

Model for integrated care for chronic disease in the Australian context: Western Sydney Integrated Care Program

*N. Wah Cheung, Michael Crampton, Victoria Nesire, Tien-Ming Hng and Clara K. Chow;
on behalf of the Western Sydney Integrated Care Program Investigators*

Australian Health Review, 2019, doi:[10.1071/AH18152](https://doi.org/10.1071/AH18152)

The authors advise that the name of an author from the Western Sydney Integrated Care Program Investigators is incorrect and the correct spelling is A. Robert Denniss.

Model for integrated care for chronic disease in the Australian context: Western Sydney Integrated Care Program

N. Wah Cheung^{1,2,8} MBBS, FRACP, PhD, Clinical Professor, Director and Endocrinologist, Clinical Advisor

Michael Crampton^{3,4} MBBS, DRANZCOG, FRAZGP, GradDipHealthInfo, General Practitioner, Clinical Lead

*Victoria Nesire*³ DipArts RCAE, GradDipEd, Director

Tien-Ming Hng^{5,6} MBBS, FRACP, PhD, Senior Lecturer, Director and Endocrinologist, Clinical Advisor

Clara K. Chow^{2,7} MBBS, FRACP, PhD, Professor and Director, Cardiologist

*On behalf of the Western Sydney Integrated Care Program Investigators**

¹Department of Diabetes and Endocrinology, Westmead Hospital, Western Sydney Local Health District, Hawkesbury Road, Westmead, NSW 2145, Australia.

²Faculty of Medicine and Health, University of Sydney, City Road, University of Sydney, NSW 2006, Australia. Email: clara.chow@sydney.edu.au

³Integrated and Community Health, Western Sydney Local Health District, 18 Blacktown Road, Blacktown, NSW 2148, Australia. Email: michael.crampton@wentwest.com.au; victoria.nesire@health.nsw.gov.au

⁴Western Sydney Primary Health Network, Level 1, 85 Flushcombe Road, Blacktown, NSW 2148, Australia.

⁵Department of Diabetes and Endocrinology, Blacktown Mt Druitt Hospital, Western Sydney Local Health District, 18 Blacktown Road, Blacktown, NSW 2148, Australia. Email: tien-ming.hng@health.nsw.gov.au

⁶Western Sydney University, Locked Bag 1797, Penrith, NSW 2751, Australia.

⁷Department of Cardiology, Westmead Hospital, Western Sydney Local Health District, Hawkesbury Road, Westmead, NSW 2145, Australia.

⁸Corresponding author. Email: wah.cheung@sydney.edu.au

Abstract

Objective. To describe the implementation of a model of integrated care for chronic disease in Western Sydney. This model was established on the basis of a partnership between the Local Health District and the Primary Health Network.

Methods. The Western Sydney Integrated Care Program (WSICP) focuses on people with type 2 diabetes, chronic obstructive pulmonary disease and coronary artery disease or congestive cardiac failure. We describe the design of the program, the processes involved and some of the challenges and barriers to integration.

Results. Early data indicate a high uptake of services, with some evidence of a reduction in hospital admissions and presentations to the emergency department.

Conclusion. A model of integrated care has been successfully implemented and embedded into local practices. Preliminary data suggest that this is having an impact on the utilisation of hospital services.

*Western Sydney Integrated Care Program Investigators: Monique Bartlett (Department of Cardiology, Westmead Hospital), Ya-Shu Chang (Department of Respiratory Medicine, Blacktown Hospital), N. Wah Cheung (Department of Diabetes & Endocrinology, Westmead Hospital), Jin-Gun Cho (Department of Respiratory Medicine, Westmead Hospital), Clara K. Chow (Department of Cardiology, Westmead Hospital), Michael Crampton (Integrated and Community Health, Western Sydney Local Health District), Robert Dennis (Department of Cardiology, Westmead Hospital), Pankaj Gaur (Integrated and Community Health, Western Sydney Local Health District), Christian Girgis (Department of Diabetes & Endocrinology, Westmead Hospital), Tien-Ming Hng (Department of Diabetes & Endocrinology, Blacktown Hospital), Glen F. Maberly (Department of Diabetes & Endocrinology, Blacktown Hospital), Mohan Nagarajah (Department of Respiratory Medicine, Blacktown Hospital), Victoria Nesire (Integrated and Community Health, Western Sydney Local Health District), Suja Padmanabhan (Department of Diabetes & Endocrinology, Westmead Hospital), Mary Roberts (Department of Respiratory Medicine, Westmead Hospital), Tracy Smith (Department of Respiratory Medicine, Westmead Hospital), Linda Soars (Integrated and Community Health, Western Sydney Local Health District), Aravinda Thiagalingam (Department of Cardiology, Westmead Hospital), John Wheatley (Department of Respiratory Medicine, Westmead Hospital).

What is known about the topic? There is evidence that integrated models can improve cost-effectiveness and the quality of clinical care for people with chronic disease. However, most integrated models are small scale, focus on very specific populations and generally do not engage both primary care and acute hospitals.

What does this paper add? This paper describes an effective partnership between state-funded hospital services in the WSLHD and the federally funded local Primary Health Network (PHN) of general practitioners. The paper outlines the design of the program and the structural, governance and clinical steps taken to embed integrated care into everyday clinical practice. In addition, preliminary results indicate a reduction in the use of hospital services by people who have received integrated care services.

What are the implications for practitioners? Involvement of both primary care and the public hospital system is important for a successful and sustainable integrated care program. This is a long and challenging process, but it can lead to positive effects not just for individuals, but also for the health system as a whole.

Received 23 May 2018, accepted 11 October 2018, published online 13 March 2019

Introduction

'Integrated care' (IC) is the provision of seamless, effective and efficient care that responds to all a person's health needs (physical, social and mental) in partnership with the individual, their carers and family.^{1,2} All modalities of care, hospital to community, are combined in the service of the patient. A health system-wide approach incorporates appropriate funding arrangements, administration, organisation and clinical care.

IC models have been shown to improve clinical and process outcomes for people with chronic disease. A systematic review of 35 randomised controlled trials (RCTs) of diabetes IC found that programs that included more chronic care management processes or their subcomponents increased the frequency of measurement of glycaemic control, lipids and blood pressure, and improved the absolute values of these parameters.³ The Diabetes Care Program, conducted in Australia and the largest RCT of diabetes coordinated care in general practice in this country, found a significant reduction in HbA1c among subjects receiving the full suite of interventions.⁴ A systematic review of 26 RCTs of integrated disease management for patients with chronic obstructive pulmonary disease (COPD) found overall benefit, with reductions in dyspnoea, fatigue and hospital admissions.⁵ A review of 11 RCTs of disease management programs for patients with congestive cardiac failure (CCF) found a reduction in hospitalisation, although this was predominantly in programs with multidisciplinary team follow-up, rather than improved coordination of primary care services.⁶

The Australian Institute of Health and Welfare estimated that in 2008–09 direct health expenditure on chronic disease exceeded A\$30 billion.⁷ In a review of IC interventions focusing on diabetes, depression, CCF and COPD, 13 of 21 studies examining incremental costs of health care showed cost savings.⁸ A meta-analysis of 53 RCTs of IC interventions for chronic disease found a 19% reduction in hospital admissions compared with usual care.⁹ Another meta-analysis of 50 RCTs using quality improvement strategies typical of IC agreed that there was a 19% reduction in the risk of hospitalisation, as well as a 31% reduction in emergency department (ED) presentations for patients aged over 65 years, but there was no reduction in the number of admissions per patient per month.¹⁰ The potential for cost control while providing higher-quality care is a motivator for government to explore the development of IC models.

The Western Sydney Integrated Care Program (WSICP) was one of three demonstration projects selected and funded by the New South Wales (NSW) Ministry of Health to develop an innovative, locally led model of IC. Western Sydney has a population of 970 000, with some 60% of the population being overweight or obese and 6.3% of the population registered with diabetes (vs the national registered prevalence of 5.2%) under the National Diabetes Services Scheme (<https://www.ndss.com.au/diabetes-map>, accessed 24 March 2018). There are approximately 10 000 potentially preventable chronic disease admissions to hospital each year in the Western Sydney Local Health District (WSLHD), with type 2 diabetes mellitus (T2DM), COPD and coronary artery disease (CAD) or CCF, accounting for 24% of these admissions and 38% of all hospital bed days.¹¹ WSICP has provided an opportunity to build on existing smaller-scale programs to produce long-lasting system change to support IC more generally.

Through both horizontal (i.e. across organisations that provide services in similar settings) and vertical (i.e. between organisations providing different levels of care) integration of healthcare services, WSICP seeks to meet the continuum of health care needs across the primary care, community, specialist and acute settings. Concepts adopted by WSICP include the Patient Centred Medical Home (PCMH),¹² rapid access to specialist care, care coordination, the use of information technology (IT) to facilitate communication between hospital and primary care and capacity building and training in primary care to use the IC arrangements to best effect. There was joint governance between WSLHD (the public health system) and the Western Sydney Primary Health Network (WSPHN; which supports general practice). The integration of elements of primary care and acute hospital services is a key factor that sets WSICP apart from other Australian IC programs.

Methods

This paper outlines the design and structure of WSICP, the process by which this was achieved, some challenges faced in implementation and preliminary results.

WSICP model and program design

Planning for WSICP commenced in 2014. A joint steering committee was established, chaired by the Chief Executive of

WSLHD, that included the Chief Executive Officer of WSPHN. Consumer representation was ensured by a Consumer and Community Advisory Group. This governance structure included hospital specialist services and programs, community health services, general practice, IT services and other NSW Health initiatives, such as the Chronic Disease Management Program,¹³ HealthOne¹⁴ and Get Healthy (<https://www.gethealthynsw.com.au/>, accessed 24 March 2018).

A WSICP project team with members with expertise in operations, finance, IT and clinical care (specialist and general practice) was established under a new directorate. Key leads in health and management from WSLHD and WSPHN met to design the new model of IC. These included representatives from general practice, the specialities of diabetes, endocrinology, cardiology and respiratory medicine from the two hospitals involved (Westmead and Blacktown), emergency, IT and community health.

Table 1. Criteria for enrolment in the Western Sydney Integrated Care Program

In addition to the disease-specific criteria, subjects needed to be over 18 years of age and be free of another active chronic medical condition that dominates their clinical needs. CAD, coronary artery disease; CCF, congestive cardiac failure; COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; T2DM, type 2 diabetes mellitus

T2DM	• HbA1c >8% OR • Unstable diabetes requiring insulin OR • Recent or current hospital admission related to diabetes or its complications OR • Significant retinopathy, nephropathy or high-risk foot
CAD or CCF	• Heart failure with history of exacerbations or established coronary diseases OR • Chronic non-revascularisable angina OR • Multiple comorbidities complicating a cardiac condition
COPD	• GOLD Stage 3 or 4 or patients with COPD who had an admission in the past 12 months who are high risk of re-presenting and are likely to benefit from self-management support

Working groups established included an IT Working Group and a Clinician Working Group, both of which included administrative and clinical team members and general practitioners (GPs), with representation from WSLHD and WSPHN. These groups met monthly through the first 2 years of WSICP to address problems as they arose and to refine the model of care.

Patient cohort

The WSICP cohort comprised people with at least one of T2DM, COPD and CAD or CCF, as well as clinical criteria indicating high risk of deterioration and hospitalisation (Table 1). Enrolment could occur in primary care or hospital. All enrolled subjects gave informed consent to participate in the program and its evaluation. Enrolled subjects and their GPs were eligible to receive the full suite of WSICP services.

Key components of WSICP

A program logic model summarising the underlying aim, inputs, activities, outputs, impacts and outcomes is shown in Fig. 1. The components of WSICP are described in detail below.

Primary care team

General practices were formally contracted to become a WSICP practice. The primary care team, comprising GPs, practice nurses and allied health professionals, focused on the whole person, with reference to accessibility, comprehensiveness, coordinated care, patient centeredness and quality and safety.¹² Enablers to support general practice included individualised shared care plans (SCP), IT tools to monitor SCPs, clinical metrics of individual patients and aggregated practice data, the engagement of care facilitators (CFs), enhanced access to specialist advice and care, modest GP support payments based on completion of the SCP and clinical metric monitoring.

Care facilitators

Each participant enrolled was assigned a CF, a role undertaken by a registered nurse employed by WSLHD who linked hospital and GP care for patients. The CFs assisted GPs by enrolling and monitoring WSICP participants in their practices and facilitated the development of SCPs and adherence to them.

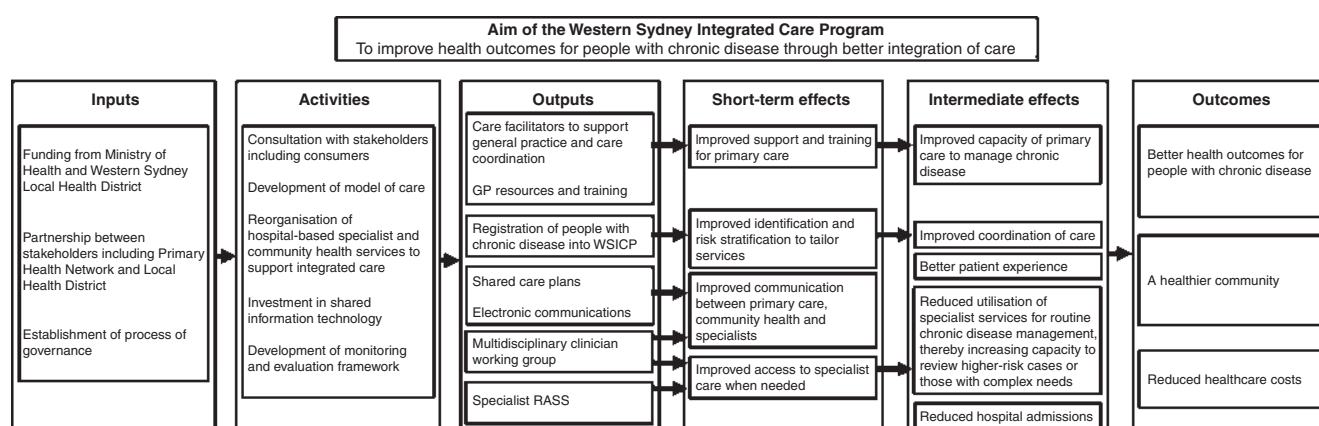


Fig. 1. Program logic model for the Western Sydney Integrated Care Program (WSICP). GP, general practitioner; RASS, rapid access stabilisation services.

The CFs supported patients through care navigation, case conferencing and self-management, and ensured that the patients had regular reviews, including medication assessments, annual cycles of care and vaccinations, as well as smoking cessation, health coaching and arrangements for allied health and community nursing services.

Specialist rapid access and stabilisation services

The main hospital component of the model provided pathways other than the ED to faster access to specialist care or advice, and better transition back to primary care following resolution of acute exacerbations. Access to the specialist rapid access and stabilisation services (RASS) was open to all people with T2DM, COPD or CAD or CCF with a clinical need and was not restricted to subjects formally enrolled in WSICP. The RASS comprised rapid access clinics (RACs) and stabilisation clinics. RACs enabled prompt evaluation of a deterioration in a patient's chronic condition, with intervention to avoid hospital admission. We aimed for patients to be referred via the GP support line, bypassing unnecessary delays or emergency presentations. Stabilisation clinics provided further specialist review and management after the RACs to ensure smooth transition for patients from the acute care environment back to GP care.

Direct specialist support for general practice

We provided an enhanced level of specialist support to GPs, facilitating communication and strengthening relationships. A GP support line, answered by specialist clinicians to provide immediate advice in the management of patients with the cohort diseases, was established. This also provided direct access to RACs. Primary care capacity building occurred through multidisciplinary joint consultations and case conferences held in GP surgeries, practice nurse education, online education and resources and teaching and training workshops.

Information sharing supported by technology

Several IT system interventions were developed by the WSLHD, WSPHN, NSW Health's HealtheNet program¹⁵ and external technology companies to support WSICP. The centre-piece of WSICP was the SCP, with both primary and specialist care teams providing information and coordinated recommendations for patient care. With a secure IT platform (Linked eHR¹⁶), the SCP was able to be viewed by both GP and hospital IT systems. In addition, CFs had access to purpose-built electronic dashboards to enable them to track health summaries, SCPs, key metrics, hospital admissions, interventions and processes for their enrolled subjects.

HealthPathways,¹⁷ a web-based portal for healthcare provider information, was customised for use in Western Sydney. This allowed sharing of best-practice guidelines and information about WSLHD-specific clinical pathways. Using the HealtheNet clinical portal, we planned for GP referrals and letters from medical specialists to be sent electronically by secure messaging between GPs and hospital teams. A process of sending 'action plans', short and immediate patient-related electronic messages, from the specialist teams to GPs was also planned. Technical challenges have hindered the implementation of these two messaging initiatives.

Monitoring framework and evaluation

A framework was developed to monitor and evaluate WSICP and ensure that care pathways met patient needs. This framework included measurements of health and process outcomes, surveys of patient-reported measures and the experience of care providers, as well as a health economic evaluation of the program. Interviews of patients, carers, healthcare providers and WSICP management were conducted for a qualitative evaluation of their experience, perspective and understanding of the program. A preliminary analysis of health services utilisation was undertaken to examine the effectiveness of RASS in reducing hospital admissions and emergency presentations.

Methods for preliminary evaluation of RASS

Data were extracted from the Community Health and Outpatient Care (CHOC) program, the NSW Health Information Exchange and the index Patient Manager System to link details of patients in WSICP, ED attendances, hospital admissions, and utilisation of RASS. The analysis included all subjects who interacted with WSICP services, either through enrolment in WSICP or attendance at RASS.

Data were analysed from the commencement of WSICP programs in March 2015 to October 2017. For each subject, hospital admissions and ED presentations in the period of time following their enrolment or first attendance at RASS were recorded. Potentially preventable hospitalisations, defined as an admission to hospital for a condition where the hospitalisation could potentially have been prevented through the provision of appropriate individualised preventative health interventions and early disease management,¹⁸ were also identified. These data were then compared with those from an equal period before enrolment or RASS contact for that subject; thereby each subject acted as his or her own historical control. For example, a subject who was enrolled in WSICP in September 2016 would have 13 months of follow-up to October 2017; data from these 13 months would be compared with the use of hospital services in the 13 months prior to September 2016.

This analysis was approved by the Western Sydney Human Research Ethics Committee. The analysis was done using Statistical Software STATA v14 (StataCorp LLC, College Station, TX, USA). The two-sample Wilcoxon rank-sum (Mann-Whitney) test was used to determine statistical significance. Two-tailed $P < 0.05$ was considered significant.

Results

WSICP commenced operations in 2015, with staged implementation of program components and gradual increase in the uptake of its services (Fig. 2). As of October 2017, 61 general practices (209 individual GPs) had registered in WSICP, with 1350 participants enrolled (mean ($\pm$ s.d.) age 64 ± 13 years, 56% male) and receiving the full suite of WSICP services as needed. In addition, 15 085 occasions of service were provided by RASS (5066 for T2DM, 5942 for CAD or CCF, 4077 for COPD) for 5485 individual patients (mean ($\pm$ s.d.) age 60 ± 16 years, 58% male), of whom 207 were enrolled participants. Fifty-four per cent of patients were seen within 2 days of referral to the RAC and 85% were seen within 5 days; 940 GP case conferences or

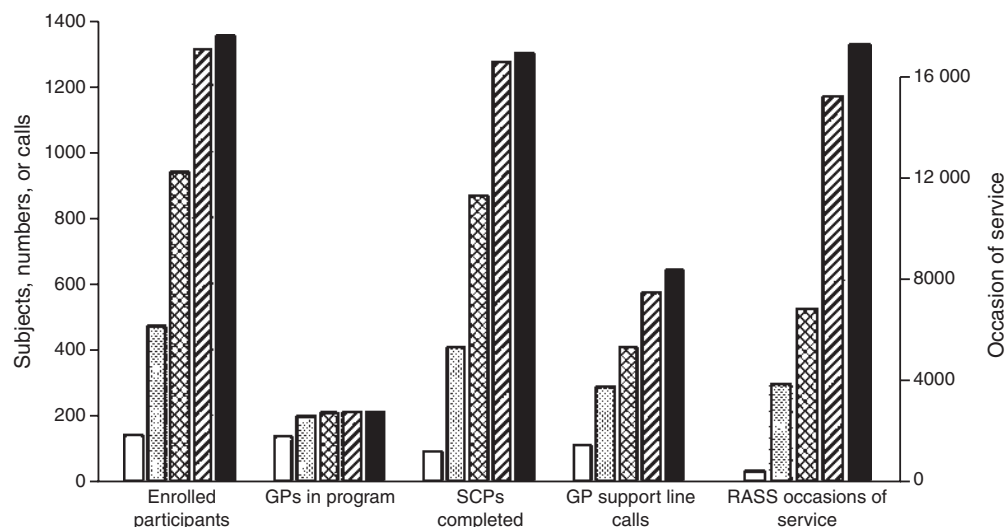


Fig. 2. Implementation progress: increase in engagement with and utilisation of Western Sydney Integrated Care Program (WSICP) services. (□), January 2016; (◻), July 2016; (▨), January 2017; (▧), July 2017; (■), October 2017; GPs, general practitioners; RASS, rapid access and stabilisation services; SCPs, shared care plans.

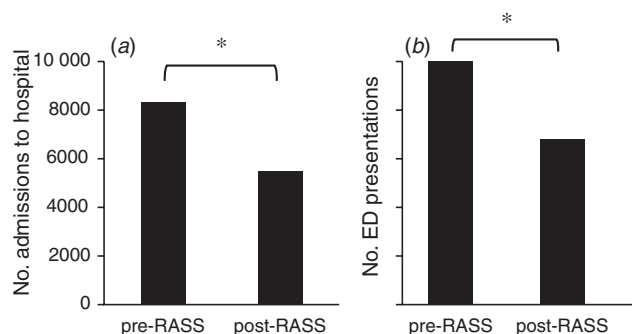


Fig. 3. Utilisation of hospital services by Western Sydney Integrated Care Program (WSICP)-enrolled subjects, and attendees of rapid access and stabilisation services (RASS) before and after enrolment or first presentation to RASS. (a) Number of admissions to hospital; (b) number of presentations to the emergency department (ED). * $P < 0.05$.

episodes of care planning were undertaken between hospital staff and primary care.

Preliminary analysis indicated that for patients who were enrolled or had attended RASS there was a 34% reduction in the number of hospital admissions from 8341 to 5484 ($P < 0.0001$), a 37% reduction in potentially preventable hospitalisations from 3219 to 2044 ($P < 0.0001$) and a 32% reduction in ED presentations from 9978 to 6760 ($P < 0.0001$) in the period of time (median duration 336 days; range 7–958 days) since initial engagement compared with the equivalent duration of time before enrolment or assessment in RASS (Fig. 3). There was a 25% reduction in unplanned admission length of stay in the same time frame for these subjects from 43 468 to 32 716 days ($P < 0.0001$).

Discussion

WSICP demonstrates that in the context of the WSLHD, with a population of almost a million people and 1300 GPs, an IC

program for people with chronic disease was achievable. Our preliminary data suggest that this program reduced the use of acute hospital services for patients with the chronic diseases focused on by WSICP. In these early days of the program, it is likely that the component of WSICP that contributed most to the reduction in the use of hospital services was the RASS.

In health care, integration between organisational units that provide different levels of care has been referred to as vertical integration, whereas horizontal integration takes place between organisations or units that are on the same hierarchical level and provide similar services.¹⁹ Most IC programs, particularly in Australia, have focused on horizontal integration at the local level. The Diabetes Care Program⁴ introduced systems for better horizontal integration of diabetes care in general practices but, without inclusion of hospitals or the community health sector, there was little vertical integration. The importance of acute hospitals services in IC has now been recognised in the UK.²⁰

WSICP is unique in Australia in that it aims for a significant degree of vertical as well as horizontal integration in the care of patients with chronic disease. The adoption of RACs into the model for WSICP was possible through vertical integration. The RACs provide the GP with an option other than the ED to which they can send their semiurgent patients for specialist assessment for specific conditions. Rapid access cardiology services for evaluation of chest pain have been shown to be cost-effective in the UK but are not the norm in Australia.²¹ Our data indicate that RACs can be incorporated into IC models, and can quickly reduce hospitalisations. This improves the likelihood of sustained support for the overall program while waiting for long-term reductions in hospital admissions through better primary and community care.

However, even when all elements of WSICP are operational, it can only achieve partial integration of care. To attain a true continuum of patient-centred care, from primary care to acute hospital services and community health services, a partnership that includes the Commonwealth, state government, healthcare

providers and consumers is necessary. The funding model is an important part of this partnership. Hospitals are funded by the state government, whereas general practice is largely funded by the Commonwealth via a fee-for-service model. Although WSICP could influence hospital care directly, it has limited capacity to incentivise adoption of IC principles by primary care. The largely fee-for-service structure in primary care creates administrative burdens and may disadvantage patients with complex needs.²² A capitated system of funding primary care for people with chronic disease is considered an essential component of successful IC models. The Commonwealth has demonstrated that this can work within the Australian framework in the Diabetes Care Program,⁴ and this has occurred in a limited form in WSICP. Ultimately a single funding system for the entire health district, incorporating primary, community and hospital care, is likely to achieve the best outcomes. This is illustrated by the successful 'one system' approach of Canterbury, New Zealand,¹⁷ and the Kaiser Permanente IC model.²³

Another major challenge is to enable IT to share information between healthcare providers and to do so in a user-friendly yet secure environment. In the Kaiser Permanente healthcare system, a single electronic medical record system is used by all health professionals caring for the patient, including primary care doctors, specialists, nurses, allied health and pharmacists.²³ In Australia there is no such system. Instead, a range of software systems is in use both within and among disciplines and locations, and there is a need to rely on third-party software to enable shared viewing (but at this stage no direct input of data), such as Linked eHR and My Health Record (<https://www.myhealthrecord.gov.au>, accessed 24 March 2018). Enabling cross-talk between the hospital IT system and general practice software was, and remains, one of the major challenges of WSICP.

Ultimately the vision of WSICP is to transform the way that health services are delivered to ensure patients with chronic disease benefit from a whole-person, collaborative and coordinated approach to achieve continuity in their health care, and to empower and support them to better understand and manage their disease. Acute care settings will deliver prompt care when needed, and chronic care will be delivered in primary and community settings, thereby freeing up scarce healthcare resources. For patients, healthcare providers and the health system, there is the philosophy that we are partners in health care, with system tools to support the monitoring of clinical status, performance and accountability. This requires a system-wide approach to the care of people with chronic disease. The successful partnership, with implementation and utilisation of most of the planned elements of WSICP, indicates that a more integrated approach to care is possible within the whole of a large Australian health district.

Competing interests

The authors declare that they have no competing interests.

Acknowledgements

The authors acknowledge the contribution of the following: David Burgess (Blacktown Cardiology), Seema Gurung (Westmead Diabetes), Sally Inglis (Westmead Diabetes), Rajini Jayaballa (Blacktown Diabetes), Walter Kmet (WSICP Steering Committee), Stephen Leeder (WSICP Steering Committee), James Linden (Integrated and Community Health), Danny O'Connor

(WSICP Steering Committee), Yvonne Snowdon (Blacktown Respiratory), Lauren Stonnill (Westmead Diabetes) and Vinita Swami (Westmead Respiratory). The Western Sydney Integrated Care Program was funded by NSW Health, under the NSW Integrated Care Strategy. Clara K. Chow is supported by a National Health and Medical Research Council Career Development Fellowship Level 2 (APP1105447) and cofunded by a Heart Foundation Future Leader fellowship (100808).

References

- 1 NSW Ministry of Health. NSW State Health Plan: towards 2021. 2014. Available at: <https://www.health.nsw.gov.au/statehealthplan/Publications/NSW-state-health-plan-towards-2021.pdf> [verified 10 January 2019].
- 2 Berwick DM, Nolan TW, Whittington J. The triple aim: care, health and cost. *Health Aff* 2008; 27: 759–69. doi:10.1377/hlthaff.27.3.759
- 3 Busetto L, Luijckx KG, Elissen AMJ, Vrijhoef JM. Intervention types and outcomes of integrated care for diabetes mellitus type 2: a systematic review. *J Eval Clin Pract* 2016; 22: 299–310. doi:10.1111/jep.12478
- 4 McKinsey and Company. Evaluation report of the diabetes care project. 2015. Available at: [http://www.health.gov.au/internet/main/publishing.nsf/Content/302DF0372F537A43CA257E35000138E8/\\$File/DCP%20Evaluation%20Report.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/302DF0372F537A43CA257E35000138E8/$File/DCP%20Evaluation%20Report.pdf) [verified 24 March 2018].
- 5 Kruis AL, Smidt N, Assendelft WJ, Gussekloo J, Boland M, Rutten-van Molken M, Chavannes NH. Integrated disease management interventions for patients with chronic obstructive pulmonary disease. *Cochrane Database Syst Rev* 2013; 10: CD009437. doi:10.1002/14651858.CD009437.pub2
- 6 McAlister FA, Lawson FME, Teo KK, Armstrong PW. A systematic review of randomised trials of disease management programs in heart failure. *Am J Med* 2001; 110: 378–84. doi:10.1016/S0002-9343(00)00743-9
- 7 Australian Institute of Health and Welfare (AIHW). Key indicators of progress for chronic disease and associated determinants: data report. Catalogue no. PHE 142. Canberra: AIHW; 2011.
- 8 de Bruin SR, Heijink R, Lemmens LC, Struijs JN, Baan CA. Impact of disease management programs on healthcare expenditures for patients with diabetes, depression, heart failure or chronic obstructive pulmonary disease: A systematic review of the literature. *Health Policy* 2011; 101: 105–21. doi:10.1016/j.healthpol.2011.03.006
- 9 Dorling G, Fountaine T, McKenna S, Suresh B. The evidence for integrated care. McKinsey and Company. 2015. Available at: <https://www.mckinsey.com/~/media/McKinsey/Industries/Healthcare%20Systems%20and%20Services/Our%20Insights/The%20evidence%20for%20integrated%20care/The%20evidence%20for%20integrated%20care.aspx> [verified 24 March 2018].
- 10 Tricco AC, Antonu J, Ivers NM, Ashoor HM, Khan PA, Blondal E, Ghassemi M, MacDonald H, Chen MH, Ezer LK, Straus SE. Effectiveness of quality improvement strategies for coordination of care to reduce use of health care services: a systematic review and meta-analysis. *CMAJ* 2014; 186: E568–78. doi:10.1503/cmaj.140289
- 11 Australian Institute of Health and Welfare. Primary health network area: Western Sydney. 2018. Available at: https://myhealthycommunities.gov.au/primary-health-network/phn103#_ [verified 24 March 2018].
- 12 American Academy of Family Physicians, American College of Pediatrics, American College of Physicians, American Osteopathic Association. Joint principles of the patient-centered medical home. 2007. Available at: https://www.aafp.org/dam/AAFP/documents/practice_management/pcmh/initiatives/PCMHJoint.pdf [verified 24 March 2018].
- 13 NSW Government. Chronic disease management program. 2017. Available at: <http://www.health.nsw.gov.au/cdm/Pages/default.aspx> [verified 24 March 2018].
- 14 NSW Government. HealthOne NSW. 2018. Available at: <http://www.health.nsw.gov.au/healthone/pages/default.aspx> [verified 23 May 2018].

- 15 NSW Government. HealtheNet: better healthcare. No date. Available at: <http://www.ehealth.nsw.gov.au/programs/clinical/healthenet> [verified 24 March 2018].
- 16 Western Sydney Integrated Care Program. Linked EHR. 2016. Available at: <https://www.betterhealthtogether.com.au/for-clinicians/linked-ehr> [verified 24 March 2018].
- 17 Timmins N, Ham C. The quest for integrated health and social care: a case study in Canterbury, New Zealand. London: The King's Fund; 2013.
- 18 Falster M, Jorm L. A guide to the potentially preventable hospitalisations indicator in Australia. Sydney: Australian Commission on Safety and Quality in Health Care; 2017.
- 19 Conrad DA, Shortell SM. Integrated health systems: promise and performance. *Front Health Serv Manage* 1996; 13: 3–40. doi:[10.1097/01974520-199607000-00002](https://doi.org/10.1097/01974520-199607000-00002)
- 20 Naylor C, Alderwick H, Honeyman M. Acute hospitals and integrated care: from hospitals to health systems. London: The King's Fund; 2015.
- 21 Klimis H, Thiagalingam A, Altman M, Atkins E, Figtree G, Lowe H, Cheung NW, Kovoov P, Denniss AR, Chow CK. A review of rapid access cardiology services – can these reduce the burden of acute chest pain on Australian and New Zealand health services? *Intern Med J* 2017; 47: 986–91. doi:[10.1111/imj.13334](https://doi.org/10.1111/imj.13334)
- 22 Taylor MJ, Swerissen H. Medicare and chronic disease management: integrated care as an exceptional circumstance? *Aust Health Rev* 2010; 34: 152–61. doi:[10.1071/AH09810](https://doi.org/10.1071/AH09810)
- 23 Liang LL, editor. Connected for health: using electronic health records to transform care delivery. San Francisco: Jossey-Bass; 2010.