

Implementation and Evaluation of a Community-Based Medication Reconciliation (CMR) System at the Hospital–Community Interface of Care

Allan L. Bailey, Grace Moe, Jessica Moe and Ryan Oland

Abstract

The WestView community-based medication reconciliation (CMR) aims to decrease medication error risk. A clinical pharmacist visits patients' homes within 72 hours of hospital discharge and compares medications in discharge orders, family physicians' charts, community pharmacy profiles and in the home. Discrepancies are discussed and reconciled with the dispenser, hospital prescriber and follow-up care provider. The CMR demonstrates successful integration that is patient-centred and standardized, bridging the hospital–community interface and improving information flow and communication channels across a family-physician-led multi-disciplinary team. A concurrent research study will evaluate the impact of CMR on health services utilization and to develop a risk prediction model.

Introduction and Background

The WestView Primary Care Network (WPCN) is a joint venture between Alberta Health Services – Edmonton and Area and the WestView Physician Collaborative (WPC), a not-for-profit corporation of 51 primary care physicians

servicing a population of approximately 72,000 people in the suburban rural tri-communities of Spruce Grove, Stony Plain and Parkland County. Eighty percent of network physicians provide emergency (ER) and/or in-hospital care at the local AHS WestView Health Centre (WHC).

Hospital discharge and coordination of patient care present challenges to the family physician (FP) responsible for post-hospitalization follow-up. Nearly half (49%) of hospitalized patients experience at least one error related to medication or diagnostic testing following hospital discharge (Moore et al. 2003). In a prospective analysis by Coleman et al. (2005), 23% of 328 patients discharged from a Canadian in-hospital medicine unit had an adverse event(s) within 30 days of discharge. Among these events, 72% were medication related, 50% were considered preventable and 17% resulted in an ER visit or a hospital re-admission (Coleman et al. 2005). Deficiencies in communication between hospital providers and primary care physicians are frequent causes of post-discharge adverse drug events (ADEs; Kripanlani et al. 2007). Other studies demonstrate the need for multi-disciplinary medication reconciliation at hospital discharge (Nickerson et al. 2005; Vira et al. 2006; Wong et al. 2008).

In November 2008, the WPC/WPCN developed and implemented a WestView community-based medication reconciliation (CMR) system with the goal of reducing or eliminating the risk of preventable ADEs at the hospital–community interface. Using the WestView CMR system, multi-

disciplinary providers collaborate on standardized CMR processes that reduce risks associated with medication – prescription, dispensing and administration across settings. Implementation of the CMR system is guided by the principles of “high-reliability organizations” (Institute for Safe Medication Practices [ISMP] 2005). This initiative supports the patient-centred and integrated “learning organization” among the WestView healthcare provider communities. Furthermore, the initiative will develop coordinated connectivity and collaboration within and between settings and sectors at the resource, administrative, organizational and provider levels, resulting in a local culture that emphasizes patient safety.

This article provides an overview of the WestView CMR initiative, recounts the experience of its development and implementation, describes the evaluation plan and examines the program’s early successes and challenges.

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Goals and Objectives

The first objective of this initiative is to develop the project “intervention” – a pharmacist-led medication reconciliation (MR) in the patient’s home. The second objective is to implement a standardized CMR program, which calls for multi-disciplinary adherence to consistent and reliable procedures defined for each point of care. The third objective is to evaluate the CMR program using a randomized controlled trial (RCT) to examine the impact of the intervention on health services utilization. Lastly, as a component of the RCT, this initiative intends to design a risk prediction model to assist in the selection of high-risk patients who would benefit from the resource-intensive intervention.

The Intervention: Pharmacist-Led Medication Reconciliation in the Patient’s Home

The intervention is a CMR carried out by a clinical pharmacist (CMR pharmacist) in the patient’s home within 72 hours of hospital discharge. Medication reconciliation is defined as the process of identifying and correcting medication discrepancies. Uniquely, the WestView CMR intervention is a community-based medication reconciliation process adapted from the ISMP Canada /Safer Healthcare Now (SHN) in-hospital medication

reconciliation process¹ (originally developed by the Institute for Health Improvement). A literature review of community-level interventions found no program or study that parallels the WestView CMR intervention in its entirety (Gardner et al. 2004; McGowan et al. 2001; Sorensen et al. 2004; Triller et al. 2003; Virani and Flanagan 2007).

During the home visit, the CMR pharmacist inventories and reviews all medications the patient is taking, including over-the-counter and herbal medicines, and removes expired and unused medications from the patient’s home (with the patient’s permission). The CMR pharmacist then compiles a best-possible medication history (BPMH) (Institute for Healthcare Improvement, n.d.), comparing actual home medications, hospital discharge medication orders, the patient’s medication list in the FP’s chart (electronic medical record or otherwise) and the patient’s current community pharmacy profile. A medication discrepancy tool (Smith et al. 2004) is used to track the cause(s) and contributing factor(s) – at patient and system levels – of each noted medication discrepancy. These discrepancies are discussed and reconciled with the dispenser, hospital prescriber and follow-up care provider.

The final medication list is mailed to the patient following reconciliation with his or her physician. This final list is also distributed to the family physician, community pharmacy and AHS home care services (where relevant). The pharmacist also assesses the patient’s need for compliance packaging and educates the patient about keeping the medication list up-to-date, instructing him or her to take the list to all medical appointments, labs, the pharmacy and hospital visits.

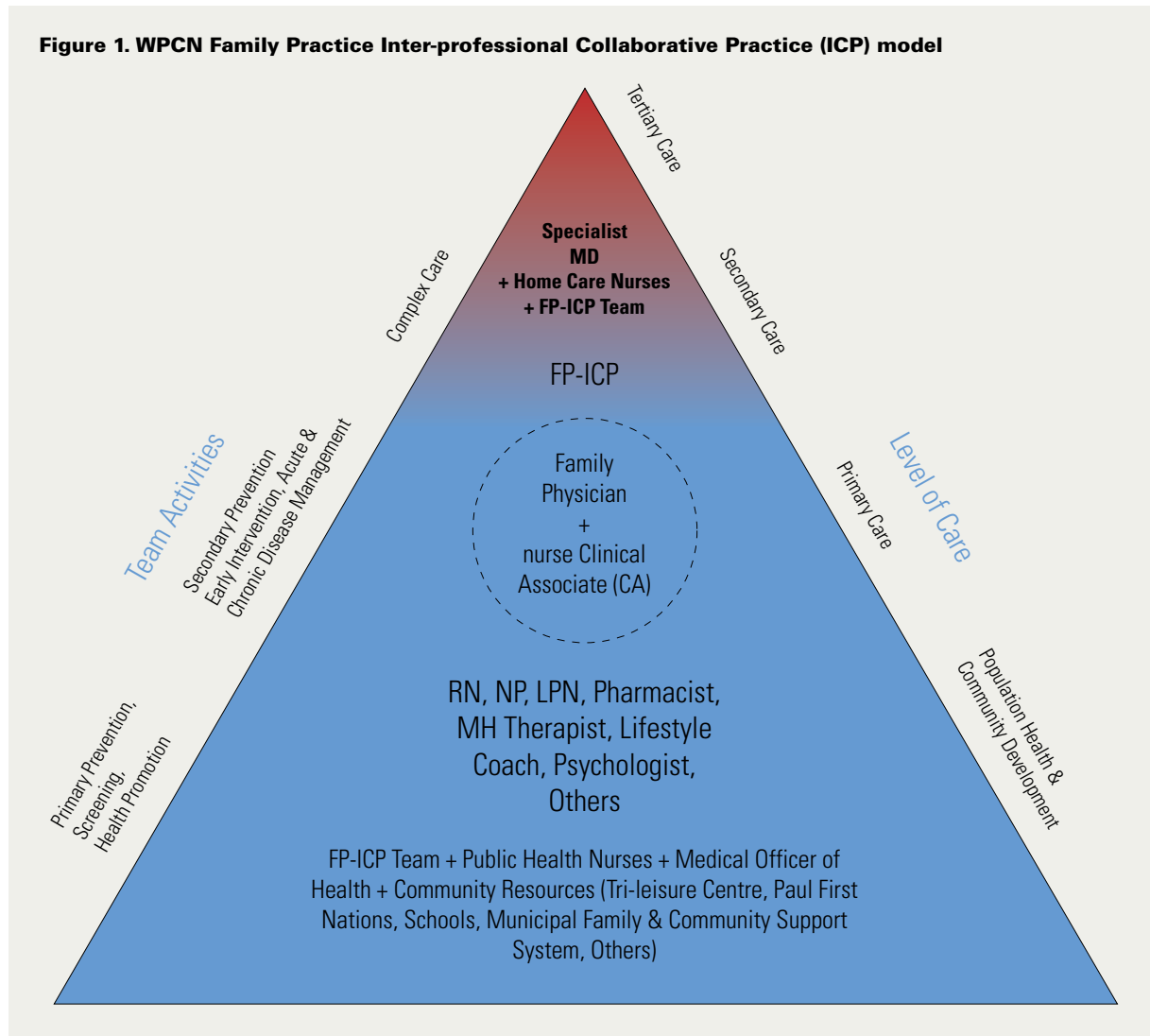
Design and Implementation of a Standardized CMR Program

While steps toward meeting the first objective are relatively simple, the second objective of this initiative – to establish and implement a standardized CMR program – is complex. It calls for multi-disciplinary adherence to consistent and reliable processes and procedures that have been defined for providers and disciplines involved at multiple points-of-care. It entails creating inter-organizational care requiring integration of systems and merging of resources across sectors. It brings together elements that were formerly complementary silos.

Methodology

Integrating organizational processes and infrastructure

At the hospital: The AHS – Edmonton and Area piloted its first in-hospital MR project at the WestView Health Centre, Stony Plain, in 2006. The project was modelled after the ISMP Canada/SHN in-hospital medication reconciliation process.¹ Initially, the project involved reconciling admission medication only. Three years into implementation, AHS – Edmonton and Area has expanded the project to include MR at discharge.



Before implementation of the CMR program, there was minimal communication of MR outcomes between in-hospital and community providers beyond the discharge summary.

At the family practice clinics: Prior to implementing the CMR program, physicians of the eight WPCN family practice clinics did not have an established system to track medication(s) prescribed for their patients by others. Community FPs, in particular those without hospital privileges, are dependent on the hospital discharge summary for developing a follow-up care plan. The discharge summary, however, is often not available in a timely manner. Information from ER may arrive at the FP office with illegible hand-written notes, if at all.

The FP's ability to reconcile the patient's medication list in the clinic's medical record with the new, actual medication list is further hindered by a lack of physician time and a shortage of

supporting personnel at the family practice clinic. Traditionally, the FP's only avenue for medication reconciliation was through "history-taking" during the patient's visit. The introduction of a WPCN-funded pharmacist to provide medication management/reconciliation services one day a week at each family practice, as described below, is a useful step toward supporting best practices for medication safety in the primary care setting.

At the WestView Primary Care Network: The WPCN has developed and implemented an FP Clinic-Based

Traditionally, the FP's only avenue for medication reconciliation was through "history-taking" during the patient's visit.

Inter-professional Collaborative Practice (CIPC) program, where nurses, pharmacists, a mental health therapist and other healthcare providers (OHCPs) are recruited as independent contractors working with FPs as clinical associates (CA).

The FP and CAs serve together as the patient's "Core Primary Care Providers," leading and coordinating the patient's needs, consulting with and referring to other health professional team members as relevant (see Figure 1. WPCN Family Practice Inter-professional Collaborative Practice [ICP] model).

The CA program was implemented in October 2006 and today includes a team of 16 full-time equivalent (FTE) nurses and 1.76 FTE pharmacists, among others, serving eight FP clinics and 51 physicians. These providers practise at the advanced end of their professional scope of practice, as regulated by their professional regulatory bodies.

Attending six of eight PCN family practice clinics one day a week, the PCN pharmacists provide services to challenging, complex and chronic care patients who have co-morbidities and are on multiple medications. Pharmacist services include structured medication review, drug education, consulting with providers and participating in interdisciplinary chronic-disease management clinics with clinic-based FP–CA teams.

The FP coordinates integrated patient-focused care, reducing isolated or compartmentalized types of professional care and creating a clearer definition of roles and responsibilities among team members.

The ICP program has built a clinic-based collaborative care team, which enhances implementation of the CMR program.

The WHC, the WestView area family practices, the WPC and the WPCN have each taken individual steps toward building a culture for patient safety and quality care. Optimizing pre-existing infrastructures of the three organizations and community pharmacies, the CMR program tracks each patient's journey across the continuum of care.

Integrating providers, service delivery and clinical care

The CMR intervention – a pharmacist-led MR in the patient's home – is one service component of the WPCN CIPC–pharmacist program. It supplements the MR process that already occurs at the local hospital (WHC). Though not formalized, and not performed consistently, WHC home care nursing performs informal MR at the patient's home as needed.

CMR requires collaboration among the WPCN-funded CMR pharmacist, hospital-attending physicians (if different

from the FP), the in-hospital MR team, hospital discharge coordinator, FP, FP clinic-based pharmacist, community dispensing pharmacist, home care nurse and the patient.

The WestView CMR model designates the patient's FP as the centre and lead of the interdisciplinary and intersectoral team. The FP coordinates integrated patient-focused care, reducing isolated or compartmentalized types of professional care and creating a clearer definition of roles and responsibilities among team members. The cross-sectoral CMR-provider network is organized and joined together by standardized referral and intake procedures, health and medication data collection and recording, shared information systems, and established communication tools and processes. Through partnerships facilitated by the WPCN with the various local healthcare providers and between the healthcare sectors (including the community, home care and hospital systems), this initiative captures many elements of successful integrated care (Leutz 1999; Kodner 2006).

A CMR operational working group is chaired by a community-based FP holding the position of both site medical director of the WHC and director of WPCN research and evaluation. The group includes members from the WHC – the in-patient MR project coordinator and site director; from the WPCN – the chief administrative officer, CA program lead, lead pharmacist and CMR pharmacist; and from the WPC – physician representatives from member clinics and the emergency department.

Integrating organizational cultures and merging of resources

Stakeholder incentives: Forty FP practising in eight clinics across the WestView region support the CMR initiative, with the expectation that the initiative will improve communication, optimize care and decrease liability to FPs providing follow-up care for discharged patients.

Healthcare professionals in collaborative practice with physicians in the community and hospital report their professional satisfaction with this initiative, which provides more reliable and consistent medication management. Community dispensing pharmacists are invited (many for the first time) to contribute to clinical care for clients they serve in the retail sector, and are valuable members of an integrated inter-organizational team.

Considering the joint benefits of improved patient care and safety and the promise of decreased future health services utilization due to ADEs, hospital site management was able to justify lending its support to the project.

Merging of inter-organizational resources: The WPCN CMR initiative complements the AHS in-hospital MR process. Starting with two-way communication between the in-hospital MR and CMR teams, a coordinated flow of information sharing then follows the patient's path along the continuum of care, including the patient's home. This process requires resources from multiple sources including private, public, provider and user.

The in-hospital MR was initiated three years prior to the introduction of the CMR. Only minor changes were required to support the WPCN CMR. The project was leveraged with minimal additional resources by utilizing AHS hospital staff already involved in MR and integrating the externally funded WPCN-initiated research project processes.

The WPCN-funded pharmacist team conducts the home visit for the CMR as part of their defined duties and responsibilities. Funding for their time in this activity is derived in part from the research grant budget, which was awarded to the study principal investigator and is administered by the WPC.

Family physicians involved in the program receive faxed notification that their hospitalized patient has consented to the CMR intervention. They are reminded that the CMR pharmacist may contact them and that the clinic-based WPCN-funded pharmacist may conduct a structured medication review.

...the community-based medication reconciliation intervention is being evaluated through a randomized controlled trial involving patients discharged from the WestView Health Centre.

Integration and cost sharing of this project involved senior management in the WPC, the WPCN and their local partners at the AHS–WHC site. Their leadership by example encourages a culture of cooperation and striving for excellence among front-line interdisciplinary staff.

Evaluation: A Randomized Controlled Trial and a Risk Prediction Model

Funded by the Canadian Medical Protective Association Collaborative Research Grant, the CMR intervention is being evaluated through a RCT involving patients discharged from the WHC. The RCT is designed to determine the impact of the intervention on health services utilization for patients who receive standard discharge teaching *or* standard discharge teaching *and* a home-visit MR by a pharmacist within 72 hours of discharge. Patients discharged from the WHC are offered participation in the RCT during a 12-month recruitment period that started on November 1, 2008.

Outcome variables are health services utilization, including number of ER and hospital re-admissions, services provided by physicians and home care, and changes in care status over an 18-month period post-index discharge. A cost-effectiveness study will be conducted at completion of the study.

In order to guide future application and implementation of this resource-intensive intervention, the initiative will also design

a risk-prediction model. It will help identify patients discharged from in-patient care with the highest level of need for the intervention. Predictor variables measured at discharge include age; number of medications; number of chronic co-morbidities; admission to home care nursing follow-up; and cognitive, health and functional mobility status at discharge.

Results

At only five months into implementation, health services utilization data are not yet available for inferential analyses of the impact of the CMR on service and patient outcomes. However, it is evident that the project implementation process has created a number of positive partnerships that have integrated funding, resources, organizational structures, service delivery and clinical processes of multiple sectors.

Discussion: Lessons in Integration

The pre-existing in-hospital MR process is complemented by the WPC/WPCN-initiated CMR at the interface of hospital and community care. Together they represent an integrated solution across sectors and interdisciplinary boundaries to a problem that consumes significant healthcare resources and directly affects patient safety. This is being done seamlessly, with the FP at the centre of a dedicated team of local healthcare providers.

The CMR intervention is being piloted and rigorously evaluated as a result of managerial cooperation across different sectors and by organizations that hold similar values. These values include defragmenting care and optimizing patient-centred case management with efficient application of scarce resources.

Financial and human resources were brought together for this project by innovative cost sharing and by bridging agency support from the national level (CMPA) to the most local level (FP offices) through the infrastructure of the WPCN and the regional health authority.

The CMR initiative provides a strong example of how a model of enhanced integration can effectively address gaps in patient care at a transition point in the healthcare system.

According to Kodner and Spreeuwenberg's definition, the goal of patient-oriented integration is to "enhance quality of care and quality of life, consumer satisfaction and system efficiency for patients with complex, long-term problems cutting across multiple services, providers and settings" (2002: 3). The CMR model observes these same principles.

CMR is fundamentally centred on the patient, whose safety and health experience continues beyond an acute care visit. Standards of patient care and of system-level efficiency require responsibility to the patient to extend beyond the hospital stay, including the return to the community and home.

CMR improves both quality of care and system efficiency by introducing standardized procedures that reduce potentially dangerous variations in post-discharge medication management.

CMR is a novel initiative that adapts standardized protocols for hospital medication reconciliation to the setting of patients' homes. It creates a flow of information from hospital MR to discharge coordinator, to clinical pharmacist, community pharmacist, patient and FP. Where none existed before, protocols have been defined at every point to streamline the identification, reporting and rectification of medication discrepancies.

The CMR program strengthens the continuum of care by linking health sectors and providers, with the patient and FP playing central roles. It bridges a discontinuity at the hospital–community interface and builds comprehensive patient-centred care founded on the grassroots capacity of FP-coordinated primary care teams. CMR recognizes that a compartmentalized system cannot meet individual health needs: separating primary care and acute hospital care into isolated silos is artificial and detrimental to the safety and quality of patient care.

This project has made changes that facilitate sharing information and creating new channels of communication among health providers. Moreover, CMR establishes new forums for broader collaboration in patient care. Finally, CMR has clearly defined other healthcare provider roles that improve patient care by ensuring adequate follow-up processes. The family physician is reinforced as the nucleus of information and principal agent in providing continuity of care in patients' healthcare experiences.

In order to guide future application and implementation of this resource-intense intervention, the initiative will also design a risk-prediction model.

The concept of building a “centre of excellence” (for delivery of primary care and inter-professional learning and research) permeates our healthcare community as a result of leadership and example in the hospital (WHC) and the WPC/WPCN. By engaging other healthcare providers in all sectors, we achieve performance far surpassing normal expectation – enabling projects such as this.

Conclusion

The CMR initiative and the funded-research CMR study (RCT) will provide new information about the effectiveness of a physician-led, multi-disciplinary-team approach to improving quality and safety around medication use by patients, especially at the interface of care between hospital and community. The statistical regression model, identifying risk predictor variables for those patients most needing CMR, will allow pharmacist services to be efficiently applied in the future. Implementing this intervention should result in a net saving in health services utilization.

Efforts to measure the CMR's impact as a patient-centred integrated care system should also include measures of patient or user-defined outcomes. The CMR should demonstrate ultimate patient acceptance and satisfaction, in addition to quality of care, effective management and cost-efficiency.

This project will provide an encouraging precedent for practising physicians or other healthcare providers interested in health system research in primary care. With the spreading umbrella of infrastructure support by Primary Care Networks across Alberta, we hope to see many more projects of this type.

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Note

¹ The Institute for Safe Medication Practices Canada (ISMP Canada), in partnership with the Safer Healthcare Now! Campaign (SHN) (<http://www.saferhealthcarenow.ca>) has adopted (with modification), for promotion in Canadian hospitals, the tools and measures originally developed by the Institute for Healthcare Improvement (IHI) for a standardized quality improvement process called medication reconciliation (<http://www.ihl.org>). The WestView CMR intervention uses the following terms with direct reference to their original definitions created by IHI:

Medication reconciliation “a formal process of obtaining a complete and accurate list of each patient's current home medications – including name, dosage, frequency and route – and comparing the physician's admission, transfer and/or discharge orders to that list. Discrepancies are brought to the attention of the prescriber and, if appropriate, changes are made to the orders. Any resulting changes in orders are documented.” The goal of medication reconcili-

ation is to monitor organizational success and to eliminate undocumented intentional discrepancies and unintentional discrepancies. This WestView CMR study adopts the IHI/SHN medication reconciliation for community practice as the study *intervention*. **HQ**

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About the authors

Allan L. Bailey, MD, CCFP, is a Founding Member and Past Chairman of WestView Primary Care Network; Medical Director of Research and Evaluation of Westview Physician Collaborative; Site Medical Director of WestView Health Centre, Alberta Health Services; Assistant Clinical Professor of the Department of Family Medicine, Faculty of Medicine and Dentistry, University of Alberta; Program Medical Director of WPC Family Medicine Residency Community Teaching Site; and a Family Physician in Spruce Grove, Alberta. Before obtaining his certification in family medicine in 1990, with a BSc (Mathematics) and a BSc (Hons, Civil Engineering) degrees, Allan Bailey worked as a civil engineer across Canada for a number of years. With interests in health economics and primary care restructuring, Allan Bailey is engaged in and is leading a number of clinical studies and health services research projects.

Grace Moe, PT, MSC, is Chief Executive Director and Director of Research and Evaluation, WestView Primary Care Network; and Director, Innovations and Integrated Professional Learning, Westview Physician Collaborative. With portfolios that bridge executive decisions, operations, quality improvement and research, Grace Moe is able to facilitate and lead the development of innovation projects that integrate providers and systems.

Jessica Moe is an associate writer of this article. She is interested in questions of health systems organization and maximizing access to health care. She is currently a medical student at Queen's University, and has also earned a M.A. in International Law and Human Rights from the United Nations University for Peace in Costa Rica, as well as a B.A.Sc., focusing on Microbiology and Immunology and International Development, from McGill University.

Ryan Oland, MD, CCFP (EM) is Chief of Emergency Staff, WestView Health Centre, Alberta Health Services and Chief Lecturer, Department of Emergency Medicine, Faculty of Medicine and Dentistry, University of Alberta. Ryan Oland served as an advisor for the research design of the randomized control trial.