information sharing in the health neighbourhood	This dimension measures the use of ICT tools to enable seamless information flows within the health centre and with other services and the community (= health neighbourhood) to support cost-effective and patient-centred coordinated care.
ICM 3. Managing health ICT implementation and change	This dimension measures a health centre's commitment and approaches to supporting innovative uses of ICT tools to improve clinical and managerial processes to achieve efficiency gains and realise the full benefits of informatics enabled change.
ICM 4. Data Quality Management and Information Governance	This dimension measures a health centre's commitment and approaches to supporting informatics as a strategic asset and its capability to produce quality data and knowledge to deliver against their clinical and managerial objectives.
ICM 5. Using health "business intelligence" to improve care and population health	This dimension measures a health centre's approach to the analysis, production and presentation of the centre's information to inform and support clinical and managerial decision-making to monitor safety and quality of care, support quality improvement activities, engage and support patients/carers/community in self-care and health promotion, and undertake innovative research and development activities.

*The Clinical Information System (CIS) is the system for collecting, storing, manipulating and using available clinical information for healthcare delivery. This includes clinical decision support tools. The eHealth record (EHR) refers to the actual repository of patient information at the IPHCC that can be accessible and shared between multiple providers.

RESEARCH DESIGN

We conducted mixed methods case studies using document review, interviews, observation, and patient records extraction and review, guided by the IPHCC evaluation conceptual framework (Figure 1). Data collection and analysis were contextualised to the three States.

Selection of cases

The IPHCCs were selected based on (a) geographical location with respect to state and rurality, (b) organisational size, (c) organisational structure, leadership and governance, (d) state or federal funding and support (e.g. HealthOne or GP Super Clinic (GPSC) policy initiatives) and (e) to represent a range of clinical and managerial practices. The seven IPHCCs selected for the case studies included:

1. An enhanced private general practice in regional NSW[2]
2. Four Commonwealth funded Super Clinics:
    - > one in outer urban Melbourne,
    - > one in outer urban Adelaide that was part of a larger organisation,
    - > one in outer urban Sydney that was owner-operated across two sites,
    - > one in regional Victoria that was part of a larger organisation, and
3. A "HealthOne" in regional NSW with a focus on integrated care through funding from the NSW Integrated Care (IC) Strategy, and
4. A Community Health Centre (CHC) in Melbourne that has been going through a merger as part of the state health reform.

Data collection

Data collection was conducted during one or two day site visits at the participating IPHCCs. The following data collection methods were included in the study protocol.

A) Document review of practice protocols and procedures to provide information about integration related tasks such as communication, information sharing, referrals, privacy and security of information, data quality management and information governance.

B) Interviews, either face-to-face or telephone interviews with care providers (including GPs, Practice Managers (PMs), IT staff, reception staff, Practice Nurses (PNs), and other providers involved in integrated care), exploring the extent to which eHealth initiatives are implemented and used in integration related activities and what mechanisms support their implementation and use in each IPHCC.

C) Non-participant observation of the IPHCCs to provide information about routines related to integrated care, how existing eHealth initiatives are negotiated in practice, and how providers undertake and complete tasks related to integrated care, such as initiating and completing referrals, and communicating and sharing care within the IPHCC and with external providers.

D) Interviews by telephone with a purposeful sample of patients from each IPHCC, recruited by the IPHCC staff, exploring the use of eHealth initiatives by IPHCC staff that facilitate integrated care.

[2] Funded by the Commonwealth practice enhancement program.

E) Extraction of a subset of de-identified (pseudonymised) records from the IPHCC clinical information systems to benchmark against the quality indicators for patient records and health summaries in The Royal Australian College of General Practitioners (RACGP) Standards for General Practice.

F) A self-assessment tool completed by senior leadership determining the ICM of the IPHCC, using a sociotechnical framework as conceptualised in Figure 3, and the key informatics maturity elements that link to eHealth innovations and integration.

Analysis

Interview transcripts and observational notes on integration and eHealth activities were entered into NVivo 10 and analysed using inductive and deductive qualitative methodologies. Analyses within and between case studies were conducted and triangulation performed at the level of data source, data collection, and data interpretation. Where available, the data quality (completeness and consistency) of the IPHCC was examined using descriptive statistics and compared between the cases.

Results

The findings are presented in a realist “context-mechanism-impact” format to reflect the sociotechnical approach taken to compare within and across the case studies.

SUMMARY OF IPHCC CASE STUDIES

These IPHCCs were multidisciplinary, usually with GPs and PNs as the core employed staff. Allied health professionals (AHPs) and medical specialists were usually co-located through arrangements such as tenancy agreements, service agreements or associateships. The government-funded Super Clinics or state-based IPHCC initiatives such as HealthOne and CHC, were purpose built with specific vision statements about integration in their contracts. The state-based HealthOne initiative had specific aims about integration and PHC. An implicit operational perspective of integrated care was the provision of enhanced primary care through multidisciplinary teams and relevant Medicare Benefits Schedule (MBS) items.

Table 1 provides an overview of the seven IPHCCs, their structures and contexts along with summary findings from the evaluation. Table 2 provides an overview of some of the common enablers and barriers experienced across the IPHCC case studies that influenced the development and use of ehealth tools to support integration.

Table 1. Overview and summarised findings of the IPHCC case studies

IPHCC model	**Enhanced General Practice**	**GP Super Clinic (GPSC)**				**HealthOne**	**Community Health Centre**
Case	**Case 1: Regional NSW**	**Case 2: Melbourne**	**Case 3: Adelaide**	**Case 4: Sydney**	**Case 5: Regional VIC**	**Case 6: Regional NSW**	**Case 7: Melbourne**
General context	Regional suburban group practice. Established in 1992. 3 GPs 5 PNs 3 AHPs	Outer urban Purpose built Established by Medicare Local (ML) in 2011. Focus on inter-professional training, mental and student health. 7 GPs (2FTE) 2 PNs 10-13 AHPs 9-10 medical specialists	Outer urban Purpose built Established in 2011. Universities and ML consortium. 3 GPs (8-9FTE) 4 PNs 14 AHPs (4 psychologists) 1 medical specialist	Outer urban Purpose built Established in 2012. 2 sites operate as independent units. *Staff (per site):* 6 GPs (2-3FTE) 3-4 PNs 1 Nurse Practitioner 9-12 AHPs 1-4 medical specialists	Regional city Purpose built GP practice since 1992. Re-established as a GPSC in 2011. 21-23 GPs 9 Nurses (PNs and community health nurses (CHNs)) 10+ AHPs 3 medical specialists	Small, inner regional town Purpose built GP practice since 2007. Re-established as a HealthOne in 2009 in partnership with the Local Health District (LHD). Outreach focus 5 GPs (3FTE) 11 Nurses (3 PN, 8 CHN) 10 AHPs (LHD and private)	Urban community health service (CHS) Established in 1975. Merged (2014) into a larger organisation operating 40 sites. 9 GPs(5.3FTE) 7 Nurses (PNs and CHNs) 15 AHPs (approx.) 1 medical specialist
Integration aims	Provide enhanced primary care through multidisciplinary (MD) team and	Meet aims of GPSC program and contract requirements.	Meet aims of GPSC program and contract requirements.	Meet aims of GPSC program and contract requirements through prevention and	Meet aims of GPSC program and contract requirements.	Meet aims of HealthOne program. Provide integrated care via shared EHR	Meet organisation aims to provide MD services to vulnerable populations.

IPHCC model	Enhanced General Practice	GP Super Clinic (GPSC)				HealthOne	Community Health Centre
Case	**Case 1: Regional NSW**	**Case 2: Melbourne**	**Case 3: Adelaide**	**Case 4: Sydney**	**Case 5: Regional VIC**	**Case 6: Regional NSW**	**Case 7: Melbourne**
	use of MBS Items.			MD co-located team care.		and streamlined services for chronic disease	
Organisation, leadership and governance	Clinician-led by Principal GP (PGP). Privately owned and operated. Board: PGP, PN, PM, Finance Manager.	Management-led Not-for-profit Board: Includes partner university. Ownership of facility reverts to University in 2031. PM and Clinical Director (CD). AHP and LHN clinics relate to PM.	Management-led Owned and operated by a larger organisation including 6 practices. Organisation board with subcommittees. Business Unit Managers at each practice.	Management-led Privately owned and operated. Non-clinical CEO. Decisions made by owner/CEO. PMs at each practice.	Management-led Three foundation partners: CHS, Local Health Network (LHN) and a University.	Flat management structure. Facility owned by local council. Leadership group: LHD, practice, ML. Community Health (CH) Manager and PGP. Resources and costs shared by practice and LHD.	Management-led Large management structure above centre management. Multiple on site managers: PM, AHP Manager, Client Services Manager-Admin Regional Managers and Board.
Team cohesion and function	Positive work environment. Core staff work well as a team GPs and PNs valued each	Positive work environment. Core staff work well as a team. Regular, informal	Positive work environment. Business Unit Manager Fortnightly GP and monthly	PNs and GPs work as a team. Clinical and staff meetings held. Often not	Board and partnership conflict have affected stability of management, team cohesion	Positive work environment. Practice and LHD staff aim to work as a cohesive team.	Recent merger has impacted on management structure and leadership.

IPHCC model	Enhanced General Practice	GP Super Clinic (GPSC)				HealthOne	Community Health Centre
Case	**Case 1: Regional NSW**	**Case 2: Melbourne**	**Case 3: Adelaide**	**Case 4: Sydney**	**Case 5: Regional VIC**	**Case 6: Regional NSW**	**Case 7: Melbourne**
	other's skills. Practice and clinical meetings held when all staff can attend.	communication between core and co-located staff. Regular clinical meetings.	staff meetings with allocated time to attend. CD is on the Board.	well attended. Aim to build a MD team but have limited formal structures.	and functioning. Management decisions difficult to implement.	Regular (separate) meetings held for practice and LHD staff.	GPs seem to work well with AHPs and PNs. Informal communication/ collaboration between staff.
Data quality	Partly meets RACGP standards for completeness, high level of correctness. No standard coding for diabetes diagnoses.	Does not meet RACGP standard for completeness. No data available for correctness and use of coding.	RACGP standards almost met for recording gender and DOB. Below for smoking, BMI, allergies, Aboriginal and Torres Strait Islander.	No data available.	No data available.	Meets the RACGP standard for recording allergies and ethnicity but not for smoking status and BMI.	Meets most RACGP standards. High level of correctness. No standard coding for diabetes diagnoses.
ICM 1	Standardised	Optimised	Optimised	Optimised	Optimised	Standardised	Standardised
ICM 2	Standardised	Standardised	Standardised	Standardised	Standardised	Standardised	Controlled
ICM 3	Controlled	Standardised	Standardised	Standardised	Standardised	Controlled	Standardised
ICM 4	Controlled	Standardised	Standardised	Controlled	Basic	Standardised	Basic
ICM 5	Standardised	Standardised	Controlled	Controlled	Basic	Basic	Basic

Table 2: Enablers and barriers influencing the development and use of ehealth tools

Enablers	**Adequate/additional resources to support the implementation of eHealth strategies**: > Dedicated time and positions, eg. PN or CD to retrieve and use clinical data, review data quality and train other clinicians. > Australian Primary Care (APC) Collaboratives facilitated the use of clinical data. > A knowledgeable local champion. **A positive and cooperative team and working environment:** > Supports change and implementation of new eHealth tools and systems. **Clinician leadership:** > Associated with adequate/additional resources to promote and support sharing of information. **A shared EHR:** > Facilitates involvement of PNs and AHPs in care. > Improves information sharing between practice and LHD staff.
Barriers	**Inadequate ICT systems to support integrated care:** > No common terminology used in all CIS. > A lack of software packages meeting the needs of all clinicians forces the use of multiple systems. **Inadequate use of information and communication systems**: > Not all health providers have or use technology to share information. > Limited "coding" by clinicians affects data quality and efficacy of systems. **Problems with interoperability between the EHR, managerial and clinical information systems:** > Misinformation, human error and inefficiencies eg. Double documentation. > Challenging to interact with providers in the health neighbourhood eg. No universal secure messaging systems. > Affected by organisational requirements of other bodies eg. LHNs. Forced to use disparate systems. **Inadequate internal and/or external support for eHealth initiatives:** > A lack of clinician leadership and engagement can affect implementation of eHealth systems. > Sustaining eHealth initiatives without external support eg. ML or APC Collaboratives is difficult. > Slow network and inadequate infrastructure can result in time inefficiencies. > Management level dysfunction impacts decision making and implementation of eHealth systems.

CASE 1: ENHANCED GENERAL PRACTICE REGIONAL NSW

Context

Case 1 was an established, suburban group practice. An additional building, built on the same site, has enabled co-located multidisciplinary team care. The practice aims to provide enhanced primary care through the use of relevant MBS Items by a multidisciplinary team.

Governance and management

Case 1 was clinician-led. The Principal GP owned the practice and chaired the Executive, which includes the PM, PN and Finance Manager (FM). GPs and PNs had separate appointment lists. Most patients were bulk billed and walk-in patients were accepted.

Mechanisms

The core multidisciplinary team included GPs and PNs, working closely together around the GP consultation. Clinical and managerial staff worked well as a team. The practice employed staff who fitted into the team and values of the practice. Practice and clinical meetings were scheduled regularly but held only when all staff were able to attend.

The multidisciplinary team shared the IPHCC clinical system to coordinate preventive care, dietary strategies and home medication reviews (HMR). The psychologist did not share the record for privacy reasons. The team shared a common appointment system implemented through the reception. There were plans to introduce an online appointment system.

Case 1 used clinical and managerial software as well as reporting tools to generate clinical and financial reports to guide planning. Participation in the APC Collaboratives, which involves data extraction from the CIS, had motivated them to use information to improve care. The Enhanced Primary Care (EPC) Nurse retrieved and used clinical information to improve patient management through care plans that included MBS items, patient tracking, recall and reminders. GPs were encouraged to use codes. However, the lack of a standard approach had resulted in a mix of coded and un-coded patient data.

Case 1 used secure messaging for discharge summaries, pathology/radiology results and pharmacist's reports between the centre and pharmacy. Urgent results may be faxed to the practice. Digital fax was used through the CIS to fax referral letters to some providers. HCN Messenger was used for internal communication.

Impacts

The key descriptors for Case 1 are summarised in Table 1 (Appendix 3). Case 1 was managing change well to optimise their information management and reporting for business decisions. According to the IPHCC the majority of patients were up to date with their immunisations due to routine auditing of patient lists. The shared EHR facilitated PN and AHP involvement in patient care, more efficient use of GP time and the pharmacist's role in HMR. Hospital discharge summaries were often of poor quality, received inconsistently or not received at the relevant time and often needed to followed up with the hospital.

CASE 2: SUPER CLINIC OUTER SUBURBAN MELBOURNE

Context

Case 2 was a Commonwealth funded Super Clinic established by a Division of General Practice (DGP) /ML in 2011 on the campus of a partner University. The practice had an inter-professional (IP) training mission and a focus on mental and student health.

Governance and management

Case 2 was jointly-led by a PM, who was responsible for the administration, PNs, AHPs and LHN clinics. The CD was responsible for the GPs. There was a not-for-profit Board, including representation from the partner University.

Mechanisms

There was a positive working environment, with the core staff working well as a team. There were regular and informal communication and collaboration between core and co-located staff. The regular clinical meetings were attended by GPs and PNs.

Case 2 used clinical and managerial information systems. The private co-located health care providers used their own systems while co-located LHN specialists were able to link to the LHN system (Citrix). Access to the various systems was through individual “log-ins”. Clinical and managerial reporting tools were also used e.g. PNs to monitor diabetes cycle of care. Staff used data from the CIS to improve data quality and to manage and monitor care. The clinic used an online appointment system which appeared to be working well and was popular with patients. The clinic participated in a research trial of the cdmNet online chronic disease management and prevention system. Following the trial, the PNs and GPs have continued to use cdmNet for care plans, monitoring and tracking patients, and communicating between the care team. A secure website was available for patients to request repeat prescriptions but was not well utilised with around four requests per month.

Impacts

The key descriptors for Case 2 are summarised in Table 2 (Appendix 3). The internal communication system worked well but staff did not perceive that co-location improved information sharing. The online appointment system had been well received by patients, particularly students. The ICM was mostly standardised, indicating room for improvement.

CASE 3: SUPER CLINIC OUTER SUBURBAN ADELAIDE

Context

Case 3 was a multidisciplinary Commonwealth funded Super Clinic established by a consortium of Universities and the ML in the far outer newly established suburbs of Adelaide. It was one of six practices operating within a larger organisation.

Governance and management

Case 3 was management-led from the parent company through a corporate management team and Business Unit Managers at each site. The Business Unit Manager worked with the CD, who had a seat on the company board, and was engaged in data quality management.

Mechanisms

The working environment was positive and the core staff worked well as a team. There were fortnightly GP (clinical) and monthly staff meetings, with quarantined time for staff to attend.

Case 3 used clinical and managerial information systems and report generators. All clinicians could access and write in the patient record. Access to the various systems was through individual “log-ins”. Initially the psychologists did not use the shared record for confidentiality reasons, but later decided to use it. The psychologist’s clinical notes were handwritten and then typed into the patient record. Clinical and managerial reporting tools were also used e.g. for PNs to monitor diabetes cycles of care. The IPHCC’s EHR had an internal messaging system (Intramail).

Case 3 used a range of technologies for external communication including fax and secure messaging, supported by the CIS address book and SA Health Provider Registry. There were health information links for patients and staff (e.g. forms and care plan templates) on the organisation website, as well as links via the CIS. Clinical staff had online access to the University Library, and remote access to patient information via mobile devices (phone, laptop). GPs used multiple reputable websites to download and print brochures. PNs used iPads to deliver health information (e.g. immunisation).

Impacts

The key descriptors for Case 3 are summarised in Table 3 (Appendix 3). Clinicians found the shared EHR worked well and the shared information, including correspondence and reports, useful. The psychologists had initial concerns about confidentiality however these were sufficiently allayed to enable sharing of patient records. Interoperability was a problem between the IPHCC's EHR and the dispensing systems (eRx and Medisecure) so they were not used. There were other problems with interoperability between the EHR and secure messaging systems, and the sending and receiving of electronic referrals and messages from specialists, which made their use inefficient.

The clinic had implemented an online appointment system that was phased out because it did not allow patients to book appointments of varying duration. Patients were not cancelling appointments, even with SMS reminders, leading to "no shows". A newer online appointment system was being considered.

Information management was optimised mainly because of the Business Unit Manager and the CD, who received a 0.6FTE salary and had protected time to review data quality and undertake training programs for the clinicians. Good information management made it easier to set patient targets for employees of the IPHCC such as the psychologists.

CASE 4: SUPER CLINIC OUTER SUBURBAN SYDNEY

Context

Case 4 was a privately owned, multidisciplinary Commonwealth funded Super Clinic established in the far outer suburbs of Sydney. It consisted of two sites operating as independent units: One practice was newly established and the other an acquired practice.

Governance and management

Case 4 was management-led by a non-clinical CEO. Decisions were fed back to staff through the full-time PMs at each site and a contracted, part-time (0.4FTE) centre manager, who supervised operations at both sites.

Mechanisms

The aim was to build a multidisciplinary team but no formal structures had been established to support the achievement of this aim. Staff and clinical meetings were held regularly but usually not well attended. There were varying degrees of collaboration among the core (GPs and PNs) and co-located staff. PNs and GPs appeared to work well as a team.

Clinical and managerial information systems and reporting tools were used. Staff were aware of the need for "coding" in the IPHCC's EHRs, but they also recognised that GPs did not always code leading to incomplete data.

GPs, PNs and AHPs had access to the EHR, with differing levels of access depending on clinician type. Access to the various systems was through individual "log-ins". Some visiting AHPs and specialists were able to log in remotely and use their own systems. The psychologist did not add clinical notes to the shared record but was able to access it to view medical notes and provide reports back to the GP which were scanned into the patient's clinical record. The clinic used an online appointment system that appeared to be satisfactory. One GP used Dragon Dictate speech recognition software to write notes.

Impacts

The key descriptors for Case 4 are summarised in Table 4 (Appendix 3). Information management was optimised by the efforts of the managerial staff. Staff reported that participation in projects such as the APC Collaboratives helped the IPHCC to make better use of their information, including the creation of patient registers, and to provide better care. However, one GP believed that EHRs were not always reliable due to errors in data entry or incomplete information (GP).

Sharing patient records can improve shared patient care however Case 4 found that including non-GP patients (who did not have a complete clinical record) in the EHR system caused inaccurate search results. There were problems with joining diabetes mellitus (DM) registers across the branch practices and the EHR was corrupted when trying to merge the patient records of a new GP who joined the practice. Staff reported that, by using electronic appointment systems there was less chance of overlapping appointments and mistakes, and seemed to use them well. The SMS reminders were also well received. Case 4 was able to track internal correspondence through the CIS. There was a perceived need to improve change management especially in the use of eHealth tools by clinicians.

CASE 5: SUPER CLINIC REGIONAL VICTORIA

Context

Case 5 was an established group practice that re-opened as a Commonwealth funded Super Clinic in 2011. It was situated in a regional city in Victoria, within the health education precinct close to the local hospital emergency department (ED).

Governance and management

Case 5 was management–led and owned by a university, CHS and LHN. However, board and partnership conflicts had caused dysfunction at a management level and affected decision making. Along with the high turnover of managerial and reception staff, the leadership was not effective and decisions were often blocked at many levels.

Mechanisms

Case 5 used clinical and managerial information systems and report generators. The complex information system, involving a network of 58 computers, was set up by a private contractor who continues to provide technical support. Wi-Fi was available for use by patients in the clinic. The appointment system was complex and included a range of services. An online appointment system had been in use since September 2014. This system was also available to the ED Triage Nurse via a tablet device. Receptionists accessed the community health system to add AHP appointments (except for the dietician and diabetes educator who send a paper list of appointments). The PN made health assessment appointments, using the online appointment system with SMS reminders. The LHN prepared appointment lists for its medical specialists a few days prior to their co-located clinics and provided their own receptionists. Unfortunately, IPHCC receptionists had to re-enter external clinic appointments into the IPHCC managerial system.

Impacts

The key descriptors for Case 5 are summarised in Table 5 (Appendix 3). There appeared to be variation in the degree to which external providers, such as AHPs, entered patient information in to the IPHCC's EHR (for practice patients). The IPHCC record system was used extensively by the private physiotherapist however LHN staff also used their own record systems meaning that information needed to be entered twice. This dual record keeping was tedious. There was an ongoing backlog of faxes that needed to be scanned into patient notes. Each workstation needed to be set up individually for electronic fax but this had not happened. The ML practice profile had identified room for improvement in recording information and codes to claim MBS items.

Patient use of the online appointment system had been increasing and was available in the ED where it was under-utilised. The system often failed when appointments were made simultaneously. Confirmation emails were not sent if the appointment wasn't successfully added to the system, and patients often arrived without a booked appointment. The online SMS reminder system had failed when the practice forgot to pay in advance for another batch of SMS messages, or the administrator forgot to send reminders. This resulted in "no shows".

Telehealth had not been well utilised due to a lack of facilities in other locations and the room set up for telehealth not being 'consultation friendly'.

A problem with the internal messaging system was that even if the message is,

> "urgent, it doesn't attract your attention, so if I'm really busy and distracted I will not pick that up until the finish of the session." (GP)

CASE 6: "HEALTHONE" REGIONAL NSW

Context

Case 6 was an integrated primary and community health unit with outreach services to satellite communities. It operated as a partnership between a GP practice and the LHD. Integration activities had recently been enhanced with funding from the NSW IC strategy. The objective was to enhance integrated care through shared health records, and streamlined chronic disease management and prevention services.

Governance and management

The building was owned by the local council. There was a flat management structure with a local leadership group focused on the IC strategy. The CH Manager worked in partnership with the PGP. Resources and operational costs were shared between the practice and LHD.

Mechanisms

Case 6 used clinical and managerial information systems and report generators. The practice and LHD staff used two different and incompatible patient record systems. Integrated Care strategy funding had enabled the practice EHR to be shared with LHD staff (with patient consent). LHD staff continued to use the Ferret clinical software package for non-practice patients and entered occasions of service for practice patients.

The single appointment system was used by both LHD and practice staff. PNs were able to make appointments for LHD AHPs and on-site staff knew the location of outreach staff because their appointments were in the CIS. The single phone number and redirection from satellite health centres made it easy for patients to contact providers. Everyone had been taught to use coded terms within the clinical record. PNs participated in coding their records as well as diagnoses from discharge summaries and specialist letters into the IPHCC's EHR. They could also do data cleaning.

Impact

The key descriptors for Case 6 are summarised in Table 6 (Appendix 3). Work time was wasted by the slow network and inadequate infrastructure. This prevented data entry or scanning of documents into the practice EHR. There was also the problem of double entry into two non-interoperable systems for LHD AHPs and CHNs.

Communication issues related to IT and information management systems between service providers were cited as causing poor uptake of some services, duplication and a lack of ongoing care coordination (IC Strategy Management Plan). This led to the implementation of a shared EHR between the practice and LHD staff. Referrals to the CHNs were not always received from major hospitals. There were occasions where CHNs were unaware of referrals until the patient contacted them. The transition was not always completely "seamless".

Access to the practice EHR provided information to LHD staff about medical history, pathology, referring GP, and medications and had improved information sharing between practice and LHD staff. Between January 2015 and March 2015, 1200 of the 2200 practice patients had agreed to the sharing of their clinical record with very few refusals. However, the IC strategy health assessment tool was not part of the IPHCC's EHR, resulting in an information gap between assessment and documentation. This made it difficult to identify patients and providers who are responsible for patient follow up.

Information management, use of business intelligence and alignment with informatics was standardised because of the IC strategy funding and the presence of knowledgeable local clinical and managerial champions. However, the relatively low bandwidth of the Internet service available in a regional location was a barrier to further improvement of the ICM.

CASE 7: COMMUNITY HEALTH CENTRE MELBOURNE

Context

This well-established CHS had experienced a number of mergers, and had recently been incorporated into an organisation of 40 sites. The objective was to provide multidisciplinary services with a focus on vulnerable refugee and migrant populations. The population served by the IPHCC included patient groups with low health literacy. This made it challenging for clinicians to communicate and provide appropriate health information to some patients.

Governance and management

Case 7 was management-led and operated under a large management structure. Clinic level management systems included a PM responsible for the GPs and PNs, an AHP Manager AHPs, and a Client Services Manager responsible for reception and administration staff. There was an organisation-wide board responsible for corporate governance.

Mechanisms

Medical and CH managerial and clinical systems were used in different combinations by practice and CH staff for each stream of the wider organisation. All patient records were electronic. Paper records used prior to the introduction of the EHR had not been scanned into the electronic system. These records were in storage and requested as needed by clinical staff. Access to the medical record varied with the type of clinician. TRAK was the clinical and appointment system used by CH staff. One receptionist was dedicated to AHP/ TRAK but all reception staff could access both systems. SMS or phone reminders were used depending on patient preferences. GPs and PNs entered recalls into IPHCC's EHR but not consistently. Radiology could be viewed online by GPs as soon as images were available.

Impact

The key indicators for Case 7 are summarised in Table 7 (Appendix 3). The recent merger had impacted on management structures and leadership. Meetings were not happening and the staff not well informed. The AHP team was having monthly team meetings. Informal communication and collaboration existed among the centre staff and GPs worked well with AHPs and PNs at the service delivery level.

The integration of the practice and CH systems used the date of birth and UR #. Reliability and consistency were not known. The two appointment systems were not aligned, making it difficult to book appointments with multiple providers. The duplication of records for AHPs was reflected below:

> "And this is how separate we are from an integrated clinic, I don't even have log ons, I don't even have a remote access to any of these systems". (Manager)

GPs did not review feedback from AHPs in the IPHCC's EHR until they next saw the patient. Clinical staff were unaware that patients had received care from hospital specialist clinics unless the patient informed them. There was also an ongoing backlog of documents to be scanned into patient files, creating confusion.

> "Most hospitals actually fax and send hard copies (that is, they also send the same documents by post), which ends up duplicating things", "confusing and time consuming" (Administration staff).

Discussion

The seven IPHCCs (Table 1) spanned a number of contexts and used a range of mechanisms that impacted on the implementation, integration and use of eHealth tools to coordinate care. This realist template was used to analyse the data to address the research questions about the extent of use of eHealth tools, as measured by use of administrative, managerial and clinical systems, and any relationship with the extent of integration, as measured by organisational systems and arrangements and clinical protocols, and the provision of accessible and coordinated care as perceived by staff and patients. Patient, provider, team organisation, maturity of information management and factors that act as enablers and barriers to the use of eHealth tools for integration were explored. For all participating IPHCCs, IT support staff were either located off-site or IT support was provided by an external organisation. This meant it wasn't possible to conduct interviews with IT support staff as part of the data collection.

CONTEXT

Sustainability

Implicit in the perception of integrated care of all cases was the provision of enhanced primary care through multidisciplinary teams and MBS items. The message appeared to be that there must be adequate ongoing core revenue through the MBS to support integrated care. Case 1 had problems sustaining initiatives once ML support via APC Collaboratives projects stopped. Case 6 had additional support from the NSW IC Strategy to develop its eHealth and integration infrastructure and protocols, leading to adequate ICM to support integrated care. However, the relatively less well developed general ICT infrastructure and the limited workforce capacity in a regional/rural environment will need to be significantly improved if this "eHealth" initiative is to be sustained functionally with burgeoning health costs made more acute with health spending cuts being high on the agenda during these times of fiscal restraint (14).

Presence of other enablers such as the multidisciplinary team, intersectoral collaboration and knowledgeable local champions working in a positive and cooperative environment was encouraging. All IPHCCs identified at least one local champion, especially for multidisciplinary teams or integrated care, from among the clinical and managerial staff; however, the degree of enthusiasm varied. Case 2 demonstrated the economic perspective where they needed to find a sustainable health service niche, leading to a focus on mental and student health.

Engagement of primary care professionals

The methods used to engage general practice specifically and primary care clinicians generally are also considerations. Case 1 was owner-operated and clinician-led and evolved with an extension to the current premises to become a multidisciplinary primary care practice. Case 4 was owner-operated and management-led and used two approaches: building a large purpose-built structure and employing or inviting participation by GPs, and acquiring an established general practice at another site. This is reflected in the ICM assessment where Case 4 scored better with information management, especially managerial, and Case 1 scored better with implementation and change management. The problems illustrated in Case 5 where the larger and more complex organisational structure governing and managing the partnership of the local university, LHN, CHS and the established general practice to create the Super Clinic with federal funding was associated with a dysfunctional board and management. Local universities were also involved as "partners" in the organisations that governed and managed Case 2 and Case 3. While Cases 2, 3 and 5 were management-led, Cases 2 and 3 did not have to engage and merge with an established general practice; more importantly, their structures included a CD. Medical and nursing staff were employees; co-located health practitioners had tenancy or

service agreements. This tension in the evolution of general practice into multidisciplinary primary care services is an important generic contextual factor to address. It requires consideration of the structure, organisation and leadership, especially clinician leadership, of the intended models for the IPHCC.

Team culture, roles and responsibilities

Apart from Cases 5 and 7 the multidisciplinary team cohesion and function was good. Case 4 was marginal because, while the GPs and PNs worked well together in service delivery, there was no formal structure to develop and support a multidisciplinary team. The key difference appeared to be clinician leadership generally and specifically as Clinical Directors in the corporatised model. Case 6 worked particularly well, which may be due to its rural, small community setting with local champions and the extra resources from the IC strategy to bring people together around integrated care. It would appear that the most positive team working environments were associated with clinician leadership (Cases 1, 2, 3, 6) and adequate/additional resources (Case 6). The complexity and extent of disciplinary division of the organisation also affected the team cohesion and function. Case 7 was the most obvious example, especially when compared to Case 6 where the management structure was flatter.

Information infrastructure

The adequacy of the ICT infrastructure was dependent on what the IPHCCs were trying to do. The managerial and clinical systems were all relatively stable on their own. However, these systems were not designed for, or were inadequate to facilitate and support, integrated team care. Some IPHCCs struggled with multiple appointment systems; some AHPs and specialists used other systems that were not integrated with the IPHCCs EHR; and secure messaging was limited due to the lack of universal secure messaging systems between health providers. Many of the IPHCCs were doing their best with what they had, but for meeting the needs of different types of health professionals in an IPHCC, software packages do not exist or in other cases the demands, organisational policies and requirements of other bodies such as LHNs forced the use of disparate systems that were unable to connect to each other.The larger IPHCCs had videoconferencing facilities. Only one (Case 6) had problems with low bandwidth because of its rurality.

MECHANISMS

Information sharing within the organisation

The communication and sharing of health information within the IPHCC and organisation was effected by a number of mechanisms including: sharing the IPHCC's EHR and internal messaging/email systems. Documentation and management of information by core staff and, in many cases, co-located clinicians into the IPHCC EHR allowed information sharing by the multidisciplinary team. However, many co-located specialists and AHPs, especially private practitioners, continued to use their own managerial and clinical systems because they were imposed by organisations outside the IPHCCs such as State health departments or LHNs. Psychologists, in particular, were averse to sharing clinical information because of perceived confidentiality issues. The shared EHR was also seen as valuable for multidisciplinary team case conferencing.

> "the beauty of it is the referrals can happen almost through a messaging system… It also means that when the allied health team or the community nurses (who) see those patients… they're actually able to enter that data directly into the medical record...the next time that patient sees a GP the actual clinical record is going to be there." (Case 6).

Some internal messaging systems were linked to patient records, which increased their usefulness beyond communication to being a referral system with tools to file and track relevant documents (Cases 2 and 6). A suboptimal infrastructure in Case 6 meant that the pharmacist used their own software program to complete HMR reports, print and send them

to the IPHCC where they were scanned into the EHR (Case 6). Some staff found the EHR internal messaging system ineffective (Case 7).

Information sharing in the health neighbourhood

For other practices and organisations in the health neighbourhood, secure messaging and digital fax were commonly used in information exchange situations such as downloading results (all cases), pharmacist sending reports from the practice to the pharmacy (Case 1), receiving letters from specialists (Case 6) or viewing images such as X-rays (Case 7). Problems with interoperability between one IPHCC's EHR and an available secure messaging system, a dispensing system and a second secure messaging system, resulted in a decision to change messaging systems.

Digital faxes were more often sent than received. Incoming faxes of letters, discharge summaries, management plans or other paper documents were often printed and scanned into the IPHCC's EHRs, rather than being received electronically as images that could be entered into the patient's record.

> "Most hospitals actually fax and send hard copies, which ends up duplicating things… (this is) confusing and time consuming" (Case 7).
>
> "No streamline of information between systems (wider LHD). Results in misinformation, human error e.g. list of medications at pharmacy is different to practice records." (Case 6).

All the IPHCCs used a service directory they had created in their own EHRs or one supplied by the ML or state government. The common problem noted was how to keep them current.

ePrescribing

Case 2 used a secure website that allowed patients to request repeat prescriptions. The Medisecure or eRx systems were installed at most practices (Cases 2, 3, 4, 6, 7) even if the local pharmacists were not using it. These systems print a barcode on the paper prescriptions that is scanned in most pharmacies and enters the full details of the prescription into the pharmacy's dispensing system, greatly reducing the risk of error.

Australia currently does not have a fully functioning electronic prescribing system because digital signing of prescriptions using a digital certificate has not been implemented. Electronically generated prescriptions still need to be printed so the GP can sign them by hand.

Patient engagement

Despite a ML recruitment campaign, the PCEHR had not been successful. All seven cases were registered but five were not contributing summaries. There was also no demand from patients. Some GPs from Case 3 were contributing and one GP in Case 7 ensured that all methadone patients attending the IPHCC had a PCEHR. Patients who were interviewed were happy that their personal information was on a computer at the IPHCC and able to be shared between clinicians.

Most IPHCCs, except for Case 6, had a website and Facebook page although patient engagement with Facebook tended to be low. Cases 1 and 4 had a specific IPHCC website for marketing purposes and Case 2 had a secure website where repeat prescriptions could be initiated although it was only used approximately four times a month by patients. Apart from Cases 1 and 5, the others had a presence on their parent company website.

Where the online appointment system was working well (Case 2), it was popular with patients, while at Case 5 patients seeing the private physiotherapist were uncertain if they would use the online appointment system and it was not being used by the physiotherapist.

Appointments and scheduling

The larger IPHCCs (Cases 2, 3, 5 and 7) provided more services and had more complex workflows and systems for making appointments and scheduling services for patients. However, it is a matter of scale as even smaller IPHCCs need to schedule services (appointments) for a range of medical, nursing and AHP providers. The tools used ranged from verbal to paper to electronic to online systems. The participants in this research raised workflow problems, best exemplified by Case 5 where the systems from the LHN, CH and general practice were not interoperable and non-collaborative. These partner organisations used their own receptionists to schedule and shepherd patients in the same location. In this case, there were numerous inefficiencies with double entry and manual generation of lists to share and transfer around. Case 7 had similar problems but was probably in a better position from the governance and management perspective. Case 6 had to manage the same complexity but had the advantage of being in a small rural setting where the change management processes are usually more acceptable; however, there are significant problems with the ICT infrastructure and Internet bandwidth.

Care plans and referral templates

Care plans and referral templates were available in GP EHRs but not the hospital systems with whom they communicate. The EPC nurse in Case 1 used clinical information through care plans to improve patient management: this included MBS Items, tracking patients, recall and reminders. Similarly, Case 4 participated in the APC Collaboratives diabetes cycle of care and EHR (diabetic kidney disease) waves, and Case 2 in QI and CPD programs. Case 3 developed standardised forms and templates and made them available online for all staff. Case 5 used a hybrid system where care plans were completed on paper questionnaires and sent to patients, after which the chronic disease nurse entered the data into the LHN system. Cases 6 and 7 used the tools available on the GP EHRs.

> "I think we all tended as a team to be more happy with the one in (the GP EHR), their basic care plan, but I think it tends to work best with patients because they can understand what's actually written on it" (Case 6, PN).

Clinical decision support tools

Clinical decision support tools were not used consistently to any extent. The CVD Risk Calculator and on screen prompts e.g. about drug-drug interactions in IPHCC's EHRs were the most commonly reported. Information resources used by clinicians and patients were mostly online or available locally in the EHRs. Use of mobile devices, such as tablets, by PNs was reported and patients were also referred to websites. However, it was interesting that current government supported online resources, such as Clinicians Health Channel in Victoria or Clinical Information Access Portal (CIAP) in NSW, were not mentioned.

Report generation

Report generation was routinely done, with management-led IPHCCs doing managerial reports well and clinician-led IPHCCs doing clinical reports well. The PNs usually generated clinical reports for the creation of registers (Cases 1, 2, 3, 4 and 6) and to track diabetes cycles of care (Cases 1, 2, 4, 6 and 7). Participation in APC Collaboratives activities were made possible with the report generators available (Cases 1 and 4). Case 5 is starting with a PN generating reminder lists for health assessments, an activity that all the other IPHCCs were also doing. Managerial reports may be as frequent as weekly in the larger corporatised IPHCCs focused on billing, financial, service utilisation, productivity and clinical indicators. The productivity requirements for psychologists (Case 3) and PNs (Case 4) were supported and monitored by these managerial reports.

IT support

The IT support provisions varied according to the IPHCC. However, none of the participating IPHCCs had a staff member(s) with expertise in IT systems. All except Case 3 used external support provided by a commercial entity (Cases 1, 4, 5, and 6) or a partner organisation, ML (Cases 1 and 6) or LHD/LHN (Cases 2, 6 and 7). Case 3 received its IT support from technicians employed by the University-owned company operating the IPHCC. Most of the support was provided remotely and IPHCC staff were mostly satisfied with the support received. Training in the IPHCC's EHR or report generators was often done in-house e.g. one-to-one or during a staff meeting, or by the ML for clinical, managerial and administrative staff. Staff were usually unaware of any software and training manual.

> "Absolutely,…they're not using it to the best capacity because they haven't been shown how to…putting strategies in place now to make sure that that does happen." (Case 6, PN).

Data security

Data security was a consideration for most of the IPHCCs. The PM was usually responsible for information systems and security either directly or via the external or LHN/LHD IT support (15). Case 4 had a privacy policy that included consent on the patient registration form for use of personal health information; Case 1 plans to do so in the near future. Case 3 explains the privacy policy to all patients and obtains verbal consent for record sharing among health professionals. Case 6 seeks consent from practice patients to share health information between the General Practice, LHD and third parties e.g. hospital. Case 2 seeks consent for particular purposes, rather than general consent at sign up. The privacy department of the parent organisation of Case 7 assists with privacy policy and information exchange. Certain areas of the patient record can be "locked down" to restrict access to other health professionals. Case 5 staff were not aware of privacy and (lack of) security of normal email.

Data quality

Data quality, including "coding", was a whole of organisation exercise involving the PM, PN and clinicians (Case 1, 4 and 6) in activities like regular audits, monthly reports, and ongoing data cleaning and archiving records after two years of inactivity. The PNs usually did data cleaning as did the CD in Case 3. Case 2 reported that duplication of patient records occurs. Conversely, Case 6 highlighted gaps in information due to use of standalone systems separate from the IPHCC's EHR to do health assessments, leading to issues with follow-up and review which may compromise care. Case 4 monitored data coding, especially of the managerial data, informally. Their experience with data corruption when merging the EHR system from a second site had been traumatic. They also reported that universal access to patient records can cause record corruption. Clinicians didn't always update the patient EHR and not all patients in the IPHCC were GP patients; therefore clinical records were often incomplete.

PNs in Case 6 conducted regular audits/data cleansing as part of the IC strategy focusing on data accuracy and coding for patient diseases and medications. As part of this data cleaning responsibility, PNs coded their own records as well as diagnoses from discharge summaries and specialist letters into the IPHCC's EHR. Cases 4 and 6 also recognised that clinicians did not always code their entries into the IPHCC's EHR. In Case 6, all staff had been taught to use coded terms within the EHR. Case 6 had developed an information sheet to standardise coding within the practice and planned to extend this to LHD staff. Computer usable information was essential for risk stratification of patients to identify them for the IC strategy. Participation in a ML Quality Improvement Diabetes group enabled the Chronic Disease nurse from Case 7 to learn how to clean data and implement a diabetes register.

IMPACT

The impact was assessed through the lens of multilevel integration (16) - technology, data and information, application (clinical and managerial) and inter-professional - to achieve integrated care by multidisciplinary care teams (17). We have described inter-professional integration as the context and, perhaps, as an outcome of the other levels of integration.

Technology integration

This is also called technical interoperability. There were a range of experiences with the issue of interoperability of both managerial and clinical information systems. Significant impacts on workflow and human resources were particularly obvious with appointments and scheduling. We also need to consider the potential for error and harm to patients. Some clinicians believe that being able to view the patient record from other team members (e.g. as scanned or fax documents) is safe because they can look at the original document. These same clinicians did not appear to appreciate that information stored as images were not usable by computer systems to generate health summaries, warnings and other advice, for example about preventive activities. Where the patient record is imported directly into the IPHCC's EHR, any changes or errors as a result of this process may not be obvious. As Case 6 pointed out, EHR information needs to be quality assured. These interoperability and EHR access issues need to be addressed across all the IPHCCs studied because it is fundamental to health information exchange to support integration and integrated care.

Data and information integration

To support integrated care it is essential that health information systems can exchange data with assurance that the meanings of the data are the same. This requires common terminology and procedures and protocols. The cases and some of the comments on "coding" highlighted that this area needs significant improvement. It also highlights the possibility that current standards or even the concept of standardisation itself may not be the most appropriate mechanism to achieve data/information integration, or even common understandings of health and healthcare!

Application integration

Application integration covers clinical and managerial applications or decision support AND depends on stable technology and data/information that are fit for purpose. The ICM of all the cases, and in particular the lack of use of electronic decision support, suggested a need for improvement, more for the clinical than managerial data collection, management, managerial reporting and business use. Appointment and scheduling appeared the most problematic managerial system to manage and integrate. Integrated care planning between IPHCC and partner hospital systems was problematic because of a lack of harmonisation of functionalities in each of the disparate systems. Information portals and other information focused decision support tools did not appear well used. That this is still suboptimal and poorly used despite years of effort and large amounts of resources is disappointing. It suggests more radical and innovative research into health and eHealth competencies as well as information literacy.

Conclusions

Seven IPHCCs were examined. They spanned three states, had varying organisational structures and leadership, were at different phases of development and change and had varying levels of team function and cohesion. A range of organisational stability and efficiencies was noted across the different IPHCCs depending on their size and whether they were part of a larger organisation. Nevertheless, team culture at the service delivery level, especially with strong clinical leadership, appeared to be good and functional.

The IPHCCs were at varying levels of ICM, and used a range of mechanisms and eHealth tools with varying efficiencies or effectiveness. Sharing of patient information within IPHCCs was via the sharing of the IPHCC's EHR, internal messaging and emails. Sharing of information in the health neighbourhood was via fax (digital), emails and secure messaging. The impacts, processed and assessed using a multilevel integration framework, suggested that:

1. Technology integration and interoperability is not present
2. Data and information integration is an emerging issue within the IPHCCs and within their referral network and health neighbourhood.
3. Applications integration between managerial and clinical components of the IPHCCs was apparent, with adoption much more established with managerial systems. However, integration of appointment/scheduling systems is still basic.
4. The benefits realisation of eHealth is not readily apparent, especially in the clinical domain.

Recommendations

Strong leadership at all levels (*clinical, managerial, software industry and government*) is required to drive change in the regulatory and policy contexts and support the implementation of these recommendations.

CONTEXT

1. Sustainability

Adequate specific support to establish eHealth and integration infrastructure and protocols AND ongoing core revenue through the MBS and/or other funding, from any, some or all of: federal, State or local governments; private health insurers; workers' compensation authorities; motor vehicle accident insurers; employers and patients themselves to support and sustain integrated care and use of clinical and managerial eHealth tools. This is essential to support other enablers such as the multidisciplinary team, intersectoral collaboration and knowledgeable local champions working in a positive and well-governed environment. The relatively less well developed ICT infrastructure (e.g. videoconferencing/ telehealth) and limited workforce capacity in rural and other "areas of need" influences implementation.

Action: Establishing and sustaining eHealth infrastructure, through specific funding from public and private sources, to support integrated care protocols. Funding through the MBS is essential to sustain patient-centred integrated care.

Who: Department of Health (health financing), health insurers, provider organisations, federal, state and local governments, consumer organisations.

2. A positive team culture to engage primary care clinicians

Regardless of the business and health financing models, clinician leadership is an important component of the overall organisational governance structure and processes. The tensions in the evolution of general practice into multidisciplinary primary care services are an important contextual factor. A positive team culture is associated with good clinical and managerial leadership, a flatter management structure and adequate/additional resources to promote and support sharing of accurate and relevant information, along with common understanding of the diagnosis and care plan.

Action: Policy, training and support to develop strong clinical and managerial leadership to support sharing of accurate and relevant information and care plans.

Who: Primary Health Networks (PHNs) and general practices, professional organisations (PMs, PNs, allied health).

3. Patient engagement

This is a complex area as patients and their families are not directly engaged with clinical and managerial eHealth systems. The PCEHR, consumer health information portals and other patient decision aids projects have had varied and variable (or lack of) success. Like clinician engagement, patient engagement must be relevant and useful at policy, governance and service delivery levels. International evidence is that the online communication that patients most want with their general practices is to be able to make appointments, to request further prescriptions and to conduct consultations by telephone, email or video (18)(19).

Action: Current strategies to promote self-management and patient-centred integrated care should include better designed eHealth tools and patient training and support programs. Funding through the MBS is essential to sustain information enhanced integrated care to achieve efficiencies in primary care.

Who: Department of Health, PHNs, general practices, consumer organisations.

MECHANISMS

4. Semantic (data and metadata) integration

Semantic data requires the use of common terminology; Australia has adopted SNOMED CT-AU as a reference terminology (20). However, Australian GP CIS use proprietary terminologies or ICPC2+ (21), or worse still, one that is not nationally recognised. Specialty disciplines (e.g. pathology or radiology) also use their own terminologies. This “tower of Babel” situation makes it difficult to ensure meanings are retained when information from different systems are shared or integrated. Some essential strategies include semantic integration and secure messaging. A small nationally maintained “core” data set and data model may be a sustainable strategy.

Action: Ownership, accountability and strong clinical leadership from the PHC sector is needed to ensure the valid and relevant implementation of semantic integration strategies in information systems. A skilled clinical informatics profession, knowledgeable in semantic integration is also required to ensure its validity and relevance.

Who: Australian Commission for eHealth (replacing NEHTA); PHNs; LHDs/LHNs; Commonwealth and State Departments of Health, Education and Technology; Health professional bodies; Higher education institutions; Software industry.

5. Application integration

The lack of technical integration of information systems, well demonstrated by the “hybrid approaches” to appointment and scheduling in the IPHCCs, has downstream costs, and reduced the safety and quality of care. Clinical and managerial decision support tools depend on accurate and stable applications and technical and semantic integration. Applications are usually developed to fill a clinical or managerial need. This means they need to embed the flow of information without significantly disrupting the flow of work practices and patient care needs. In integrated care, these considerations need to go beyond the health service and engage other services in the health neighbourhood. This requires secure messaging.

Action: The PHC sector must be engaged, through formal structures, in the development, maintenance and governance of standards and benchmarks. Ownership, accountability and strong clinical leadership from the PHC sector are required for successful implementation of clinical and managerial tools. Skilled implementation scientists and health informaticians are required to optimise the diffusion of reliable and useful eHealth tools to the health workforce.

Who: Australian Commission for eHealth (replacing NEHTA); PHNs; LHDs/LHNs; Health professional bodies; Higher education institutions.

6. Data/information governance

Governance is essential to ensure fitness for purpose of data/information and the systems that manage them (22). It can be divided into data/information custodianship (security, accessibility, risks, etc.) and stewardship (data quality). IPHCCs need an internal structure and protocols to promote data quality and manage risks such as hybrid “paper+EHR” systems to ensure fitness for purpose of their information and eHealth tools (23). For integrated care and information exchange, the data/information governance may be at the neighbourhood or regional (e.g. PHN) levels to achieve functional efficiencies and relevance. In this context, a national discussion on data/information governance is essential to formulate a meaningful policy and strategy for eHealth (and data analytics) and integration.

Action: A national approach on data/information governance is essential to formulate a meaningful policy and strategy for data governance, eHealth and integration. A national approach to audit, feedback, continuous quality improvement, research and outcomes monitoring will also promote a culture that values good data and documentation.

Who: Australian Commission for eHealth (replacing NEHTA); PHNs; LHDs/LHNs; Health professional bodies; Higher education institutions.

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Appendices

APPENDIX 1: ABBREVIATIONS

Abbreviation	Description
AHP	Allied Health Professional
APC	Australian Primary Care
BMI	Body Mass Index
CD	Clinical Director
CEO	Chief Executive Officer
CH	Community Health
CHC	Community Health Centre
CHN	Community Health Nurse
CHS	Community Health Service
CIAP	Clinical Information Access Portal
CIS	Clinical Information System
CPD	Continuous Professional Development
DGP	Division of General Practice
ED	Emergency Department
EHR	Electronic Health Record
EPC	Enhanced Primary Care
FM	Finance Manager
FTE	Full Time Equivalent
GP	General Practitioner
GPSC	General Practice Super Clinic
HMR	Home Medicine Review
IC	Integrated Care
ICM	Informatics Capability Maturity
ICMM	Informatics Capability Maturity Model
ICT	Information and communications technology

Abbreviation	Description
IPHCC	Integrated Primary Health Care Centre
IT	Information Technology
LHD	Local Health District
LHN	Local Health Network
MBS	Medicare Benefits Schedule
MD	Multidisciplinary
ML	Medicare Local
NEHTA	National eHealth Transition Authority
NHS	National Health Service
NSW	New South Wales
PCEHR	Personally Controlled eHealth Record
PGP	Principal GP
PHC	Primary Health Care
PHN	Primary Health Network
PIP	Practice Incentives Program
PN	Practice Nurse
PM	Practice Manager
QI	Quality Improvement
RACGP	The Royal Australian College of General Practitioners
SA	South Australia
UK	United Kingdom
VIC	Victoria

APPENDIX 2: INFORMATICS CAPABILITY MATURITY TOOL

Assessing your Informatics Capability Maturity (ICM)

The ICM tool is a qualitative self-assessment instrument to assist you to determine how capable or *mature* your health centre is from an informatics perspective. *Informatics is the use of information and communication tools to ensure good quality information is available to the right person in the right format at the right place and the right time to ensure the best decisions for clinical and managerial purposes*. The instrument can help you identify informatics-enabled actions to improve the performance of your health centre.

You, as the clinical and/or managerial leader, are asked to evaluate your health centre through five different *informatics capability dimensions.* Each dimension has five levels of *maturity* ranging from 'BASIC' (least mature) through 'CONTROLLED' to "STANDARDISED' to 'OPTIMISED' to 'INNOVATIVE' (most mature). Attributes of the levels of maturity, with examples, are listed in the instrument to assist you to recognise and position your centre appropriately on the informatics capability maturity scale. We strongly encourage you to seek input from your staff to complete this PRIOR TO the practice visit.

Five informatics capability dimensions:

Data collection, integration & management in CIS/EHR	This dimension looks at the collection, management and display of high quality information across a health centre to ensure that the right users have the right access to the right information at the right time in a confidential and secure manner.
Information sharing in health neighbourhood	This dimension looks at the use of Information and Communication Technology (ICT) tools to enable seamless information flows within the health centre and with other services and community (=Health Neighbourhood) to support cost-effective and patient-centred coordinated care.
Managing health ICT implementation & change	This dimension looks at a health centre's commitment and approaches to supporting innovative uses of ICT tools to improve clinical and managerial processes to achieve efficiency gains and realise the full benefits of informatics enabled change.
Data Quality Management & Information Governance	This dimension looks at a health centre's commitment and approaches to supporting informatics as a strategic asset and its capability to produce good quality data and knowledge to deliver against their clinical and managerial objectives.
Using health information to improve clinical care and population health	This dimension looks at a health centre's approaches to the analysis, production and presentation of the centre's information to inform and support clinical, managerial and strategic decision-making to monitor safety and quality of care, support quality improvement activities, engage and support patients/carers/community in self-care and health promotion, and undertake innovative research and development activities.

Self-assessment instrument

Informatics Capability dimension	Self-Assessed Informatics Capability Maturity				
	BASIC	**CONTROLLED**	**STANDARDISED**	**OPTIMISED**	**INNOVATIVE**
Data collection, integration & management in CIS/EHR	□ Clinical: Patient register present but not integrated □ Managerial: Billing system □ Appointment system	□ Patient register accessible to all clinical and managerial staff □ Online claims	□ Use coded terms eg. Diagnoses, measures, behavioural health □ Reports from clinical and managerial systems. □ Staff discuss simple quality improvement reports for all disciplines	□ Produce integrated report from clinical, managerial and patient sources □ Staff discuss integrated reports and plan actions □ Online appt systems □ Track patients for e.g. diabetes cycle of care □ Use clinical data to identify patients with complex needs and monitor health outcomes	□ Part of a research and referral network with focus on improving data quality of patient registers with peer review □ Use e-systems to track care between providers e.g. Referral attendances
Information sharing in health neighbourhood	□ Traditional referral networks with communication mainly by phone and fax	□ Electronic local service directory present and maintained □ Automated digital fax where printing is optional	□ Able to do secure messaging externally e.g. referrals	□ Sending and receiving secure messages consistently for referrals □ Majority of scripts sent to Prescribing Exchange Service	□ Seamless information flows between and among clinicians, patients and authorized entities using referrals as example
Managing health Information & Communication Technology (ICT) implementation & change	□ Vendor training and support for practice software e.g. clinical, messaging, telehealth, □ Have an ICT system but it is not being used or does not work reliably	□ Partially meet requirements for PIP eHealth □ Liaison with vendor to provide ongoing support for staff □ Practice IT person □ Practice champions	□ Meet all requirements for PIP eHealth □ Coordinated and optimized purchasing plan re ICT hardware and software □ Participate in user groups around ICT implementation	□ Registered and contributing to PCEHR □ Fully interoperable systems within and among centres in neighbourhood □ Consensus business plans and policy in ICT	□ Exploring new ICT to innovate e.g. social media and interactive website for patients to feedback on care plans and eHealth processes.
Data Quality Management & Information Governance	□ Privacy and security protection (RACGP benchmarks). □ Uncoordinated within and across professions	□ Separate ad hoc clinical audit activities □ Protocols to regularly assess and manage data quality in EHRs	□ Coordinated regular clinical audits □ Data governance person identified but no clear roles or responsibilities or resources	□ Clear information governance roles and responsibilities with executive and administrative support.	□ Part of a research and referral network sharing data with explicit rules for access and use
Using health information to improve care and population health	□ Decision support (e.g. Prompts, registers) may be present in EHR, but is not specifically used □ Staff development is staff's own responsibility within and across disciplines	□ Coordinated policy on use of DS tools e.g. templates and care plans □ Centre wide approach to QICPD but little coordination between professions	□ EDS tools e.g. CVD Absolute Risk calculator used consistently □ Centrally coordinated data driven QICPD programs for centre staff within and across disciplines	□ Patient registers with clinical and managerial information to guide planning e.g. cost-effectiveness studies as part of QI program using cohorts identified in EHR	□ Research and referral network conducting innovative informatics R&D, clinical & population health studies, and multicenter RCTs

APPENDIX 3: OVERVIEW OF EHEALTH AND INTEGRATION INDICATORS CASES 1-7

Table 1. Overview of eHealth and Integration indicators for Case Study 1

Case 1	Integration and shared care elements	eHealth elements	Informatics capability maturity				
			ICM 1. Standardised	ICM 2. Standardised	ICM 3. Controlled	ICM 4. Controlled	ICM 5. Standardised
Consumer focused integrated PHC system	Patient and carer centred Clear roles for clinical, managerial and administration staff Positive work environment Clinical-managerial team works well Management plans and team care (GP and PN). Co-located AHPs share resources (EHR)	Shared EHR between GPs, PNs and pharmacist PCEHR enabled Shared appointment system Results received through secure messaging uploaded into clinical system.					
Improve access and reduce inequity	Established relationships with community Long term GP and PN Co-located AHP services Bulk billing for GPs	Maintained website providing information about services and links for patients. Facebook page Address book in CIS used by all staff					
Health promotion, prevention, screening and early intervention	Designated PNs for recall/reminders and EPC Minimal patient self-management Individual patient focus Protocols present No focus on health literacy	Regular recalls (including external providers) generated using CIS and put into care plans where relevant. Routine auditing of patient lists for immunisation Decision Support Tools in CIS used but no centre policy					

		All clinicians use the Doctors Control Panel for clinical care Use the internet and CIS resources to provide health information for patients Standardised care plan/referral templates
Quality, safety, performance and accountability	Clinical-managerial team works well Clinical and corporate governance structures function well Data governance ad hoc: PM responsibility Meetings and business reports Clinical audits/reports External provider for IT support QI and CPD ad hoc RACGP accredited	Most data is coded PENCAT* Clinical Reports generated routinely Billing, financial reports and patient demographics generated weekly for management meetings. Secure messaging used to receive pathology, radiology and discharge summaries and send HMRs. Internal messaging system used by all staff
Data quality report	The recording of specific information in the patient record met most RACGP targets* including: gender (100%); DOB (100%); Aboriginal and Torres Strait Islander; (74%) and smoking status (75%). The practice is working towards the recording of height (61%), weight (61%) and BMI (39%) while allergies (89%) is 1% below the standard and the recording of alcohol (35.3%) and country of birth (1.1%) are well below. The correctness of these records is high (99%-100%). There is no standard recording of a diabetes diagnosis (almost 90 different terms).	

***** Clinical Audit Tool software provided by Pen Computing Systems.

Table 2. Overview of eHealth and Integration indicators for Case Study 2

Case 2	Integration and shared care elements	eHealth elements	Informatics capability maturity				
			ICM 1. Optimised	ICM 2. Standardised	ICM 3. Standardised	ICM 4. Standardised	ICM 5. Standardised
Consumer-focused integrated PHC system	Patient/carer centred Chronic disease, mental health and student health focus No shared care planning or management Positive working environment Core staff work well as a team	Online appointment system (HealthEngine) to book appointments with GPs and PNs. SMS reminders for GP appointments Multiple billing, appointment and recording systems for co-located clinicians. Registered but not contributing to PCEHR					
Improve access and reduce inequity	Newly established. Developing a niche and profile in the community. Strong links with university. Co-located services (AHP and LHN specialists). Aim to provide an environment appropriate to the needs of mental health patients.	Electronic health service directory is regularly maintained. Practice website Active Facebook page Secure website for patients to request repeat prescriptions.					
Health promotion, prevention, screening and early intervention	PN has recall protocols for diabetes Individual patient focus. Not much patient self-management.	cdmNet used to manage chronic disease and preventive care across the team. Reports generated to track patient care (eg. Diabetes), recall and reminders. Use Absolute Risk Tool and other Decision Support tools in CIS.					

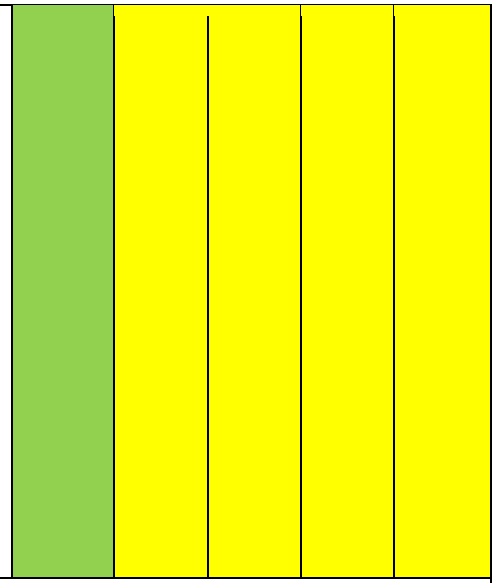
Quality, safety, performance and accountability	Not for profit board Clinical Director Practice Manager External provider for IT support Staff and clinical meetings. Managerial information systems Data driven QI and CPD programs RACGP accredited	Argus secure external messaging used for receiving letters from specialists. Use CIS internal messaging system Digital fax for receiving specialist reports and ED summaries. Medisecure installed Clinicians use coded terms through drop down menus in CIS. Monitoring and auditing of the clinical information of new GPs. Administration head leads eHealth – looks for new developments that could benefit the Centre.	
Data quality report	Based on a PENCAT report of all patients provided by the practice they did not meet the RACGP standards for recording gender (96.7%), DOB (97.4%), allergies (83.3%), smoking (51%) and alcohol (43.9%) while they were working gradually towards the recording of height and weight (32%). Results may be higher for RACGP active patients.		

Table 3. Overview of eHealth and Integration Indicators for Case Study 3

Case 3	Integration and shared care elements	eHealth elements	Informatics capability maturity
Consumer-focused integrated PHC system	Patient/carer-centred Comprehensive Co-located AHPs share resources (EHR) Team appears to be positive and cooperative	Integrated clinical, administrative, billing and communication system. All clinicians add to the EHR (not general surgeon). Multiple users can access a patient's record simultaneously. Patients can self-register on a computer in reception. SMS recall and reminders HealthLink and eRef installed for referrals but not integrated with CIS so cannot be used. PCEHR enabled with some GPs contributing but few health summaries uploaded.	ICM 1. Optimised ICM 2. Standardised ICM 3. Standardised ICM 4. Standardised ICM 5. Controlled
Improve access and reduce inequity	Community-centred Links with local universities Large, multidisciplinary centre with co-located AHPs and specialists. Bulk billing Open extended hours	Used telehealth until changes to the Telehealth MBS items rendered this centre ineligible for Medicare benefits. Central organisation website Health service directory within integrated system. Also use the State Health provider directory.	
Health promotion, prevention, screening and early intervention	Individual patient focus No policy for use of decision support tools.	Track patients for care Standardised forms and templates	

Quality, safety, performance and accountability	Large organisation with multiple practices. Board with subcommittees Business Unit Manager and CD: Data quality management and clinical governance. Staff and clinical meetings, address eHealth issues. CD salaried with time for teaching, data cleansing, creating templates. IT support provided by university Teaching culture ICT business plan Coordinated regular audits	Routinely use billing and management data for financial planning purposes. WiFi available for fast internet connection. Mix of coded terms and free text for recording diagnosis. Internal email system used between clinicians that provides an audit trail. Onsite IT support one day per week. Dedicated server room and latest software available. Regular IT training for clinicians and students. Ongoing record cleaning Participate in the ASPREN (Research network) which is monitoring infectious diseases. Medisecure installed	
Data quality report	A CAT summary report provided by the Centre indicated that gender (97.8%) and DOB (99.96%) were almost at the RACGP target (100%) but the recording of Aboriginal and Torres Strait Islander (2.1%), allergies (8.1%), smoking (64.7%) and BMI (39%) were below the targets.		

Table 4. Overview of eHealth and Integration indicators for Case Study 4

Case 4	Integration and shared care elements	eHealth elements	Informatics capability maturity				
			ICM 1. Optimised	ICM 2. Standardised	ICM 3. Standardised	ICM 4. Standardised	ICM 5. Controlled
Consumer-focused integrated PHC system	Patient/carer-centred Focus on multidisciplinary and preventative care. GPs and PNs work well as a team. Collaboration with co-located staff varied. Some co-located staff share resources (EHR, appointment, billing systems).	Integrated clinical, administrative and billing system. Most clinicians (except psychologist and specialists) contribute to the clinical record. Online appointment system Dragon Dictate speech recognition software used by one GP.					
Improve access and reduce inequity	Patient records provided to 'home' practice as required. Co-location of AHPs and specialists Open extended hours Bulk billing for concessions	Central organisation website and Facebook page. Electronic local service directory updated regularly and a directory of specialist services.					
Health promotion, prevention, screening and early intervention	Individual patient focus Recall and reminder systems in place No policies on clinician use of decision support tools or health resources.	PENCAT used by PNs to identify patients for preventive care. Recall and reminders run weekly Resources within CIS and external websites used for patient information.					

Quality, safety, performance and accountability	Privately owned, corporate governance. Centre and practice managers on site. Responsible for data governance. PN role to clean data and produce clinical reports No clinical director Staff, clinical and admin meetings External providers for IT support RACGP accredited	PENCAT reports generated monthly to clean patient data and check disease registers Financial and billing reports produced weekly for clinician productivity and business targets. Participating in Improvement Foundation activities. Internal messaging system integrated with CIS. Secure external messaging system receiving discharge summaries. Medisecure available but pharmacists don't use it. External IT support can provide remote access.					
Data quality report	No data available.						

Table 5. Overview of eHealth and Integration indicators for Case Study 5

Case 5	Integration and shared care elements	eHealth elements	Informatics capability maturity
Consumer-focused integrated PHC system	Patient/carer-centred Work environment negative	Multiple clinical, billing and appointment systems that are not integrated. GPs, PNs most external providers contribute to the IPHCC EHR but not consistently. AHPs keep own records and may write in the EHR. Patient records uploaded to laptop for aged care visits. HotDoc online appointment system - also available on tablets at ED using Wi-Fi. SMS reminders for appointments Registered for PCEHR but not contributing	ICM 1. Optimised ICM 2. Standardised ICM 3. Standardised ICM 4. Basic ICM 5. Basic
Improve access and reduce inequity	Co-located AHPs, community health staff, specialists and hospital clinics. Extended opening hours	Telehealth not used often. GPs use Skype for some consultations. No centralised health service directory	
Health promotion, prevention, screening and early intervention	Individual patient focus PN conducts health assessments Not much self-management	Patients flagged for health assessments	

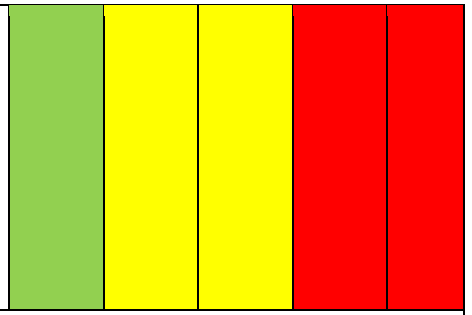
Quality, safety, performance and accountability	Multiple partners involved in ownership and governance. Board Centre management shared by two positions. External provider for IT support.	F8 internal messaging system used. Receive secure external messages. Digital fax used to send some referrals and pathology results. External IT support Use drop down menus and codes in CIS.	
Data quality report	No data available.		

Table 6. Overview of eHealth and Integration indicators for Case Study 6

Case 6	Integration and shared care elements	eHealth elements	Informatics capability maturity
Consumer-focused integrated PHC system	Patient/carer-centred Partnership between practice and LHD. Shared resources (EHR, facility, costs) . Management plans/team care (GP, PN, CH). Positive work environment Focus on building teamwork	Integrated clinical, billing and appointment system for practice and CH staff (private providers use own systems). Registered for PCEHR	ICM 1. Standardised ICM 2. Standardised ICM 3. Controlled ICM 4. Standardised ICM 5. Basic
Improve access and reduce inequity	Co-located CH staff and AHPs. Outreach services (GP, PN, CHN) Bulk billing	Centralised health service directory in CIS.	
Health promotion, prevention, screening and early intervention	Individual patient and community focus Recall protocols (PN, GO, Admin) Not much self-management Funding for integrated care activities Aiming for consistent clinician use of decision support tools and health resources.	PENCAT reports used to identify target groups for IC strategy. Track patients for recall and care plans. Care plan templates in CIS used but not by CH. Use of online health resources and apps for patient information. Use Decision Support Tools in CIS.	

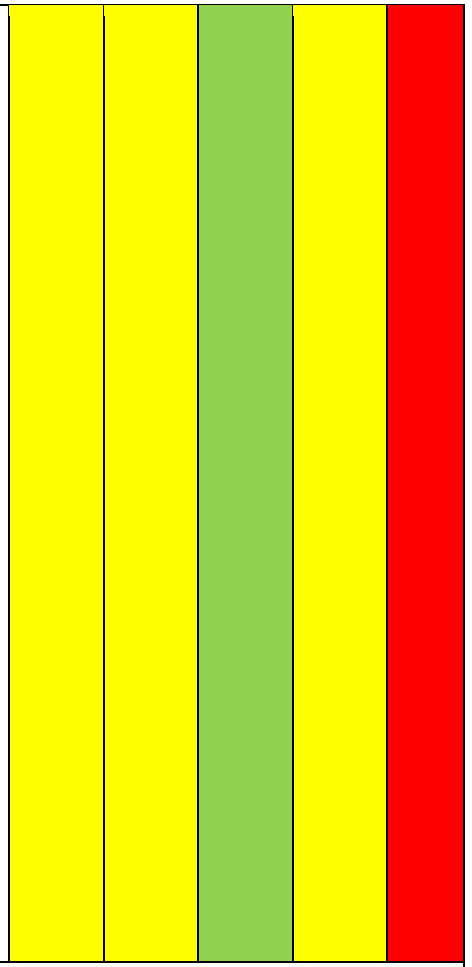
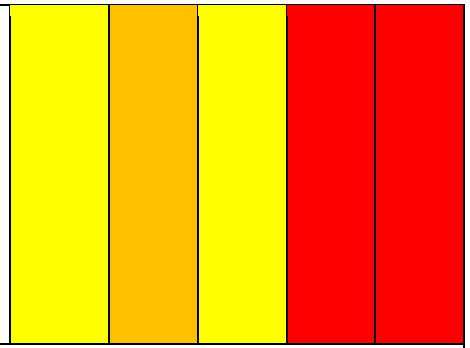
Quality, safety, performance and accountability	Local leadership group Community Health Manager, Principal GP, PM Facility owned by the council Practice and CH staff meetings External provider for IT support. Ensures RACGP standards are maintained. Policies/code of conduct for sharing EHR. Audits/data cleansing focused on data accuracy and coding. RACGP accredited	Recently implemented standard coding for diagnoses. PENCAT reports provided by ML for QI with comparative data from other practices. Videoconferencing for management meetings. Integrated clinical and management reports for management meetings. Argus is used to receive letters from specialists. CIS Internal messaging Medisecure installed External IT support remotely Principal GP initiates implementation of new IT systems. Governance about the sharing of clinical records is included in policies, procedures, staff codes of conduct and includes consent from individual patients. Notification system about patient consent is in EHR. Patients can opt out a clinician from accessing any section of their record. Regular assessment and DQ management.	
Data quality report	A report from the ML Quality Health Improvement Program for the HealthOne showed it met the RACGP standard for recording allergies (91%) and ethnicity (86%) but not for smoking status (52%) and BMI (20%).		

Table 7. Overview of eHealth and Integration indicators for Case Study 7

Case 7	Integration and shared care elements	eHealth elements	Informatics capability maturity
Consumer-focused integrated PHC system	Patient/carer-centred Informal teamwork and collaboration. Access and use of shared EHR varies between clinical staff.	Multiple clinical, appointment and billing systems. Use of a unique ID in the IPHCC's EHR and CH system. CH staff can access the IPHCC's EHR but do not consistently add to clinical notes. Some scan and add notes. Registered and contributing to the PCeHR for a specific patient group.	ICM 1. Standardised ICM 2. Controlled ICM 3. Standardised ICM 4. Basic ICM 5. Basic
Improve access and reduce inequity	Community centred Co-located CH AHPs Bulk billing Grants sought to provide services	Health Service Directory but not regularly updated. Organisation website and Facebook page	
Health promotion, prevention, screening and early intervention	Focus on individual patients and vulnerable population groups. Some tracking of patients for recalls (Diabetes register). Self-management Health literacy training	GPs use care plan templates. Decision Support Tools not used consistently. Access health resources online for patient information.	

Quality, safety, performance and accountability	Large corporate management structure external to centre. PM, AHP and Client Services managers. Staff meetings CD PN nurse able to clean data External provider for IT support. Shared resources and operational costs.	Secure external messaging system receives referrals. Digital fax Multiple internal messaging systems Medisecure installed	
Data quality report	This practice exceeds the RACGP targets: DOB (100%), Aboriginal and Torres Strait Islander (82%), smoking status (88%), allergies (96%) and almost gender (99.96%). There are very high rates of recording height (84%), weight (87%) and BMI (71%). Correctness of these records is very high (99.6%-100%). There is no standard recording of Diabetes diagnoses (over 300 terms).		

APPENDIX 4: MATRIX FOR WHOLE STUDY OF INFORMATICS CAPABILITY MATURITY AND INTEGRATION

IPHCC model	Enhanced General Practice	GP Super Clinic				HealthOne	Community Health Centre
Case	**Case 1: Regional NSW**	**Case 2: Melbourne**	**Case 3: Adelaide**	**Case 4: Sydney**	**Case 5: Regional VIC**	**Case 6: Regional NSW**	**Case 7: Melbourne**
Context	Traditional family practice. Established for 20 years approx. Expanded from 1 to 2 small buildings on the same site (separate waiting areas). Major city (ASGC) 3 GPs PGP involved in APC Collaboratives and DGP. Accredited Previously a teaching practice.	Newly established by DGP/Medicare Local in 2011. Purpose built on a university campus. Major city (ASGC) Mental and student health focus, 7 GPs (2 FTE)Accredited Teaching practice medical, nursing and GP registrars.	Major city (ASGC) Large multidisciplinary centre. Major city (ASGC) 13 GPs (8-9 FTE) Generally has a positive feel. Links with local universities.	2 sites (40km apart) operating as independent practices. Site 4a newly established in 2012. Site 4b previously established and reopened in 2012. Purpose built facilities. Major City (Site 4a) /Inner Regional (Site 4b) (ASGC) 6 GPs (2-3 FTE) per site.	Previous practice on site since 1992. Re-opened as a GPSC in 2011 in a larger purpose built facility (same site). Inner regional (ASGC) 19 GPs approx.	Opened 7 years ago approx. Inner regional (ASGC) An integrated primary and CH initiative. Moved to a purpose built facility 5 years ago. Participating in NSW Integrated Care strategy (partnership between LHD and ML) Provide outreach services to surrounding smaller communities 5 GPs (3 FTE)	Community Health Service. Established for 40 years. Major City (ASGC) Large organisation with 40 sites. Experienced a number of mergers. Most recent 12 months ago. 11 GPs approx.
Organisation	Privately owned by Principal GP and wife. Board: PGP, PN, PM, Finance Manager.	Not-for-profit. Board to PM and Clinical Director; PM to admin and Nurse, CD to GPs and nurse.	Part of a larger organisation operating 6 practices. Organisation Board, Board subcommittees,	Privately owned and operated by a non-clinical CEO. Full-time PMs at each site. Contracted centre	Owned by a university, CH service and LHD 4 project partners represented on board: ML, University, Council,	HealthOne Model Operational costs shared between practice and LHD. Utilise each other's resources.	Large management structure above centre management structures. Regional manager

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
	Co-located private AHPs (Diet, Psych, Phar)	Allied health and LHN clinics - relate to PM. University on Board. Building reverts to them in 2031. Multiple co-located AHPs and medical specialists (LHN).	corporate mgmt team and Business Unit Managers The IPHCC has a CD who is on the Board and a Business Unit Manager. Multiple co-located AHPs. General surgeon	manager part-time across both sites. Link between CEO and PMs. Operating company owns practices in 2 Australian states. Multiple co-located, private AHPs. Medical specialists (Site 4a only).	Medical Education body. Board includes independent reps Dysfunctional Board and partnership. Blocks decision making. HARP, CMH nursing (ML), medical specialists, podiatry (CH). Co-located private AHPs (physio, psych).	Facility owned by the council. Practice staff (GPs, PNs, Admin) and LHD/CH staff (CHNs, AHPs, admin) Co-located, private AHPs (Pod, Psych, Optometrist).	for 3 streams of the larger organisation. GPs, PNs and multiple AHPs (CH). Hospital clinics. 1 medical specialist.
Integration aims	Enhanced Primary Care – new PN role to retrieve and improve mgmt through use of MBS Items.	Meeting aims of GPSC funding requirements. Developing a chronic disease management focus. Health workforce education in MD care environment.	Meeting aims of GPSC funding requirements. Shared EHR between all co-located staff.	Meeting aims of GPSC funding requirements Provision of Multidisciplinary team care and a focus on preventive care.	Meeting aims of GPSC funding requirements	Meeting aims of HealthOne funding requirements Chronic disease management and prevention Shared health record between HealthOne and the hospital. Current demonstration site for an IC pilot trial in partnership with ML and LHD. Presents itself as one service.	Provide multidisciplinary services to vulnerable populations. Particularly refugee and migrant groups.
Leadership model	Clinician-led PGP and PM are primary decision makers. Major decisions made by	Management-led PM manages day to day decision making, Major decisions referred	Management-led Business Unit Manager and CD manage day to day	Management-led. Decisions made by owner/CEO. Fed back to staff through	Management–led. Centre management shared across 2	HealthOne flat management structure. 3 PGPs. Local leadership group for IC	Management-led PM: Manages GPs and PNs AH Manager and

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
	the board.	to the board.	decision making.	contracted centre manager and PMs.	positions. Board conflicts and high turnover of mgmt staff has disrupted leadership.	strategy: PGP, CH Manager, ML, HSM, PN. CH Manager works in partnership with PGP.	care coordinator: Manages AHPs Client Services Manager: Manages reception and administration. Some decision-making within teams. Higher level decisions made by management staff.
ICM 1. Data collection, integration and management							
ICM MATURITY	STANDARDISED	OPTIMISED	OPTIMISED	OPTMISED	OPTIMISED	STANDARDISED	STANDARDISED
CONTEXTUAL FACTORS	Practice systems upgraded 4 years ago with arrival of new PM. Recent introduction of bulk billing and a no appts necessary policy. History of co-located private AHPs.	Medical staff well set up with eHealth tools Fully computerised. Trialling cdmNet.	Psychologists are employees of the practice and have specific patient targets to meet.	Customer service/ business focus eg. focus on reception as the front line. PNs asked to complete a certain number of preventative appts per day. Caters for walk-in patients and emergencies. Co-located specialists. Receive external, non-practice patients. Billing and record keeping procedures vary between	Centre employees are GPs, PNs and admin staff Medical oncology there 4 days per week, completely separate. Complex and expensive IT system (58 computers). Multiple clinics including private providers and LHN. Finance Manager started 2 months ago. Shares CM role. Not trained to use PENCAT.	Different IT systems used by practice and CH staff Multiple IT systems used throughout LHD. Aim to maintain a reputation of no fees. Private providers responsible for own billing so payments aren't associated with the practice. Back office shared by practice and LHD staff. MOU between LHD and practice for shared administration	Different combinations of IT systems used by practice and CH staff for each stream of the wider organisation. External finance Dept: in charge of billing and maximising use of MBS items. The merger means the on-site finance person is moving to head office. Nurse-led connecting care program- Chronic disease, refugee, mental health.

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				specialists.		duties.	All patient records are electronic. Previous paper files have not been scanned into electronic system. Paper records are stored and requested as required.
RESOURCES: **Number of managerial and clinical information systems used.** **Other resources**	3 systems	5+ systems Multiple systems used by specialists and AHPs.	2 systems WiFi available, provided by the university. Staff access only. Terminal server. Multiple users can access a patient record simultaneously.	3 systems (+ private AHPs and specialists).	3 systems (+ private AHPs and specialists)	3 systems (+ private AHPs)	5 systems
Managerial/ financial systems	Pracsoft: Billing, appointment lists, weekly generation of financial reports, patient demographics. PENCAT: Clinical reports, diabetes cycles of care, identifying gaps in care.	Best Practice (BP): Billing Private/LHN specialists/AHPs: Majority handle own billing. Health Engine: Online appointment system PENCAT: Identification of patients.	ZedMed: Administrative, appointments, billing, reports. PENCAT: Used by PM to generate reports. General surgeon uses a different clinical and billing system.	BP: bulk billing, private billing, appointments, weekly financial reports. PENCAT and Canning tool: Clinical and managerial reports. Online appt system	BP: PENCAT: Not fully utilised. Used by PN. TRAK: Billing for some CH AHPs.	BP: Billing, appts, recalls PENCAT: Used to identify target pts for IC strategy. Monitoring quality improvement. Private AHPs use own billing systems.	PracSoft: Medical appts. TRAK: AHP appts and room bookings.

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Clinical systems	Medical Director (MD3): Patient register, clinical records, recall and reminder system, referral and care plan templates.	BP: Patient records (GPs and PNs) cdmNet: Participated in a research trial of online chronic disease management and prevention system. Private AHPs: Range of systems Citrix used by LHN	Zed Med: Clinical system. Used by all clinical staff. General surgeon uses a different clinical and billing system.	BP: Patient records. Chiropractor: Uses own record system.	BP: GPs, PNs, private physio TRAK: (CH) LHN: Use own record systems.	BP: GPs, PNs, CHNs, CHAHPs Ferret (CH). Private AHPs use own record systems.	Medical Director (MD: records TRAK: All AHPs (AHPs – for physio and podiatry. Titanium: Dental
Staff/Time/Funding/ Other resources	Dedicated nurse/ admin time for recalls and diabetes cycles of care. Supernumerary EPC nurse Experienced PM and Finance Manager MBS items facilitate PN employment APC Collaboratives	Experienced PM. Assesses other practices for accreditation.	CD with protected time to review data quality.	Data reports run by PNs and followed up by admin staff. APC Collaboratives supported by ML.	FM looks after payroll (outsourced), billing, operating costs and contracts. ML has provided a practice profile to assist in improving MBS revenue eg. use of management plans and item numbers (support not ongoing). WiFi available for patient use.	Funded GP and PN time to plan and implement integrated care programs (IC strategy). Support available from ML eg. IC strategy project lead (ML) is the main person responsible for using PENCAT. Health Intelligence Unit. Assists with evaluation of IC strategy and data reporting. PN employed by IC strategy, assists LHD CHNs with using BP.	

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MECHANISMS: **Access and use of patient records (shared/separate)**	Shared single patient record (Pharmacist and Dietician). Psychologist uses own record system for privacy reasons. Pharmacist accesses patient records to identify patients for HMR.	Individual log ins. Staff can track who made changes in patient files. Psychologist uses own system for privacy reasons Separate records for practice and co-located external providers. A terminal links to LHN patient mgmt systems. Permission is required to access different areas of the patient record. Handwritten/ printed copies of electronic notes in LHN system are scanned into BP.	All clinical staff can access and add to the clinical record. Limited access for non-clinical staff. Psychologist: Handwritten notes are typed into EHR. Online registration desks for patients.	GPs, PNs and AHPs have access. PNs and GPs have different levels of access. Some AHPs/ specialists use own systems. Dial in remotely to servers.	Single patient record for practice patients shared with LHD and CH service staff for practice patients. LHN and CH staff have separate records (eg. CH use TRAK) not accessible to practice staff. External providers supposed to enter notes for practice patients into BP record. Not consistently entered. Psychologists keep BP. Uncertain if they are accessible to others. Specialists can log into own systems (private network) using practice computers HARP staff: Hospital systems accessible on site. Can access BP	Single patient record (BP) for practice patients shared with CH staff as part of IC strategy (with consent). CH staff use Ferret for non-practice patients and to enter occasions of service for practice patients. Private AHPs do not access BP. Use own record systems. Reception staff have limited access to patient records. Ferret and EMR used by CH staff when seeing hospital patients.	Differences between who, what and how information is entered into MD record. Not everyone has access to MD. Depends on clinician. Some PNs and GPs have access to TRAK and MD. GPs don't use TRAK to view notes or occasions of care. Community mental health nurses use MD. AHPs can access MD. Some AHPs can access MD. (Notes entered into TRAK, summary into MD) LHN AHPs use Citrix only.
Care coordination	GPs and PNs use Doctors Control Panel for preventive care. PNs review patient	Clozapine register	Track patients for care e.g. diabetes cycles of care	BP tracks referrals. GPs responsibility to enter. Clinical data used	PENCAT: Limited use. PN uses for reminder lists, patients due for health assessments,		Recently started tracking patients for diabetes cycles of care.

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	lists for the next day to assess care needs.			to identify patients for health assessments, health checks and HMR. Participating in APCC waves including diabetes and Site 4b eHR tracking diabetes patients to evaluate kidney function.	updating and cleaning records (active/inactive patient register).		
Reports	EPC Nurse: Care coordination using data from MD3, Pracsoft and PENCAT reports. Correspondence from providers entered into MD3 and Care Plans	Practice Information Management Support (PIMS) report produced using PENCAT by PN. Used to track Diabetes COC. Results distributed.	Managerial reports produced weekly for Head Office. Reports generated using PENCAT and ZedMed. Used for particular projects or identifying groups of patients as needed rather than planning. Free text and coding (IPC) searches used. Regular reports supplied to Cth Govt.	Coded terms used by GPs in BP but not universal. Financial and billing reports produced weekly. Includes billing, practitioner and PN productivity. Reports sent to owner. Reviewed against financial targets. PENCAT/Canning tools: Not used regularly. Improvement Foundation waves and accreditation. BP and PENCAT reports generated monthly to clean patient data,		Coded terms used for diagnoses within clinical record. Everyone has been taught how to code. PNs participate in coding, data cleaning, coding diagnoses from discharge summaries and specialist letter s into BP. Recently started piloting generation of monthly reports using PENCAT sent to ML (IC strategy). 1, 6, 12 monthly data reports about service utilisation and clinical indicators provided	

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				check disease registers, and identify patients for preventive care.		to HIU (IC strategy)	
Billing	Direct billing and rebates Batch manager (Excel)	Online claims Billing done through centre system for haematology and endocrinology only. All others do their own.	Physios lease rooms: Practice reception book appts and do HICAPS claims.	Codes used for billing Online claims	A range of billing arrangements for AHPs. Not all LHN and CH staff are billed through practice computer system. Eg. podiatry is TRAK. Co-payments collected by the practice. Paediatric clinic (LHN): Own receptionist uses BP. Billing done separately. HICAPS used only for physio (private patients). Billing by practice receptionists. Online claiming. Unsure if EPC reimbursement is done automatically.	Online billing through Medicare using BP. Private providers complete own billing.	External Finance Dept: Billing and maximising use of MBS items. FM in charge of billing including AHPs. Provides billing reports to GPs.
Appointments	Separate appointment lists for GPs and PNs. Phone AHPs book own appts.	Separate appointment systems for external providers and hospital clinics. Online	Phone Previous online appt system.	Online appointment system available. PNs have own appointment lists.	Receptionists access TRAK and make appts. Reception book physio appointments.	Single reception desk/ access point for GPs, PNs, LHD and pathology. Single appt system (BP) for GP, PN	One receptionist dedicated to AHP/ TRAK. All receptionists can access both systems.

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	Reception book pharmacist appts. Plan to implement an online appointment system.	appointments (GPs and PNs)			Online appointment system (HotDoc) since Sept 2014. Also available via tablet with ED triage nurse in ED. LHN: Appt list received a few days before. Provide own receptionists. External clinics email appointment lists to reception who enter into BP. HARP appts- made by the LHN. List is sent to the IPHCC. PN usually books appts for health assessments.	and LHD staff Private AHPs manage own appointment lists. LHD physio has paper based appt book. Unsure why. Procedures to account for missed appts. External appts entered into patient file. Staff can remind patients of appts.	Appts for GPs and PNs in PracSoft and AHPs in TRAK.
Recall and reminders	Recall system on MD. Recalls run weekly, GPs and PNs can add and update. Reminder letters sent to patients. Practice templates in MD. Recalls from external providers added to MD EPC nurse.	SMS reminders for GP appointments. Recall and reminder systems for preventive health checks, diabetes COC and test results.	SMS recall and reminders through ZedMed (for long appts and AHP care plans).	Recall and reminders run weekly. PNs and admin staff manage urgent recalls. Appt reminders via SMS and email.	SMS reminder system. PN uses PENCAT to run patient reminder lists for health assessments.	Recall/reminder system in BP. Used for chronic disease patients (diabetes, TCAs, Mgmt plans). PNs and GPs enter recalls. GP "action list" including urgent recalls and referral appts attended to by reception staff.	SMS sent for all appt reminders or phone if preferred by patient. No recall system in TRAK eg. for Diabetes foot checks. GPs and PNs enter recalls into MD but ad hoc.

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
IMPACT	**Shared records and integrated systems:** - Improve patient experience and continuity of care - Facilitate PN involvement and more efficient use of GP time - Allow patients to see other GPs. **Follow up:** Unable to maintain activities started in APC collaboratives without key people eg. diabetes cycles of care missed without dedicated PN.	Online appts well received by patients particularly students.	**Shared records** GP find shared eHR works well. Information from AHPs is useful. AHP finds EHR useful eg. can access correspondence, and reports. Psychologist: Double handling of records. Prefers to handwrite and scan into notes. Initial concerns from psychologist around confidentiality of records sharing. **Interoperability of systems** Problem between ZedMed and eRx. Problems with secure messaging through Zed Med and Health Link. eRx and Medi-Secure are not functional – had to terminate. Online appt system ceased. Patients not cancelling appts. Not able to book the right	Participation in APCC collaboratives eg. Diabetes wave. Patient registers currently limited to participation in APCC waves. Single patient record facilitates patient care between clinicians. Other clinicians can check patient results if their GP is away. Electronic health record not always trustworthy. Mistakes can be made entering information. People are too hurried and make mistakes. Analysis of patient data depends on consistent data entry. Universal access to patient records 'corrupts searches'. Not all patients are GP	External providers are supposed to enter information for practice patients into BP record. Dual record keeping for AHPs. Information not entered by all AHPs. SMS reminder system, bought in blocks of 10,000. Reminder given when running out of messages. System failed when new messages weren't purchased or admin forget to send. Patients didn't arrive. Patient use of online appt system has been increasing. Not well utilised in ED setting. HotDoc appointments can fail when made simultaneously. Confirmation email not sent if appointment isn't successful. Patients arrive without booked	**Slow network** Work time wasted by slow network and inadequate infrastructure. Can't enter individual information or scan documentation into Ferret due to slow system and time restraints Most patients approached about sharing their EHR have agreed and provided consent. Double documentation required for AHPs and CHNs (Ferret and BP). **Single access point and appt system** The single appt system used by CH and practice staff works well. PNs can make appts for CH AHPs. On site staff know where outreach staff are because appts are in BP. Single phone number and redirection from satellite health	**System integration** – Only patient date of birth and the UR # are merged from TRAK into MD. So consistent UR # is consistent. Two appt systems are not aligned. Difficult to book appts with multiple providers. Chronic care PN can access TRAK to check if a patient has had an appt with AHP. MD doesn't integrate well with PractSoft and TRAK systems. Duplication of records for AHPs. *"And this is how separate we are from an integrated clinic, I don't even have log ons, I don't even have a remote access to any of these systems". (7-CM)*

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			length appt. Didn't suit practice needs. Now looking at other options.	patients and don't have a complete clinical record. **Appointment systems** Electronic so less chance of overlapping and mistakes. Online appt seems to be well-used. Appointment reminders. Patients less likely to miss appts. PN satisfied with diabetes wave. Patients are checked regularly for diabetes care.	appointment. Minimal impact on number of phone calls received at this stage. ML practice profile identified room for improvement in recording information/ codes to claim MBS items	centres Easier for patients to contact providers. **Gaps in information** IC strategy health assessment tool is outside of BP. Gap between assessment and documentation in BP. Difficult to identify who is responsible for patient follow up. **Access to EHR has improved information sharing** LHD staff can access information about medical history, pathology, referring GP, medications. Communication issues related to IT/IM systems between service providers cited as causing poor uptake of some services, duplication and a lack of ongoing care coordination (IC Project Mgmt Plan).	

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ICM 2. Information Sharing in the Health Neighbourhood							
ICM MATURITY	STANDARDISED	STANDARDISED	STANDARDISED	STANDARDISED	STANDARDISED	STANDARDISED	CONTROLLED
CONTEXTUAL FACTORS	Smaller practice facilitates communication and clinical cohesion Established practice (20 years) Long term relationships with local health and community services. Few local specialists use electronic communication systems. Co-located AHPs (Diet, Psych, Phar) report having good rapport with GPs.	Multiple co-located AHPs and specialists (LHN and private). Operate as tenants. Area well-serviced for GPs and AHPs. Increasing numbers of patients with chronic and/or complex needs. LHN record system now available. Previously progress notes carried in a confidential bag to and from the hospital.		Most local specialists don't use secure messaging. Relationships with community/hospital services initiated by nursing staff.	Hospital ED located close by. Practice reception will contact them by phone to let them know they have appointments available. Pathology located on site. Private providers lease rooms. Receive external referrals for counselling and child psychologist. *"We don't do a huge amount of telemedicine just yet."* Would be useful for accessing specialists in Melbourne.	Gradually developed a relationship with the hospital who are included in the "*full team approach*" to IC. Both practice and non-practice patients are seen by CH staff. Most AHPs employed by the LHD. Some co-located private AHPs. CHN and GP outreach clinics to surrounding smaller towns. Staff seem to work well as a team and have good rapport with each other. Common tea room used by all staff (practice and LHD). Small community setting. CH AHPs see hospital inpatients. Local pharmacist conducts HMRs for IC strategy.	Culturally diverse patient population. Recent merger, disintegration of structure, meetings not happening, changes to management and leaders. CM is trying encourage more GPs to use Argus and set up information required. Most referrals are to public hospitals who don't use Argus. GPs don't always have time to look at internal message alerts.

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						Minimal but increasing uptake of Argus amongst local external providers. Many standalone systems (hospital, centre, LHD, pathology) that don't connect with each other. **Pharmacy:** *"the scripts now are…all electronic, they all get a barcode, so we still physically get the actual prescriptions from the clinics, but we scan them now so that it actually downloads off the – the cloud or I don't know where ever it is."*	
RESOURCES	Argus Healthlink HCN Messenger Doctors Control Panel Digital fax ML PN liaison team	Argus BP internal messaging system Digital fax Clinics have a physical folder describing who has decision making authority, billing and appointment arrangements.	Have Argus and Healthlink (not used) MediSecure is automated for scripts. Digital fax	MediSecure available but it is not used. Secure messaging: Argus (4b) and Healthlink (4a and 4b). BP: Some AHPs add to the patient record.	F8 messaging system Argus Digital fax (1 computer only). Telehealth set up in boardroom.	BP internal messaging system. Argus Healthlink: Available but not yet using. Videoconferencing facilities shared by LHD and practice. General referral templates used by GPs and PNs.	Argus used to receive messages. Electronic fax (incoming) available Yammer messaging system. External website, not secure. Teleconferencing/ videoconferencing

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
							facilities (not used). Admin staff member sets up computers for new GPs to do imaging and pathology downloads.
MECHANISMS **Internal communication**	Clinicians and pharmacist use MD. HCN messenger used by all staff for internal communication.	BP internal messaging system, works well. All messaging is linked to patient files. Emails received from patients but not sending personal details.	Clinicians use internal emails and SMS through ZedMed. Provides an audit trail. Intramail (ZedMed) used within practice Email used to communicate with other clinics within the organisation and head office.	Shared single patient record accessed by GPs, PNs and contracted AHPs (dietician and osteo). Psychologist don't use for privacy reasons BP internal messaging.	External providers are supposed to enter into BP for practice patients Private physio uses BP record system Aged care facilities: patient records are uploaded to a laptop. Clinical notes recorded in Manad (Aged Care software) which uploads into BP. F8 messaging system in BP used by some staff. Physio used to send summary reports.	BP shared by all practice clinicians. CH staff able to access as part of IC strategy. BP internal messaging used by practice staff only. Use of shared record system during case conferences for IC strategy. Two separate computer systems for practice and LHD staff meant they couldn't emails each other. Now able to access the same software and can "*send a private message on the program".*	Nurse-led connecting care program AHPs use different methods to add info into MD. TRAK used for internal communication for relevant staff. Internal messaging system on MD not yet working. Insecure external emails used for internal messaging.
Secure messaging and results	Argus: Receiving discharge summaries, some pathology/radiology results. Pharmacist uses to send	Argus: Receiving letters from specialists but not sending. Downloading	Argus and Healthlink: available but not used. SMS used through	Healthlink and Argus: Used to receive discharge summaries. Not used for emails or	Argus: Used to receive information. only Fax: Paper copies scanned into	Argus: Receiving letters from specialists but not sending referrals. Most specialists don't use therefore	Argus: Receiving incoming referrals, but not sending. Digital fax with optional printing

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
Email	reports between the centre and pharmacy. Pathology received electronically. Downloaded into MD through Healthlink. Urgent results faxed. Use digital fax through MD to some providers	pathology results. Information received goes directly into clinical notes. ePrescriptions used but not for all patients. Use a secure website for repeat prescription request bookings. Result scanned into patient files. Faxes and reports are stored in the system until seen by GP. GPs upload when checked. Discharge summaries received by fax. No external emails sent. Do receive emails from patients.	ZedMed for recalls, reminders and some results Pathology and diagnostic results uploaded into ZedMed. Online results for spirometry and EC Live radiology imaging – Data viewer. Clinical photos uploaded to patient files. Use emails for other communication with patients. Psychologist: Uses ordinary emails to communicate with patients. Psychology College not concerned about unencrypted emails if patient has consented.	messages. MediSecure: Barcodes printed automatically onto scripts but local pharmacies do not use this system. Electronic downloads from pathology and radiology providers Email used to communicate with AHPs without internal email addresses. Not used for communicating patient data.	patient notes. Pathology reports downloaded directly into patient record and from digital fax.	cannot ensure info is received. Information for the Connecting Care program received through Argus. Email not used to send clinical information because it is unencrypted.	used for incoming but not sending. Faxes and results received electronically. Incoming correspondence is held in a *"holding folder"* on MD until checked by the relevant GP. Posted correspondence is scanned into the holding folder. Radiology images viewed online (no hard copy films). Online imaging set up on GPs computers. Patients can use general email address. Emails received go to a holding file and actioned. Unencrypted, patients not informed that it is insecure.
Referrals and feedback	Letter referrals to external providers. May be faxed. Use digital fax through MD for some providers. Reports received by	Letter referrals to internal and external providers. Given to patients or faxed.	Referrals by fax (not digital). Online referrals being developed. Send some faxes from computer system, but don't	Referral letters are given to patients or faxed to specialist's rooms. Feedback reports received by post.	Majority of referrals sent by fax by admin staff. Some GPs send by electronic fax. Majority of referrals received by fax or	Referral letters sent ATAPS referral template used by GPs to refer patients to private psychologist. Form faxed to	Referrals generated in MD and automatically saved. GPs write own referrals which are faxed by admin staff. GPs

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
	mail and email. Hard copies scanned into record and destroyed.		receive. General surgeon just started using email. Psychologist: We do the 6 session letter, sent to the patient file. A lot of people do that as an Intramail. Some specialists send letters back through normal email.	Specialists generate GP correspondence letters using own software.	posted letter, then printed and scanned into notes. GP referrals to a CH podiatrist or diabetes educator go through LHN central system. Discharge summaries are faxed and scanned.	psychologist's base practice. No standard referral mechanisms for CH AHPs. Multiple methods used – verbal, phone, email referral forms. Majority received from inside the team. Template used in BP by GP to refer patients to AHPs. Information from AHP consults now provided to GPs and PNs through BP notes. Previously a feedback letter was written by the AHP. Referrals for private psychologist received from reception staff in person when working at the practice. Hard copy HMR referrals received by pharmacist when she attends IC strategy meetings. Pharmacist uses own software	don't have electronic signatures so faxes are printed and signed Reports cut and pasted from TRAK into MD. Standard reporting processes between internal AHPs and GPs eg. letter. Some add reports to MD. Refugee Nurse adds report to MD.

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
						program to complete HMR reports. Hard copies sent to the centre. Pharmacist thinks they are scanned into patient record. GPs fax a copy of their action plan. Hospital discharge summaries received by fax but inconsistent. Hospital OT discharge summaries received by email. **External mechanisms** Videoconference/ teleconference facilities used for team or project meetings rather than patient care. Regular teleconferences held with outlying centres. Scripts and medication charts faxed to local pharmacy (ACF)	
Service directory	Electronic service directory in MD. Not formally	Electronic service directory regularly maintained.	Practice address book in ZedMed. Health Provider	Electronic local service directory updated regularly by administration	No centralised health service directory.	Contact/service directory in BP. Updated routinely when receptionists	MD address book available but incomplete.

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
	maintained.		Registry. Funded by State Health. Maintained by GPSA.	staff. A directory of specialist services is also received once a year. Cross referenced with local service directory. PNs have own informal contact lists.		contact regarding referrals and add new specialists.	
IMPACT	Colocation of AHPs facilitates 'over the counter dialogue'. Hospital discharge summaries received inconsistently, poor quality and not received at the relevant time. Often need to be followed up by staff.	Internal communication system works well. Few shared data systems. Some duplication of patient records. Co-location does not help HIE.	Haven't been proactive to move to electronic messages (to specialists) due to glitches. Also time constraints to send details out to them.	Problems joining diabetes data sets in branches. Can electronically track correspondence internally.	Restrictions on use of MBS items for Telehealth Each workstation needs to be set up individually for electronic fax. This has not yet happened. F8 messenger: *"my one problem with it is that if it's urgent it doesn't attract your attention".* Ongoing backlog of faxes that need to be scanned into patient notes.	*"So for the general practice to refer to allied health it meant writing a referral in best practice, printing it out, handing it to the community allied health team. They would then see the patient, enter the information then into Ferret … They would then have to write a report, print out the report, hand it back to the GPs and then that would be scanned back into the system…"* *"the beauty of it being is the referrals can happen almost through a messaging*	Staff find MD internal messaging system ineffective GPs don't review AHP feedback in MD until they see the patient again. Radiology can be viewed by GPs as soon as images are available. Clinical staff unaware patients are receiving care from hospital specialist clinics eg. endocrinology, unless patient informs them. Ongoing backlog of scanning documents into patient files. *"Most hospitals actually fax and send hard*

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						system… It also means that when the allied health team or the community nurses see those patients they're actually able to enter that data directly into the medical record...the next time that patient sees a GP the actual clinical record is going to be there." No streamline of information between systems (Wider LHD). Results in misinformation, human error eg. list of medications at pharmacy is different to practice records. (6ES-ML).	*copies, which ends up duplicating things." "confusing and time consuming".*

Case	Case 1: Regional NSW	Case 2: Melbourne	Case 3: Adelaide	Case 4: Sydney	Case 5: Regional VIC	Case 6: Regional NSW	Case 7: Melbourne
ICM 3. Managing ICT implementation and change							
ICM MATURITY	CONTROLLED	STANDARDISED	STANDARDISED	STANDARDISED	STANDARDISED	CONTROLLED	STANDARDISED
RESOURCES **Knowledgeable champion**	Workstations, hardware, cables etc… well set up. APC Collaboratives have been a driver in using data for care. PM described as IT literate.	Practice eHealth champion External IT support by LHD.	CD salaried with time for teaching, cleaning data, creating templates etc…. IT support by 2 university-based IT staff (onsite 1 day per week) and Logic Plus.	External IT support provided remotely. One GP supported to use voice recognition software.	Should be Finance admin or PM, but staff changes obstruct. 5AD7(FIN) is acting CEO for IT, HR and Finance. Includes computer systems and security.	PGP enthusiastic about ICT and PCEHR. 6PGP(1) and 6ES-ML responsible for initiating implementation of new IT systems.	External IT support through organisation and LHN.
Support	External IT consultant supports decision making, management and implementation of systems. Division of GP supported implementation of eHealth systems. Website established by PGPs son and IT provider specialising in medical websites.	Bimonthly IT reports. Staff and GP meetings include eHealth eg. how to use different tools, updates, remind staff how to use.	External IT support (Digital Medical Systems). Includes an agreed amount of support time per month then extra time is paid by the practice.	IT savvy CH nurse directs patients to apps and sites. External IT support + remote support ML involvement and support. Previously provided IT training for staff.	Online risk management system.
Training	Majority of staff have had training in use of PENCAT.	Training provided for GPs	Regular IT training for clinicians and students. eg. loading health summaries onto PCEHR, entering data into structured fields. Admin staff assist with training new staff.	Some training and manuals available to use practice software. Administration focused internal training.	No formal training with PIP. "…*I just fly by the seat of my pants." (5NGEN1lead).* *5AD8* assisted with training new reception staff in the absence of a senior receptionist.	Internal BP training for LHD CH staff External training provided as required eg. ML for use of Argus. Plan to train staff to sign up patients up for PCeHR and provide education to clinicians.	

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CONTEXTUAL FACTORS **Staff KAPs** **Practice**	New PM well-accepted. Staff seem to recognise the value of change. Complete change of medical staff in last 18 months. Staffing now stable. Easier to implement changes. PGP sees value in eHealth systems to facilitate preventative care and running the practice. Selective employment of new staff. Important they fit into the team. PGP: Driver for decision making. PM implements changes. Problems prompt changes to eHealth systems. PM and PGP have good working relationship.		Try to promote a culture of teaching. Patients expect there to be a student. Many GPs don't use codes ICPC, only RFE or freehand. GP can't understand need for PCeHR. Better to spend money on GP training, keeping up to date on latest guidelines. Hard for GPs to stay up to date. PCeHR should be used by professionals only. One patient has asked about the PCeHR.	Time in motion studies of PNs and admin staff. Used to establish how staff were using their time. Role of PN expanding in terms of patient care and use of eHealth systems for care delivery. PNs contribute to EHR and use recall and reminder systems.	Staff unaware if there is an IT manual for troubleshooting. GP SLAs individually negotiated, not standardised. Not all have SLAs. Disruption at a management level. Multiple CMs over last 2 years. Mgmt shared across 2 positions. Agreements in place with CH for AHPs	IT connectivity identified as an activity required to enable a fully integrated service. Accredited practice. PIP eHealth compliant. Fully enabled to use PCeHR, but staff require training. The staff work well as a team. The practice is very open to sharing records and data. 6PGP(1) is *"highly motivated around sharing the health record" (6ES-ML).* "*that's the thing, they're not using it to the best capacity because they haven't been shown how to…putting strategies in place now to make sure that that does happen." (6N-GEN4(b).* No "*planned, proactive approach*" to implementation of eHealth technology *(6ES-ML).*	**Management structures and merger** Three streams of management. Merger has resulted in management changes. A stressful experience. People immersed in their own work and routines, not much support or direction. Vision and goals for new organisation not yet set. PNs lack confidence and need upskilling in use of IT systems. Difficult to implement because PNs are so busy. Reps from mgmt streams not sent to each other's meetings.

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MECHANISMS **PCeHR** **Decision-making** **Web presence**	Meet PIP eHealth requirements. Registered for PCeHR but not contributing. Clinical, admin and practice meetings. Clinical meetings used to share information about use of eHealth systems. Website: Purpose is for marketing rather than clinical. Interactive Facebook page with someone to monitor and respond to comments.	Meet PIP eHealth requirements. Registered for PCeHR but not contributing Staff meetings monthly; clinical meetings less often; informal meetings as necessary. Ad hoc clinical meetings for relevant internal staff Secure website and Facebook page	Registered for PCeHR and some GPs contributing. Two PCeHR patient sign up days for run by ML. Fortnightly GP and monthly staff meetings with allocated time to attend. There is an ICT business plan. Centralised organisation website.	Meet PIP eHealth requirements. Registered for PCeHR but not contributing. ML sign up day but little response. Clinical meetings held once a month. One GP uses Dragon Dictate speech recognition software to write notes. Single website for clinics operating as part of the organsation. Facebook page used by patients to contact practice for practice information.	5AD7(FIN) logs all IT support requests. Tries to fix issues before contacting IT support. Registered for PCeHR but not contributing.	Registered for PCeHR but not yet contributing. Plan to provide training for staff and start registering patients Monthly practice meetings. PM, CHM and PGP are the decision makers. Monthly team meetings for LHD staff. Clinical Leadership Team for IC strategy meets every 6 weeks. (Reps from practice and LHD). No joint planning between practice and CH. Only for IC strategy. No website or Facebook page.	PCeHR initially promoted but hasn't continued. PCeHR used by one GP: Mandatory for methadone patients Separate team meetings and decision making within those teams. Monthly GP meetings. Clinical/practice meetings difficult to organise. Everyone works at different times. GPs meet informally with 7CM1 weekly for 30 minutes. Regular meetings for AHP and client services teams. 3 websites for separate streams of the organisation. Not specific for clinic.
IMPACT	Ongoing participation in APC Collaboratives would have facilitated PCeHR		PCeHR: Some problems with ZedMed and event summaries template. Talking to	Inconsistencies in data coding.		A regular full team meeting including practice and LHD staff would be beneficial.	*"Yeah, but I – and I did ask for some training on it* (PCeHR) *but it hasn't really – I'm*

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	implementation. PM has successfully implemented a number of changes.		NEHTA. Shared health summary is fine.			*- "We're not probably maximising our IT as we should in the provider network, so we probably need to really think about the wider providers outside the HealthOne and how we can better communicate, data share and use the IT systems for a better care pathway" (6ES-ML).*	*not really aware of when that's going to happen. And I must say I feel quite rusty about it." (N-CMH).* External IT Dept takes a week to respond. Staff search for their own solutions.
ICM 4. Data quality management and governance							
ICM MATURITY	CONTROLLED	STANDARDISED	STANDARDISED	CONTROLLED	BASIC	STANDARDISED	BASIC
CONTEXTUAL FACTORS	Smaller practice facilitates clinical cohesion. A number of new staff. Overseas doctors employed because of recruitment difficulties. Selective employment. GPs employed as independent contractors.	Div of GP/ML established the centre and represented on Board Located on university campus: strong links, student health practice, board rep GP, PNs and collocated AHPs specialists and hospital clinics. PM does accreditation for other practices.		GPs support shared records with other co-located professionals with permission from the patient.	LHN is on the board, *"a major stakeholder"* of the practice. Board also includes CH. Historically dysfunctional. Decision making often blocked, conflicts of interest at board level. Disruption at a management level. Multiple CMs over last 2 years. Mgmt shared across 2 positions.	Complies with privacy regulations including RACGP standards. Plan Do Study Act cycle used as a tool for quality improvement. *(6Field notes: PandP manual).* 6ES-ML (site lead for IC strategy works at the practice 2 days/wk. Well known by staff, aware of what is happening at the practice.	Historically there hasn't been a culture of evaluating services or programs (7AHP-man).

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						Trial site for providing data to ML *"we were the first integrated site to put our hands up to collect – do a data extraction and provide the data" (6ES-ML).*	
RESOURCES	PGP previously involved in APC Collaboratives. Provided Motivation to consider strategies for using information to improve care.		CD with protected time to create templates, clean data and teaching.	Good incident reporting procedures. Under university insurance framework One PN has specific role to clean the data and produce monthly clinical reports on a using BP and PENCAT. Most staff trained to use PENCAT tool.		ML provides monthly reports on submitted data. External IT provider contracted to ensure RACGP standards are maintained.	Chronic Disease nurse participates in the ML QI Diabetes group. IT department for the wider organisation.
MECHANISMS **Governance**	Board of Directors. Make major decisions including introduction of eHealth systems. PM responsible for electronic systems, security and adherence to protocols. Patient data	Board makes strategic and contractual decisions. PM and GP1 attend meetings. Clear information governance roles and responsibilities PM responsible for day to day running and relations with	ICT policy and business plan. PM and CD responsible for data governance. Clear information governance roles and responsibilities with executive and administrative support. Standardised forms	Meet RACGP benchmarks for privacy and security protection. Absence of leadership in terms of clinical governance. Data coding monitored informally. Written reminder notes	Finance Manager oversees data governance as part of her role. All staff use BP codes and drop down menus.	LHD-ML local leadership group supports integration No policy on eHealth tools. Policies, procedures, codes of conduct in place for sharing of patient records. Notification system to indicate if	Large corporate structure above the clinic. Three reporting streams GP/PN (medical); client services (reception, admin) and AHP No overall centre manager for the site.

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Audits **Research and referral networks**	systems backed up daily. PM, PGP, some PNs responsible for monitoring quality. PM: Workshops ways to ensure and maintain consistent quality and standards. External audit being conducted on skin cancer service.	LHN etc… GP1 responsible for clinical direction. Coordinated regular audits. Part of a research and referral network sharing data	and templates available on website for staff Health information links for patients on centralised organisation website. Practice policy that GPs must choose a diagnosis in ZedMed. Ongoing data cleansing. PM archives records after 2 years. Coordinated regular audits. External audit completed by Safe Work SA. Results fed back to practice. Participate in ASPREN (Research network) monitoring infectious diseases. Data is recorded in a web-based collection system.	added to patient lists to remind GPs to update patient data eg. allergies. One PN has specific role to clean data and produce monthly clinical reports using BP and PENCAT. Participated in 2 APCC waves and other ad hoc clinical audit activities decided by individual GPs.	Audits of clinical data are completed but not routinely.	patients have consented to record sharing. Data back-up is held off site. Standardising coding into BP for diagnoses. Policies reviewed annually. Quality, safety, policies are a standing agenda item for practice meetings. Analysis of practice data may inform service changes to improve outcomes *(6Field notes: P&P Manual).* Audits/data cleansing for IC strategy. Focus on data accuracy and coding. Risk stratification of patient cohort to identify patients for IC strategy. PNs do some auditing. Information sheet developed to standardise coding within the practice. (not LHD staff).	ML QI Diabetes group: enabled CD nurse to learn how to clean data and implement a diabetes register. Some staff are able to use PENCAT to generate reports eg CM and chronic disease PN.

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Consent models	Not explicit. Patient privacy information and consent included on new patient registration form.	Consent requested for particular purpose, rather than general consent at sign up.		Privacy policy and consent for use of personal health information included on patient registration form		Consent requested from practice patients to share health information between the practice, LHD and third parties eg. hospital. Patients can opt out if they decide they don't want certain sections of their record shared with other providers.	
Privacy	Staff understanding low which explains lack of trust re: information security and privacy. New patient forms request permission to leave messages.	Strong privacy policies in general; specific for Clozapine register	Can send SMSs on anything with patient permission. Have to follow audit trail. Privacy policy explained to all patients. Includes verbal and record sharing between HPs. All staff sign confidentiality statements as part of employment contracts.	Privacy policy and consent for use of personal health information included on patient registration form. Access to EHR can be locked for patient confidentiality. Avoid email correspondence due to privacy concerns.	Most staff unaware of privacy and security of email.	Certain areas of the record can be *"locked down"* by GPs at patients request to restrict access to other professionals. *"…we've all been given individualised passwords, so it's controlled that way, … if you are in someone's record it will actually show up that you've been in there and how long …."* Computer screens not visible from waiting area.	Privacy department assists with concerns about patient privacy and exchange of information to third parties *(7CM6-3-15).*

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IMPACT **Errors**	PGP satisfied with decision making through the Board. Reduces pressure on PGP and wife as practice owners. Same templates used by all staff for patient management plans. All clinicians use Doctors Control Panel for clinical care.		All diagnoses entered in ZedMed are permanent. Some issues with GPs choosing custom diagnoses. SMS wrong Pathology results.	Universal access to patient records 'corrupts searches'. Not all patients are GP patients and don't have a complete clinical record. Corruption of record system when merged 2 systems (new GP joined practice and added records).		RACGP DQ benchmarks. Clinicians are coding rather than free texting but probably not standardised. Data extracted and provided to the ML monthly (population ehealth, service utilisation, care delivery-IC strategy). Data shared with LHD. Fed back to governance level of IC strategy to determine planning and system re-design. Fed back to practice for service improvement.	MD isn't always used by GPs to update patient information and enter recalls. Impacts on accuracy of patient information for Diabetes COC. PN has to check progress notes to make sure information has been entered.
ICM 5. Using health information (*for clinical, managerial, planning and support purpose*)							
ICM MATURITY	STANDARDISED	STANDARDISED	CONTROLLED	CONTROLLED	BASIC	BASIC	BASIC
CONTEXTUAL FACTORS	Quality audit activities don't involve all staff. Not all staff aware of how it works. Patient numbers not large enough to run disease specific clinics. GPs and lead PN have an interest in preventive care.	Coordinated policy on use of Decision Support tools.				Mothers in the community use mobile phones to access health information.	Practice population includes refugees, patients from NESB and illiterate. Challenging for clinicians to communicate and provide appropriate health information

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RESOURCES	PN role: Well-utilised for assessments and care plans. Medicare item numbers: Allowed employment of PNs and expansion of role.		Health information links for patients on centralised organisation website. Links to relevant websites provided and added in ZedMed. Online access to University Library for clinical staff.			Need to pay for pamphlets from the Heart Foundation Oline resources from Heartwise used instead. Clinical references and resources: selective about resources accessed by staff. Must be culturally appropriate, current and evidence based. Local leadership group (IC strategy) make decisions on system redesign and the local model of care. GP-CH team working well with positive culture.	
MECHANISMS **Care planning**	Care plan and referral templates used on MD. New EPC Nurse role: use clinical information to improve patient management. EPC Nurse: Uses clinical information to improve patient management. Includes use of MBS Items,	Staff involved in coordinated data driven QICPD programs using data from clinical information systems. PN runs reports to track diabetes cycle of care and distributes results to GPs and PNs.	NAML and PIP reporting. Insurance Standardised forms and template available on website for staff.	Site 4a had completed an APCC diabetes wave; Site 4b was doing an EHR wave (tracking kidney function of diabetes patients) Use data to identify and track patients for preventive and managed care. Eg. health	Care plans completed by paper questionnaire and sent to patients. Data entered by the chronic disease nurse. CD Nurse runs reports for MBS Items.	GPs and PNs use care plan templates in BP CH staff can add information. BP tools available and used at the discretion of the clinicians. PGP says that all staff use the same decision support tools. Inconsistent use of	Focus on integrated care Nurse led diabetes clinic starting. Coordinated diabetes COC about to start including GPs and AHPs. Enabled by a grant received through the organisation. Diabetes nurse is coordinating it and

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Decision support tools **Health resources/patient information**	tracking patients, recall and reminders. Doctors Control Panel used to assist with managing preventive care. Therapeutic Guidelines up to date and used for clinical decision making Decision support tools available but not universally utilised. PNs use internet to source health information for patients. Resources on MD used by some PNs.	GP photocopies health information for patients and refers patients to websites	No policy for use of decision support tools. Some GPs use the CVD Risk calculator. Don't use risk calculators online much, go with the charts. Remote desktop on devices (phone, laptop), can use from home or in patients homes. Multiple sources used by GPs: Reputable websites, writes it down, email, print off brochures. Downloads brochures. CD adds links to useful tools, resources and websites into ZedMed. PNs use IPads to deliver health information eg. immunisation app.	assessments and diabetes cycle of care. PNs provide information resources to patients from BP and external internet sites.	*"I've printed off a health summary or something for a patient"*	decision support tools and BP prompts *(6GP(2).* No coordinated approach, dependent on individual clinician *"we use the built-in clinical tools, so say we use K10's and mini-mentals and the risk calculator, probably the (?Ausrisk)".* Online health resources used to provide information to patients. Aim to standardise use of particular apps and websites. Staff directed to use agreed sites. GPs use internet for clinical information *(6ES-ML).* Annual audit of resources and references. Standard item at clinical meetings. *(6Field notes: P&P Manual)* C&FH nurse uses email to provide health resources to patients.	using PENCAT. Review completed by organisation looking at individual clinics and performance. GPs use care plan templates Decision support tools not used consistently. *7N-CMH* uses the Mental Health Nurse Incentive Guidelines GPs download and print information from the internet. Refer patients to websites in their own language.

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						Information is printed and given to patients. *"Everyone just goes into the filing cabinet and finds it, or looks it up on the net, or whatever, but yeah, no, there's nothing really formalised; what everyone gets." (N-GEN(CN)2).*	
IMPACT	Care plans benefit patients and staff: Templates make care planning faster. PNs have more time to review plans with the patient. Majority of patients up to date with immunisations.		Remote desktop. Beauty of terminal server, can do this easily. Part timers love it. Can check when not here.			- "*I think we all tended as a team to be more happy with the one in Best Practice, their basic care plan, but I think it tends to work best with patients because they can understand what's actually written on it". (6N-GEN4(b).*	
Data quality assessment							
Data Quality Reports			Some cleaning of data eg. tidying scripts and diagnoses Use PENCAT but not sure what for.	PN generate monthly reports with PENCAT to clean and update data (eg. deceased, left practice), check disease registers.			

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Document review (*Examples of how good is the match between policy and practice?*)							
ICM 1				In policy 'Use accepted coding of drop down selections rather than free text' This is not enforced in practice. Up to clinicians. In policy: 'All staff involved in clinical care able to document their activities in the medical record'. This is available in practice.		P&P needs updating for accreditation. Policy specific to the Centre – includes staff names.	
ICM 2						Shared EHR an aim of ICP. LHD staff included as members of the practice team in the P&P manual. Analysis of practice data may inform changes to services or activities to improve outcomes	
ICM 3				Telehealth included in P&P but only one site is eligible. Not provided as specialists don't think it is		ICP Plan – sharing information systems and clinical information exchange between HealthOne, hospital, health	Online risk management system and protocols in place. Unsure if they are used effectively.

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				necessary for patients to access care. In P&P 'Computer Care Australia contracted to oversee computers and security'.		services and aged care. Monthly practice meetings that include clinical meeting A practice website is mentioned in the P&P manual but doesn't exist. To be raised by the PM at a practice meeting.	
ICM 4						Complies with privacy regulations including RACGP standards *(6Field notes: P&P manual).* Plan Do Study Act cycle used as a tool for quality improvement. *(6Field notes: P&P manual).* Policies reviewed annually. Quality, safety, policies are a standing agenda item for practice meetings. Whole practice team involved in approving policies and procedures. Analysis of practice data may inform changes to services or	

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						activities to improve outcomes *(6Field notes: P&P Manual).* **Risk Assessment: Supporting the RACGP Computer and information security standards** Covers back up, inadvertent access by staff, information loss, misuse of systems. Includes the threat/ risk source, impact, vulnerability, solutions, existing and required solutions and person responsible. Policies in place: - Acceptable use of computer systems - Confidentiality Policy - Data breach response and reporting procedure - Management of consumer health records.	
ICM 5				Recalls run weekly, but not all staff are clear about this.		Annual audit of resources and references. Standard item at	

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						clinical meetings. *(6Field notes: P&P Manual)* *"Everyone just goes into the filing cabinet and finds it, or looks it up on the net, or whatever, but yeah, no, there's nothing really formalised; what everyone gets." (N-GEN(CN)2).*	
Patient perceptions							
	Staff perceive patients as having limited awareness about eHealth.	Happy for personal information to be shared among the team	Feels good that my information is in a computer. Prefer face to face consultations rather than video conferencing.	Mum and families whom are internet savvy like the idea of eHealth systems. Patient stated they like being able to see available appointment times. Patient does not like the idea of eHealth- prefer face to face. No trust on video conferencing. Someone can be present that you can't see.	Online appointment system available but not yet set up by the physio. Patients are uncertain whether they would use it.	Happy for personal information to be shared among the team. Shared record allows patients to be "*treated correctly*". All treating health professionals should have access. *"So it would be a lot easier to do that, and I think especially with older people, my mother-in-law won't change doctors, 'cause she said, "I'll have to repeat everything," and she's, like, in her*	

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						70s, so all that stuff previous, and she forgets. (6P(2). GP has had some conversations with patients who aren't happy about sharing their records *(6GP(2).*	
Staff perceptions							
	PGP sees value in implementing eHealth systems to facilitate preventative health care. Vision for the use of apps and an online appointment system. PGP describes himself as 'pre-literate' and on a 'steep learning curve'. 1GP(1) describes himself as being cynical about the PCeHR, a waste of time, based on UK experience.	PN thinks eHealth is important. Patients have needs met faster. PN encourages patients to register for PCeHR. Useful when they travel and easier than trying to remember health information. An opt out system would be better. *"I think if I knew more about it (eHealth), I would probably use it." (GP).* PN prefers to use fax than email because of privacy concerns.	GP can't understand need for PCeHR. Better to spend money on GP training, keeping up to date on latest guidelines. PCeHR should be used by health professionals only, No patients asking for it. GP would like online appointments back, e-prescriptions functional to pharmacy of choice; e-communication with specialists, no paper. GP sees benefits of PCeHR. Psychologist not concerned about sharing records.	GP- eHR not always trustworthy. Mistakes can be made entering information. People are too hurried and make mistakes. Some patients do not like eHealth systems, especially older age group due to privacy concerns. Seen as a govt checking system. Staff unaware of privacy and security of email.	Don't trust secure messaging. GPs don't have time to contribute to the PCeHR.	Some nurses have been *"overwhelmed"* by the implementation of the shared EHR. It could have been better implemented. More education required, particularly for LHD nurses.	Advantage of electronic systems: *"I mean, there's all kinds of areas. It's much easier to find information once it is an electronic system, of course, so it doesn't sort of get lost as easily as it has in the past in volume 1 of the record. So that there is a lot of advantages there". (7- GP1).* *"We're looking at doing case conferencing. Telehealth, no; eHealth too, the doctors aren't very interested in the electronic records and that sort of thing."*