

2012

# Using an Evidence Based Practice Informatics Guided Medication Safety Intervention To Improve Medication Safety among Community Dwelling Older Adults

Raeann G. LeBlanc

*University of Massachusetts Amherst*

Follow this and additional works at: [https://scholarworks.umass.edu/nursing\\_dnp\\_capstone](https://scholarworks.umass.edu/nursing_dnp_capstone)



Part of the [Community Health and Preventive Medicine Commons](#), and the [Nursing Commons](#)

---

LeBlanc, Raeann G., "Using an Evidence Based Practice Informatics Guided Medication Safety Intervention To Improve Medication Safety among Community Dwelling Older Adults" (2012). *Doctor of Nursing Practice (DNP) Projects*. 16.

Retrieved from [https://scholarworks.umass.edu/nursing\\_dnp\\_capstone/16](https://scholarworks.umass.edu/nursing_dnp_capstone/16)

This Open Access is brought to you for free and open access by the College of Nursing at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Doctor of Nursing Practice (DNP) Projects by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact [scholarworks@library.umass.edu](mailto:scholarworks@library.umass.edu).

Using an Evidence Based Practice Informatics Guided Medication Safety Intervention  
To Improve Medication Safety among Community Dwelling Older Adults

By

Raeann G LeBlanc

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment

Of the requirements for the degree of

DOCTOR OF NURSING PRACTICE

May, 2012

School of Nursing

Approved as to style and content by:

Dr. Jean Swinney: School of Nursing Committee Chair

Dr. Jeungok Choi: School of Nursing Member

Dr. Sarah Kemble: Outside Member

### Abstract

Medication safety and prevention of medication related problems are important issues in promoting and maintaining health and safety in one's home for community dwelling older adults. Assessment of medications and management of a medication schedule are essential elements of medication safety, medication review, and medication care coordination. *The Framework for Geriatric Homecare Excellence* (Collaboration for Home Care Advances and Practices, 2009) is used as the foundation of this project to improve medication management, and promote and maintain health and safety at home. An in-home medication assessment was completed, using a medication management software informatics system to review medications, identify medication related problems, and convey this information to the Primary Care Provider, case manager, and client. Educational interventions on management and understanding of medications were provided to participants to assess and emphasize the correct use of medications and use of a personal medication record. The goal of this health promotion and health maintenance project was to improve medication safety through focused assessment and medication related education interventions for community dwelling older adults. This informatics based medication safety intervention showed considerable strength in completing and sharing medication home assessments enhanced by the software abilities. Significant outcome improvements were associated with the pre-post test comparison in provision of an up-to-date medication list and comprehension by clients of specific medication safety education.

*Keywords:* polypharmacy, older adults, inappropriate medications, medication safety, nursing informatics, medication/health literacy

Table of Contents

Abstract .....2

Using the EBP Informatics Medication Safety Intervention.....5

    Statement of Problem.....6

    Evidence of Problem.....6

    Review of Literature.....9

    Conceptual Framework.....12

Project Description.....13

    Purpose.....13

Methods.....14

    Study Design.....14

    Setting.....15

    Participants.....15

    Sample Size.....16

    Materials and Procedures.....17

    Agency support.....20

Results.....21

    Data Analysis.....21

    Outcomes and Evaluation.....22

    Medication Self-Management.....22

    Medication Related Interventions.....23

    Functional Health Literacy and Education Teach Back.....24

    Available Medication List.....25

Discussion.....26

    Medication Assessment .....26

    Sensory Deficits and Self-Management .....26

    Informal Supports.....27

    Limitations .....28

Conclusions.....28

References .....30

Appendixes.....39

    Appendix A.....39

    Appendix B .....41

    Appendix C.....42

    Appendix D.....43

    Appendix E.....48

    Appendix F.....49

    Appendix G.....51

    Appendix H.....55

    Appendix I.....56

    Appendix J.....57

### Using the EBP Informatics Guided Medication Safety Intervention

Medication safety is an important public health issue among the population of community dwelling older adults (Centers for Disease Control and Prevention (CDC), 2010). Community dwelling older adults are those adults age sixty-five and older who live and manage their health care and personal needs at home. Community dwelling older adults may receive both social support (friends and family) and, formal support (home care agencies, aging services providers) to maintain their health and safety while residing at home.

According to Budnitz and Layde (2007), the environmental context of medication management for community dwelling older adults is highly complex. Complex variables increase one's vulnerability of a medication related problem. These variables include an inaccurate medication list or regimen, multiple retail sources used to obtain prescription medications, multiple prescription medications and multiple over the counter drugs and supplements stored in a variety of locations, physical, economic, transportation, and communication barriers that impact access to timely monitoring of drug effects (p. 162).

Use of multiple and inappropriate medications increase the risk of serious and fatal outcomes for community dwelling older adults (Gurwitz, Field, & Harrold, 2003; Fulton & Allen, 2005; Zhan et al., 2005; Haque, 2009). *Healthy People 2020* (US Department of Health and Human Services) identifies medication safety as an influential factor that underlies the leading objectives for older adults including decreasing falls, improving self-management of chronic conditions, promoting health, and reducing injury. Gurwitz et al. (2003) found that approximately ninety-five percent of adverse drug reactions are predictable, and approximately twenty-eight percent are preventable. Adverse drug events in the United States cost over three billion dollars annually (Institute of Medicine (IOM), 2006).

Medication safety is an important issue among all populations requiring multiple medications to manage complex chronic mental and physical illnesses. Changes in functional status, complex medication regimens, communication barriers, multiple prescribers, and physiological changes place older adults at significant risk for an adverse medication event or medication related problem (Fick, Mion, Beers, & Waller, 2008). During transitions between home, hospital, rehabilitation, and long-term care, the risk of a medication related problem increases (Albert, Colombi, & Hanlon, 2010; Hennessey, & Suter, 2011). According to Coleman, Smith, Raha and Min (2005), risk of a medication related problem among community dwelling older adults is increased by “a high burden of illness and accompanying polypharmacy, transient or chronic cognitive impairment, and variable health literacy” (p. 1842).

Provider and client knowledge, through improved information exchange of medication related problems, an accurate shared medication list, understanding of current medications, and improved medication health literacy can improve safety and decrease practices known to increase this risk of adverse drug reactions (Persell, Osborn, Richard, Skripkauskas, & Wolf, 2007; Metlay, Cohen, Polsky, Kimmel, Koppel, & Hennessy, 2005).

### **Statement of the Problem**

Risk of adverse drug reactions among older adults increases with medication mismanagement and misunderstanding, lack of routine assessment, a lack of collaboration and communication between a client and their healthcare providers (Zwicker & Fulmer, 2008), and during transitions of care between settings (Coleman, Parry, Chalmers, & Min, 2006).

### **Evidence of the Problem**

Use of multiple and inappropriate medications increase the risk of serious and fatal outcomes for community dwelling older adults (Gurwitz et al., 2003; Fulton et al., 2005; Zhan et

al, 2005; Haque, 2009). Adverse drug reactions are frequently the result of polypharmacy and inappropriate medication use (Fick, Cooper, Wade, Waller, Maclean, & Beers, 2003). National data trends indicate a significant increase in older adults' visits to the emergency department for adverse drug reactions (Budnitz, Shehab, Kegler, & Richards, 2007; CDC, 2010).

Older adults in the United States are the largest consumers of prescription and over the counter medications (Slone Survey, 2006; Zwicker et al., 2008). Risk of adverse drug reactions increases with medication mismanagement and lack of routine assessment of polypharmacy (Budnitz & Layde, 2006; Zwicker et al., 2008). Shared provider and client knowledge about the medications being taken, along with routine review of clients' in home medication use can improve safety and decrease practices known to increase this risk of adverse drug reactions (Coleman, Smith, Raha, & Min, 2005; Metlay et al., 2005).

In contrast to the community, nursing homes and inpatient settings are highly regulated environments with regard to medication safety initiatives (Budnitz et al., 2007; Golden, Tweary, Dang, & Roos, 2010). For example, nursing home residents receive federally mandated regular reviews of their medications by a consultant pharmacist, with Primary Care Providers required to review and sign off on the medication orders every sixty days (Golden, Qiu, & Roos, 2011).

In community home care, an accurate medication list is cited by nurses as often unavailable (Ellenbecker, Frazier, & Verney, 2004), reflect discrepancies (Bain et al., 2008; Tessier, Henneman, Nathanson, Plotkin, & Heelon, 2010), or difficult to access (Murray & Kroenke, 2004). Federal policy changes under the Patient Protection and Affordable Care Act (2010) change the delivery of healthcare. A support system of safety and equity, where the community dwelling older adult who qualifies for nursing home level of care, receives collaborative review of medications is needed. Processes that improve medication safety include



systems of collaboration and communication between a patient and their healthcare providers as essential to insuring medication safety.

A common finding among older adults living with one or more chronic diseases is the issue of polypharmacy. Adverse drug events are frequently the result of polypharmacy and inappropriate medication use, as defined by the *Beers Criteria* (Fick et al., 2003). These negative outcomes are costly, both in terms of human suffering and in terms of healthcare expenditures. There is a significant increase in the rate of older adults' visits to the emergency department for adverse-drug events brought on by inappropriate prescription medication use. Older adults are twice as likely to go to emergency departments for adverse drug events. Older adults are nearly seven times more likely to be hospitalized after an emergency visit for a drug related problem (Centers for Disease Control, 2010)

As recognized by Fulton and Allen (2005), aging itself increases the risk for drug-to-drug interactions with multiple medication use. Safe medication management is a key element in the prevention of complications, as well as the promotion of health in maintaining quality of life and function within one's home and community. Medication safety also requires addressing the individual's ability and understanding on how to take medications safely, within the environment of their home, to the best of their ability (Roth & Ivey, 2005; Budnitz et al., 2007; Shrank, Polinski, & Avorn, 2007). This public health problem of unsafe and inappropriate medication use can range in outcomes, from an undesired side effect that impacts quality of life, to a significant adverse event that leads to multiple complications, institutional long-term care, or even death for the older adult.

## **Review of Literature**

The results of literature reviewed support that medication safety among community dwelling older adults in the developed countries, primarily the United States, is a complex public health issue with risk for adverse outcomes. Medication safety issues are complicated by polypharmacy (Ellenbecker et al., 2004; Haider, Johnell, Weitoft, Thorslund, & Fastbom, 2009; Castelino, Hilmer, Bajorek, Nishtala, & Chen, 2010), inappropriate treatment (Fick et al, 2003; Gurwitz et al., 2003; Higashi et al., 2004; Steinman et al., 2006; Field, Mazor, Briesacher, DeBellis, & Gurwitz, 2007; Budnitz et al., 2007; Raebel et al., 2007; Fick et al., 2008; Meurer et al., 2010), medication related problems (Raebel et al., 2007), and lack of understanding by clients on how to correctly take their medications (Hope, Wu, Tu, Young, & Murray, 2004; Roth & Ivey, 2007).

Fragmentation in prescribing and exchange of medication information across settings within the healthcare system and home (Arora et al., 2010; Crilly, Keefe, & Volpe, 2011) is also a newly emerging area of focus supporting the significance of this issue (Coleman, Smith, Raha, & Min, 2007; Golden et al., 2010; Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011). In understanding the characteristics of transition care interventions, priority emphasis is given to medication management, symptom management, and early follow up (Hennessey & Suter, 2011).

Communication problems within the system of healthcare delivery include miscommunication and absence of communication about prescribed and discontinued medications (Arora et al., 2010), and are significant elements of risk for the home care population (Ellenbeker et al., 2011; Crilly et al, 2011).

Though the issue of adverse medication related events is defined as a public health issue for older adults (CDC, 2010), there is a need to expand a quaternary public health prevention perspective (Starfield, Hyde, Ge´rvas, & Heath, 2008). Addressing the issue of medication safety among older adults, who are prescribed the majority of pharmaceuticals in the United States (Slone Survey, 2006), is a measure in equity to safe care that is both timely and necessary in reducing the risks that are inherent in treatment across the lifespan and within the trajectory of chronic disease.

The evidence supports the wide spread issue of polypharmacy and potentially inappropriate medication use among the population of older adults within the community. Both systematic and individual reasons contribute to the use of inappropriate medications. One issue leading to polypharmacy is that, among prescribers, medications are routinely added but rarely discontinued (Bain, Holmes, Beers, Maio, Handler, & Pauker, (2008). How information is exchanged among healthcare environments and providers is also vulnerable to error. Poorly reconciled medications between an individual’s record of what they are taking at home and their medical record within any one setting often differ (Coleman et al, 2007).

According to an Institute of Health Improvement (IHI) panel discussion (2012), with multiple providers there are also multiple prescribers which makes the risk of inappropriate medication use or prescribing medications that have drug-drug, drug-disease interactions more likely. Individuals may also take over-the-counter medications and supplements and take prescription medications not prescribed to them that can create medication related problems. In addition to multiple prescribers, clients may have multiple pharmacies.

Purchasing medications from many different pharmacies and automatic medication renewals can lead an individual to taking more medications than intended, managing more

complexity in number of medications, and less opportunity for oversight of medication safety (Gurwitz et al, 2003; Steinman et al., 2006; Budnitz et al., 2007; IHI, 2012). Medication safety and health maintenance are important to address in the promotion of optimal care at home, safe transitions across settings, and prevention of avoidable adverse outcomes (Marek & Antle, 2008).

Solutions to these medication related problems include technology to improve the accurate exchange of medication related information in the home (Neafsey, Strickler, Shellman, & Chartier, 2002). Computer based software support systems that screen for polypharmacy and drug-drug, drug-disease interactions as well as side effects and self-management of medication administration (Alkema, Wilber, & Simmons, 2007) are additional solutions. Emphasis on basic care coordination in the home, communication strategies including an accurate medication record, routine review of medications with the client and shared with the Primary Care Provider, and discontinuation of inappropriate medications are key prevention measures to avoid medication related problems. Early intervention, collaboration, and communication among health care providers and clients are identified priorities to promote medication safety for older adults who wish to remain at home (Rossi et al., 2007; Levesque et al., 2009; George & Jacobs, 2011; Naylor et al., 2011; Sato, Shaffer, Arbaje, & Zuckerman, 2011).

On a policy level, there remains a critical need for improved health care delivery in addressing the broad range of problems that patients and their caregivers encounter in safely managing health and medication regimes at home (Orwig, Brandt, & Gruber-Baldini, 2006; Field et al., 2007). Routine medication review refers to a routine process that assesses the client in their home, the medications they are taking, how they are taking these medications, maintaining an up-to-date medication list as reconciled with their primary care and specialty providers, and

screening for any potential medication related problems. A salient gap in the literature, and an important safeguard, is a need to insure routine medication review annually for older adults who reside at home (Shrank, Polanski, & Avorn, 2007).

The HomeMeds Medication Management Improvement System is a medication assessment software system that has shown positive client outcomes. These outcomes have included discontinuation of potentially harmful medicines, decreased confusion and dizziness, better pain control, and decreased risk of falls (Partners in Care Foundation, 2011). This software program generates a report based on inputs of medication, diseases, and patient specific symptoms (see Appendix A) that can be communicated to the healthcare team.

Evidence based interventions that emphasize “pharmacovigilance” and pay specific attention to functional ability, client understanding about their medications, how medications are prescribed and ultimately managed (World Health Organization, 2004) are opportunities to address the public health problem of adverse medication events, and support home based care for frail older adults. Public health nursing and delivery of care in the home for community-dwelling older adults that address medication literacy offer a substantial opportunity for effective innovations.

### **Conceptual Framework**

The *National Framework for Geriatric Home Care Excellence* (Collaboration for Home Care Advances and Practices (CHAMP), 2009) conceptual framework defines the essential aspects of health services at home and is based on health care provision that values maximizing older persons’ quality of life, honors client preferences, optimizes health and function, and improves coping with end of life (CHAMP, 2009). Within this framework, key practice areas are emphasized as high priority to improving care and quality of life for older adults in their home.

These key practice areas include care coordination, medication management, cognitive function, physical function, chronic pain management, and palliative care (CHAMP, 2009).

Interdependent factors, as defined in *The National Framework for Geriatric Home Care Excellence*, necessitate a healthcare support system that collaborates and exchanges key assessment data among formal health providers, community agencies that support homecare, and clients at home. Relationships between healthcare providers and clients that promote information exchange improve safety (Institute of Medicine (IOM), 2001). Looking toward a holistic praxis oriented conceptual framework places the person and people living in their homes at the center, with exchange of support and information between formal and informal healthcare providers as vital links. Within the home, promoting care approaches that include the client and their understanding of their medications and enable safe management of medications is a theoretically grounded perspective within this framework.

### **Project Description**

#### **Purpose**

The aims of this project were to promote medication safety among community dwelling older adults. Medication assessments were completed, medication lists reviewed, medication related problems identified, and education provided to promote safety at home. HomeMeds is a medications management information system (see Appendix A). HomeMeds is an evidence-based intervention with a strong expert evidence rating and is supported by the Agency for Healthcare Research and Quality – Healthcare Innovations Exchange (2010).

This project implemented HomeMeds to clients of the Franklin County Home Care Corporation (FCHCC) who live in different areas of Franklin County, Massachusetts and receive

care through a non-integrated rural and suburban healthcare system. Franklin County Home Care Corporation is a non-profit Aging Service Access Point (ASAP).

This project implemented HomeMeds, assessed client understanding of their medication regimen, created an accurate medication list, provided client-centered education, and evaluated the education intervention through assessment of client's ability to teach the information back. This information was communicated to the Primary Care Provider and agency case manager.

As identified by the Institute of Medicine (2001), processes that improve medication safety include collaboration and communication between a patient and their healthcare providers. This project sought to provide targeted interventions in medication assessment, offer services specifically aimed at improving safety for older adults who self-manage multiple medications, and improve current understanding of this issue from the perspective of the older adult (Miller & DeMarzo, 2009). This project was accomplished in the community during the period of January-April 2012, with the primary implementation period during the month of April 2012 with Franklin County Homecare Corporation (FCHCC), who currently provides homecare levels of support to both Medicare and Medicaid populations.

## **Methods**

### **Study Design**

IRB approval was sought and granted by University of Massachusetts, Amherst, (see Appendix B) and the Commonwealth of Massachusetts Executive Office of Elder Affairs (see Appendix C). This project was a comparison two groups, pre- and post-test design (Issel, 2009). The target population for this project was community dwelling older adults who are managing their own medications. A purposive sample of community dwelling adults who are currently

clients of the Franklin County Home Care Corporation (FCHCC) were selected (Lewis & Ritchie, 2003).

### **Setting**

Franklin County Home Care (FCHCC) is one of the twenty-seven Aging Services Access Points (ASAPS) in Massachusetts and administers the Massachusetts State Home Care program. FCHCC is a private, non-profit corporation that provides and coordinates a range of services to support the independent living of older adults, people with disabilities, and their caregivers.

FCHCC serves the population of the geographically diverse Franklin County towns of Ashfield, Bernardston, Buckland, Charlemont, Colrain, Conway, Deerfield, Erving, Gill, Greenfield, Hawley, Heath, Leverett, Leyden, Monroe, Montague, New Salem, Northfield, Orange, Rowe, Shelburne, Shutesbury, Sunderland, Warwick, Wendell, Whately, and the additional towns of Royalston, Phillipston, Athol, and Petersham.

According to the US Census Bureau (2011), the population of Franklin County in 2010 was 71,372 residents. Of that population, 15.2% are persons age 65 or older, 51.2% female, 48.8% male, 94.2% White, 3.2% Hispanic or Latino, 1.3% Asian, 1.1% Black, 0.3% American Indian/Alaska Native, and 2.1% persons reporting two or more races.

### **Participants**

Criteria for sample inclusion included selection of FCHCC clients who receive current home care support, live in the community, are age sixty-five or older, and manage their medications without formal support. This population was selected because of their increased risk of the adverse medication related events associated with polypharmacy, multiple chronic diseases, and vulnerability to medication related problems (Zwicker et al., 2008; Miller & DeMarzo, 2009; CDC, 2010). Exclusion criteria included those who have scored 19 or below on



their mini-mental status exam (noted in their client record) indicating a moderate to severe level of dementia. These clients were excluded due to their cognitive impairment in receiving education and follow up medication management interventions as identified as key aspects of this program. Clients under age sixty-five were not included. Clients who are unable to communicate in English were also not included for the pilot-project. Possible participants were identified in two ways, first by direct referral from case managers and second through database record review and consultation for appropriateness and final approval by the client's case manager.

### **Sample Size**

Of a total of 90 clients identified from the record review and referrals, a total of 54 were selected as appropriate, based on case manager review and criteria. Of the 54 selected, a total of 25 were able to be contacted and agreed to participate in this project. This sample was randomized into the comparison (n=10) and intervention (n=15) group. All participants were white, with the mean age of 79.2 years of age, a higher percentage (68%) of females to males in both groups. The majority (76%) of the participants lived alone.

All participants had significant need assistance with Activities of Daily Living and Independent Activities of Daily Living as identified below (Table 1). Risk level of 3 in both groups supports that the majority of clients have a health risk and daily health care need, and a risk to their personal safety, in addition to having some level of involved informal support identified.

Participants represented 8 towns from the agency service area with a geographic radius of 77 miles. Of the 15 participants in the intervention group these participants were associated with 11 different Primary Care Providers and 6 different FCHCC agency case managers.

Table 1. Descriptive Characteristics of Project Population

<i>Characteristic</i>	<i>Comparison Group (n=10)</i>	<i>Intervention Group (n=15)</i>
<b>Demographics</b>		
Age (mean)	79	81
Female	60%	73%
Male	40%	27%
Rural	40%	33%
<b>*Activities of Daily Living</b>		
ADLs	4	5
IADLs	6	6
<b>**Risk Level (mean)</b>	3	3
<b>***STOFHLA</b>	33	32

\*ADLS – the activities usually performed in the course of a normal day in a person's life, such as eating, toileting, dressing, bathing, or brushing the teeth (The Free Dictionary, n.d.)

\*IADLS-the activities often performed by a person who is living independently in a community setting during the course of a normal day, such as managing money, shopping, telephone use, travel in community, housekeeping, preparing meals, and taking medications correctly (The Free Dictionary, n.d.).

\*\*Risk Level-Composite score based on health risks, daily care needed, personal safety risks and behavioral risks. Involved informal support is included in this level. Those with the lowest score of 1 have no informal support. The lower the score the more formal care services required (1=highest, 5 lowest).

\*\*\*STOHFLA – Short Test of Functional Health Literacy in Adults. Score 23-36 = Adequate Functional Health Literacy; 60% participation; only one client scored below adequate with a score of 21.

## Materials and Procedure

At the time of the first home visit, the project was explained in full and the informed consent form reviewed (see Appendix D). The individual was given time to ask any questions. The informed consent form was signed before the client's participation. The participant also signed a release of medical information agreement so that the report of the medication review may be communicated to their Primary Care Provider. The project leader, Doctoral (DNP) candidate, scheduled and conducted all home visits.

The process of pre-testing included the baseline data collection before the intervention of HomeMeds medication assessment program and the educational component on medication management. Pre-testing was completed through primary medication assessments at the clients'

homes. This baseline data collection (see Appendix E, Assessment Questions) included the initial assessment of the participant and their medications, participant's understanding of medications used, and participant's ability to manage medications. Side effects associated with potential medication problems (confusion, dizziness, falls) and characteristics related to potential drug duplication and interactions (pain, alcohol use) were measured through the interview assessment.

Because health literacy can influence management of medications and education design, The Short Test of Functional Health Literacy in Adults (STOFHLA) (Baker, Williams, Parker, & Nurss, 1999), was administered to assess the participant's level of functional health literacy. Individual client medication management was assessed using the Drug Regimen Unassisted Grading Scale (DRUGS) (Edelberg, Shallenberger, & Wei, 1999), which measures the individual's ability to access, identify, and demonstrate dosage and timing of medications. This is a numerical scale: zero (needs assistance) to one (independent) and measures ability of the four criteria of medication management (access, identification, dosage, and timing) for each medication. A total score is multiplied by the number of medications and determines both the type of assistance a person may need and/or the need for further monitoring. DRUGS has shown reliability and validity for determining an older adult's ability to manage his or her medications independently (Farris & Phillips, 2008). This element of independent medication management provides further information on the level of supports a person needs in the actual taking of medications and offers more descriptive information that can be shared with the client, agency, and family to strengthen this area of care.

The DNP candidate was trained in the use of the HomeMeds system and the Evidence Based Protocols by a pharmacist and information systems specialist from the Partners in Care Foundation. This system identified drug-drug interactions, drug-disease interactions, medications

considered inappropriate for older adults, medication duplication, duplicate ingredients, and medication related problems based on symptoms assessment. The medications the participant reported taking, their health history, and potential medication related symptoms were used as input data and a report compiled. This data served as the comparison information between the initial meeting with the client in their home, the follow up assessment after the HomeMeds medication review, and before addressing the client's management of their medications through education (Issel, 2009).

The information collected at the time of the home visit was unable to be input directly into the database via a laptop in the participant's home. Since the database requires internet to access, this was not possible since the majority of participants did not have internet access available. Because of this, it was determined that all HomeMeds assessments were done via paper record and transcribed later into the HomeMeds database system, where alerts were processed.

The DNP candidate completed all survey measurement, data input, and review of the generated report. This report was mailed to the home care client's Primary Care Provider. In situations where a more immediate need was identified, a telephone call was made. Copies of this comprehensive assessment were provided to all agency case managers associated with the clients. Participants selected to the comparison group did not receive the HomeMeds intervention (alert processing, Primary Care Provider communication, education) but did receive the medication assessment for comparison.

A follow up home visit provided post test data and addressed if changes were made in the patient's medications by one's Primary Care Provider, if the client used an accurate medication list, if the client experienced a medication related problem, and if the client expressed

understanding of their medication regime. Individual client medication management was reassessed using the Drug Regimen Unassisted Grading Scale (DRUGS) for comparison. The DRUGS score was obtained on the initial visit and obtained 1-2 weeks later during the follow up visit.

During this follow up home visit, the participant was also instructed and assisted on the use of a personal list of their medications. Participants were educated on bringing this list with them to all appointments and making it readily available if needed in case of an emergency (Miller & DeMarzo, 2009). Assessment of understanding of this education was done through teach back assessment of the information provided (see Appendix F, Project Protocol). The project period occurred over one-hundred and fifty hours during the month of April 2012 (see Appendix I, Timeline).

### **Agency Support**

This project sought to meet priority community needs to reduce the risk of adverse medication events (reduce polypharmacy and inappropriate drug use, improve medication self-management and client understanding, and access community support resources). This public health project, designed to meet these goals, also gained further insight into ongoing community needs, program evaluation, and program sustainability (see Appendix G). Organizational commitment was sought and strongly supported this identified need and medication safety improvement project (see Appendix H, Executive Director Letter of Support).

Simple communication updates were reported at the beginning, middle, and end of the program to the agency and doctoral committee by the DNP candidate (Bell-Elkins, 2002). The majority of designated costs for this program emphasized the process of provider-patient assessment and education (see Appendix J, Costs). For this timeframe, many of the provider fees

were volunteered, such as the Geriatric Nurse Practitioner salary and mileage travel costs.

Agency support funded the HomeMeds medication informatics system contract for the period of this project (April-May2012). Resources of space, office equipment and telephone use were provided by the Franklin County Home Care Corporation as well as access to databases and information resources.

## Results

### Data Analysis

Categorical data were analyzed to describe the population based on demographic data, level of health literacy, and level of care needs (see Table 1). Medication related information, including number of diagnoses, and number and type of medications, were also collected for descriptive characteristics of the participants (see Table 2). In this project, the mean number of medications for the entire sample was 12 medications per person, with a maximum number of 25 and a minimum of 2 medications per person. This is consistent with the data that suggest the high frequency of polypharmacy among those persons age 65 years and older (Slone Survey, 2006; Zwicker et al., 2008).

Table 2. Medication Related Characteristics

<i>Characteristic</i>	<i>Comparison (n=10)</i>	<i>Intervention (n=15)</i>
Medical Information		
Medications (Mean)	10	12
Medical Diagnoses (Mean)	6	8
Pharmacy		
Uses 1 pharmacy	90%	87%
Self-Management		
Receives informal support for medication management	40%	87%
Uses Medication Box	60%	67%

Uses a Medication List	60%	60%
------------------------	-----	-----

### **Outcomes and Evaluation**

The first level of evaluation is the analyses of the percentage impact of this program based on the defined goals and outcomes (see Appendix G). Four primary objectives of this medication safety improvement project were evaluated. This includes pre and post test comparison of the ability to self-manage one's medications independently, pre and post test evaluation of the availability of a medication list, evaluation of understanding based on the education component through teach-back, and a post-test intervention group evaluation of medication changes based on the HomeMeds assessment and information communication with the Primary Care Provider.

### **Medication Self-Management**

Comparison between the control, group a, and intervention, group b, data was utilized to evaluate basic medication management results of the Drug Regimen Unassisted Grade Scale (Edelberg et al., 1999). DRUGS was only administered to those clients that were primarily unassisted in their medication management and did not include participants who received formal or informal supports. The intervention group b (n=9) received education on self-management of medications through the review of the medications and the parameters as defined by the DRUGS. An independent t-test using SPSS 20 was run to compare DRUGS scores. There was no significant difference ( $p < .05$ ) in the scores for the comparison group ( $M_A=97$ ,  $SD=7.0$ ) and the intervention group ( $M_B=93$ ,  $SD=10.0$ ),  $t(16)=-.816$ ,  $p=.426$ .

Of the total sample size of 25, it was found that 7 participants were dependent on an informal support person and did not manage their medications unassisted; therefore, this

measurement could not be conducted. Additionally, 68% of the participants used a medication box and 65% relied on informal support to assist in managing their medications.

Though assessment for adherence was not a main point of measurement, issues were identified in 27% of the intervention group and the Primary Care Provider was notified. Of the total sample, 7 participants were identified as high-risk for frequent re-hospitalization, suggesting increased vulnerability in medication management in the transition across settings.

### **Medication Related Interventions**

The HomeMeds informatics based software system evaluated the medication and medication related safety profiles of each participant in the intervention group. Based on the generated alerts, specific types of interventions were included (alert letter to Primary Care Provider (15), alert telephone call (2), tailored education (16)). Post test medication changes showed there was no significant difference among the comparison group and the intervention group ( $M=.20$ ,  $SD=.41$ ) in post test medication changes  $t(14)=1.87$ ,  $p=.082$ . Of the total number of assessments in the intervention group, only 2 participants required immediate intervention by the Primary Care Provider. First was an appointment to refill seizure medications the client had run out of after discharge from sub-acute care (caused by confusion between pharmacies) and the other case for severe elevated blood pressure.

Alerts were generated based on three specific areas of medication safety including potential medication related problems, duplicate ingredients, and duplicate therapies. Based on the type of alert, an evidence based practice protocol was followed in attending to the issue identified. Data from HomeMeds revealed the highest incidence of problems in the area of duplicate therapies and medication related problems (See Table 3).



Table 3. HomeMeds Alerts.

<i>HomeMeds Alerts</i>	<i>Comparison (n=10)</i>	<i>Intervention (n=15)</i>
Potential Medication Related Problem	11	22
Duplicate Ingredients	0	6
Duplicate Therapies	20	22

Other specific data generated specific associations. The most significant three findings were: 40% of participants reported symptom of dizziness from a medication; 20% use of Non Steroidal Anti-inflammatory Drugs (NSAIDS) in age over 80 years; and a reported falls history and associated psychotropic medication use among 12%. These findings support the sophistication in the software to correlate important assessment findings for the prevention of a longer term medication related problem.

### **Functional Health Literacy and Education Teach-Back**

Functional health literacy based of STOFHLA was adequate in the majority of participants who completed this (60%) with a mean score of 32.4. Only 1 client demonstrated marginal functional health literacy with a score of 21. Reasons given for not completing the STOFHLA included visual deficits and fatigue. The results of the STOFHLA support the appropriateness of the education intervention aspect of the program.

Tailored client specific education (Schillinger,et al., 2003) was provided based on the HomeMeds alerts following the HomeMeds protocol. Education was specific based on alerts. The most frequently taught concept was based on the HomeMeds alert of duplicate therapies and duplicate ingredients. This teaching was simplified to advise avoidance of combining specific over the counter medications with prescription medications. This was seen more often in participants with osteoarthritis in the management of pain with both prescribed and over-the-counter anti-inflammatory medications. These educational components were centered on the

participant's specific medications. Within the post-test follow up visit, tailored education occurred for 83% of the participants in the intervention group based on the generated alerts. Additional educational concepts included the importance of bringing a medication list to their Primary Care Provider appointments, keeping a medication list in an easily accessible location in the event of an emergency, and calling the provider with medication related concern or symptoms of dizziness, confusion, or falls. Out of 16 concepts, 100% of the participants were able to teach back the concept within the post-test follow up visit.

### **Available Medication List**

Of the total sample (n=25), 48% had a medication list that they or the person who pre-filled their medications could refer. Pre-test assessment of the use and availability of a personal medication list with drug name, dosage, frequency, and time was identified. This was compared to the availability of a medication list at the return home visit. 26% of participants stated the most frequent reason for a loss of their medication list was that it had been taken by a healthcare provider and not returned. Medication lists were provided to the intervention group participants, as well as mailed to their Primary Care Provider, with the report of the medication assessment, and given to the agency case manager. An independent t-test was conducted to compare pre and post intervention availability of a medication list. There was a significant difference in the scores for the comparison group ( $M_A=.70$ ,  $SD=.48$ ) and intervention group ( $M_B=1.0$ ,  $SD=.0$ ),  $t(23)=2.43$ ,  $p=.023$  suggesting the impact of providing an up-to-date medication list among participants was successful within this short time frame.

## **Discussion**

### **Medication Assessment**

The expectation of this program was to provide a public health intervention to decrease the risk of adverse medication events for community dwelling older adults while promoting and maintaining health to remain safely at home. Data generated by the HomeMeds informatics software system support a detailed assessment of the self-report of medications being taken and offers the ability to share this information across settings (home, agency case manager, and Primary Care Provider) as part of a process that promotes medication safety, data sharing, communication, and ongoing education.

In home assessment provides another level of detailed and essential assessment of the complexity associated with managing multiple medications and diseases. In addition to number of prescription drugs, there is the need to access medications and manage associated side effects while managing complex diseases such diabetes, heart failure, chronic obstructive pulmonary disease, and advanced osteoarthritis. Future follow up interventions on adherence are important aspects to fully address all levels of health promotion related to safe medication use and chronic disease management.

### **Sensory Deficits and Self-Management**

Sensory deficits such as visual deficits due to macular degeneration, glaucoma, and cataracts also complicate self-management ability. In one case, a participant who is legally blind used a system where his formal homemaker would tie strings around a series of similarly shaped eye drop containers (one string indicating one medication, 2 strings another, etc.). Within this system, the participant was able to report the medication, identify the medication, access it, demonstrate dosing and timing of administration, however there was a level of detailed

assistance in which the client did depend and a vulnerability to the system of safety that can only be clearly identified on a home visit.

Additional examples of systems to self-manage to take medications were frequently observed, with findings including the setting of alarms and cues from family members. Several participants used a medication box that either they or a family member prefilled once a week. This suggests very simple systems can considerably improve self-management.

### **Informal Supports**

Use of the Drug Unassisted Guiding Scale, had some limitations for this project. First, participants required and had some level of assistance (both formal and informal) as reflected by their combined mean risk level of level 3 (Table 1) and as self-reported. Tools that measure not just individual ability to manage medications but collaborative informal caregiver and client cooperative management could be developed to more clearly be able to identify level of safety. Unmet needs on which to base future technologies and innovations to support home care could be better addressed through assessment of informal and formal collaboration.

### **Limitations**

A significant limitation in this study in that the participants did not represent ethnic diversity and this limits the generalizability of these results. A one-month time frame for the project implementation, and a very short time frame between pre-post follow up (1-2 weeks), did not allow for changes in medication regimens to be made that were not deemed as urgent or emergent. Follow up by Primary Care Provider outcomes in the prevention of longer term adverse events, and retention and application of the education components, will require longer term monitoring and evaluation to promote meaning. Assessment of the education intervention relied on teach back at the time of the education initiative. To assess retention of education,

continued use and ongoing availability of the medication list, as well as changes and reduction in symptoms associated with medications will require a longer period of evaluation with a larger sample size.

## **Conclusions**

This informatics based medication safety intervention showed considerable strength in completing and sharing medication home assessments enhanced by the software abilities. Significant outcomes improvements were only associated with the pre-post test comparison in provision of an up-to-date medication list, and education. Addition of Phase 2 based on this pilot is supported. This project was readily received by all participants and supports the use of it for a longer period, among a more ethnically diverse group of participants, and among a larger sample for ongoing evaluation.

Ongoing work is planned for a Phase 2 follow up at 6 and 18 weeks based on the current design. After that period, evaluation will be completed again. Additionally, there is a plan to train identified case managers from FCHCC in the use of the HomeMeds system for routine medication assessments. Follow up with Primary Care Providers for their feedback on this level of collaboration is also proposed.

This program may lead to further discovery in promoting and maintaining the health of older adults at home and also identify ongoing use of this system as an information technology that supports home care safety. This project is especially important because community dwelling adults currently do not always benefit from access to routine medication assessment, despite taking multiple medications (Alkema et al., 2008).

At the writing of this report, discussion between organizations of the Executive Office of Elder Affairs and the vendor of HomeMeds has been initiated to operationalize this software as

part of the integrated database currently in place within the office of Elder Affairs. Franklin County Homecare may be able to collaborate in this project and expand the data sharing capacity to bring routine medication assessment toward a standard of practice among Aging Services Access Providers in Massachusetts while addressing a well documented need.

HomeMeds is an informatics system that offers increased potential within the service networks in communicating key information. This project has improved and expanded the relationships between healthcare providers, clients, and agencies that promote information exchange to improve safety (Institute of Medicine (IOM), 2001).

## References

- Agency for Healthcare Research and Quality -- Healthcare Innovations Exchange (2010). medication Management Improvement System (MMIS) Toolkits. Retrieved from <http://www.innovations.ahrq.gov/content.aspx?id=2965>
- Albert, S., Colombi, A., & Hanlon, J. (2010). Potentially inappropriate medications and risk of hospitalization in retirees. *Drugs and Aging*, 27,5, 407-415.
- Alkema, G.E., Wilber, K.H., & Simmons, W.J., Enguidanos, S.M., Frey, D. (2007). Prevalence of potential medication problems among dually eligible older adults in Medicaid waiver services. *The Annals of Pharmacotherapy*, 14,12, 1971-1978. doi 10.1345/aph.1K270
- Arora, V.M., Prochaska, M.L., Farnan, J.M., D'Arcy, M.J., Schwanz, K.J., Vinci, L.M. ... Johnson, J.K. (2010). Problems after discharge and understanding of communication with their primary care physicians among hospitalized seniors: a mixed methods study. *Journal of Hospital Medicine*, 5,2, 385-391. doi: 10.1002/jhm.668
- Baker, D.W., Williams, M.V., Parker, R.M., Gazmararian, J.A., Nurss, J. (1999). Development of a brief test to measure functional health literacy. *Patient Education Counseling*, 38,1, 33-42.
- Bain, K., Holmes, H., Beers, M., Maio, V., Handler, S., & Pauker, S. (2008). Discontinuing medications: a novel approach for revising the prescribing stage of medication-use process. *Journal American Geriatric Society*, 56, 1946-1952.
- Bell-Elkins, J. (2002). Assessing the CCPH principles of partnership in a community-campus partnership. California *Breast Cancer Research Program*. Retrieved from <http://www.cbcprp.org/community/CRCPartnershipAssessmentTools.pdf>

Budnitz, D. S., & Layde, P.M. (2007). Outpatient drug safety: new steps in an old direction.

*Pharmacoepidemiology and Drug Safety*, 16, 160-165. doi: 10.1002/pds.1242

Budnitz, D. S., Shehab, N., Kegler, S.R., & Richards, C.L. (2007). Medication use leading to emergency department visits for adverse drug events. *Annals of Internal Medicine*,

147,11, 755-765. Retrieved from [www.annals.org/content/147/11/755.full](http://www.annals.org/content/147/11/755.full)

Castelino, R., Hilmer, S., Bajorek, B., Nishtala, P., & Chen., T. (2010). Drug burden index and potentially inappropriate medications in community-dwelling older people - The impact of home medicines review. *Drugs and Aging*, 27,2, 135-148.

Centers for Disease Control & Prevention (2010). Adults and older adults: adverse drug events.

Retrieved from [http://www.cdc.gov/MedicationSafety/Adult\\_AdverseDrugEvents.html](http://www.cdc.gov/MedicationSafety/Adult_AdverseDrugEvents.html)

Collaboration for Home Care Advances in Management and Practice, Center for Home Care

Policy & Research, Visiting Nurse Service of New York (2009). *National Framework for Geriatric Home Care Excellence*. Retrieved from [http://champ-](http://champ-program.org/page/56/framework)

[program.org/page/56/framework](http://champ-program.org/page/56/framework)

Coleman, E.A., Smith, J.D., Raha, D., Min, S. (2005). Posthospital medication discrepancies.

*Archives of Internal Medicine*, 165, 1842-1847.

Coleman, E.A., Parry, C., Chalmers, S., & Min, S. (2006). The care transitions intervention.

*Archives of Internal Medicine*, 166, 1822-1828.

Crilly, J.F., Keefe, R.H., Volpe, F. (2011). Use of electronic technologies to promote

community and personal health for individuals unconnected to healthcare systems.

*American Journal of Public Health*, 101,7, 1163-1167.



- Edelberg, H., Shallenberger, E., Wei, J.Y., (1999). Medication management capacity in highly functioning community-living older adults: detection of early deficits. *Journal of American Geriatrics Society*, 47,5, 592-596.
- Ellenbecker, C.H., Frazier, S.C., & Verney, S. (2004). Nursing observations and experiences of problems and adverse effects of medication management in home care. *Geriatric Nursing*, 25,3, 164-170.
- Espinoza, S., & Walston, J. D. (2005). Frailty in older adults: insights and interventions. *Cleveland Clinic Journal of Medicine*, 72,12, 1105-1112.
- Farris, K., Phillips, B. (2008). Instruments assessing capacity to manage medications. *The Annals of Pharmacotherapy*, 42, 1026-1036. Doi 10.1345/aph.1G502
- Fick, D., Cooper, J., Wade, W., Waller, J., Maclean, R., & Beers, M., (2003). Updating the Beers Criteria for potentially inappropriate medication use in older adults - Results of a US consensus panel of experts. *Archives of Internal Medicine*, 163,27, 2716-2724.
- Fick, D., Mion, L., Beers, M., & Waller, J. (2008). Health outcomes associated with potentially inappropriate medication use in older adults. *Research Nursing Health*, 31,1, 42-51.
- Field, T., Mazor, K., Briesacher, B., DeBellis, K., & Gurwitz, J. (2007). Adverse drug events resulting from patient errors in older adults. *Journal of the American Geriatrics Society*, 55, 271-276. doi 10.1111/j.1532-5415.2007.01047.x
- Franklin County Home Care Corporation. <http://www.fchcc.org/>
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191

- Fulton, M., & Allen, E. (2005). Polypharmacy in the elderly: A literature review. *Journal of the American Academy of Nurse Practitioners, 17*,4, 123-132.
- George, C., & Jacobs, L. (2011). Geriatrics medication management rounds: a novel approach to teaching rational prescribing with the use of the medication-screening questionnaire. *Journal of the American Geriatrics Society, 59*, 138-142.
- Golden, A., Tweary, S., Dang, S., & Roos, B. (2010). Care management's challenges and opportunities to reduce the rapid rehospitalization of frail community-dwelling older adults. *The Gerontologist, 50*,4, 451-458. doi: 10.1093/geront/gnq015
- Golden, A., Qiu, D., & Roos, B. (2011). Medication assessments by care managers reveal potential safety issues in homebound older adults. *The Annals of Pharmacotherapy, 4*, 1, 492-498.
- Gurwitz, J., Field, T. S., Harrold, L. R., Rothschild J., Debellis, K., Seger, A.C., ... Bates, D.W. (2003). Incidence and preventability of adverse drug events among older persons in the ambulatory setting. *JAMA, 289*, 1107-16.
- Haider, S. I., Johnell, K., Weitoft, G.R., Thorslund, M., & Fastbom, J. (2008). The influence on educational level on polypharmacy and inappropriate drug use: a register-based study of more than 600,000 older people. *Journal of the American Geriatrics Society, 57*,1, 62-69.
- Haque, R. (2009). ARMOR: A tool to evaluate polypharmacy in elderly patients. *Annals of Long Term Care, 17*,6, 26-30.
- Hennessey, B., & Suter, P. (2011). The community-based transitions model: one agency's experience. *Home Healthcare Nurse, 29*,4, 218-230.

- Higashi, T., Shekelle, P., Adams, J., Kamberg, C., Roth, C., Solomon, D., & Wenger, N. (2005). Quality of care is associated with survival in vulnerable older patients. *American College of Physicians, 143*,4, 274-281.
- Higashi, T., Shekelle, P., Solomon, D., Knight, E., Roth, C., Change, J., ... Wenger, N. (2004). The quality of pharmacologic care for vulnerable older patients. *American College of Physicians, 140*, 714-720.
- Hope, C.J., Wu, J., Tu, W., Young, J., & Murray, M. (2004). Association of medication adherence, knowledge, and skills with emergency department visits by adults 50 years or older with congestive heart failure. *American Journal of Health-System Pharmacy, 61*:2043-2050.
- Institute of Health Improvement, (2012, January). MA Starr Content Call. *Panel Discussion*.
- Institute of Medicine (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press.
- Institute of Medicine Committee on Identifying and Preventing Medical Errors (2006). *Preventing Medical Errors*. Washington, DC: National Academies Press.
- Issel, L. M. (2009). *Health Program Planning and Evaluation* (2nd ed.). Sudbury, MA.
- Lewis, J., Ritchie, J. Eds. (2003). *Qualitative Research Practice: A Guide for Social Science Candidates and Researchers*. London: Sage Publications.
- Levesque, L., Ducharme, F., Caron, C., Hanson, E., Magnusson, L., Nolan, J., & Nolan, M. (2010). A partnership approach to service needs assessment with family caregivers of an aging relative living at home: a qualitative analysis of the experiences of caregivers and practitioners. *International Journal of Nursing Studies, 47*, 876-887.

Lund Research (2010). Purposive sampling: an overview. *Laerd Dissertation*. Retrieved from

<http://dissertation.laerd.com/articles/purposive-sampling-an-overview.php>

Marek, K.D., & Antle, L. (2008). *Medication management of the community-dwelling older adult in patient safety and quality: an evidence-based handbook for nurses*. Rockville (MD): Agency for Healthcare Research and Quality.

Metlay, J.P., Cohen, A., Polsky, D., Kimmel, S.E., Koppei, R., & Hennessy, S. (2005).

Medication safety in older adults: home-based practice patterns. *Journal of American Geriatric Society*, 5,6, 976-982.

Meurer, W.J., Potti, T.A., Kerber, K.A., Sasson, C., Macy, M. L., West, B., & Losman, E. D.

(2010), Potentially inappropriate medication utilization in the emergency department visits by older adults: analysis from a nationally representative sample. *Academic Emergency Medicine*, 17,3, 231-237. doi: 10.1111/j.1553-2712.2010.00667.x

Miller, A., & DeMarzo, L. (2009). Medication safety with community dwelling older adults.

*Medicare Patient Management*, 10-14. Retrieved from

<http://www.medicarepatientmanagement.com/issues/04-02/mpmMA09-MedSafetyMiller.pdf>

Murray, M.D., & Kroenke, K. (2004). Polypharmacy and medication adherence: small steps on

a long road. *Journal of General Internal Medicine*, 16,2, 136-139. doi: 10.1111/j.1525-1497.2001.01229.x

Naylor, M.D., Aiken, L.H., Kurtzman, E.T., Olds, D.M., & Hirschman, K.B. (2011). The

importance of transitional care in achieving health reform. *Health Affairs*, 30 ,4, 746-754. doi: 10.1377/hlthaff.2011.0041

National Council on Aging. (2006, Spring). Using the evidence base to promote healthy aging:

The administration on aging's evidence-based Prevention programs for the elderly Initiative (Issue Brief Number 3). Washington, DC: The Center for Healthy Aging

Neafsey, P.J., Strickler, Z., Shellman, J., Chartier, V. (2002). An interactive technology approach to educate older adults about drug interactions arising from over-the-counter self-medication practices. *Public Health Nursing, 19,4*, 255-262.

Orwig, D., Brandt, N., & Gruber-Baldini, A. (2006). Medication management assessment for older adults in the community. *The Gerontologist, 46,5*, 661-668.

Partners in Care Foundation (2011). [www.picf.org](http://www.picf.org).

Persell, S.D., Osborn, C.Y., Richard, R., Skipkauskas, S., & Wolf, M.S. (2007). Limited health literacy is a barrier to medication reconciliation in ambulatory care. *Journal of General Internal Medicine, 22,11*, 1523-1526. doi: 10.1007/s116606-007-0334-x

Raebel, M., Charles, J., Dugan, J., Carroll, N., Korner, E., Brand, D., & Magid, D. (2007). Randomized trial to improve prescribing safety in ambulatory elderly patients. *Journal of the American Geriatrics Society, 55,7*, 977-985.

Rossi, M.I, Young, A., Maher, R., Rodriguez, K.L., Appelt, C.J., Perera, S., Hajjar, E.R., & Hanlon, J. T. (2007). Polypharmacy and health beliefs in older out patients. *The American Journal of Geriatric Pharmacotherapy, 5 ,4*, 317-323. doi: 10.1016/j.amjopharm.2007.12.0011543-5496

Roth, M.T., & Ivey, J.L. (2005). Self-reported medication use in community-residing older adults: a pilot study. *The American Journal of Geriatric Pharmacotherapy, 3,3*, 196-204. doi: 101016/jamjopharm200509009

- Sato, M., Shaffer, T., Arbaje, A.I., & Zuckerman, I.H. (2010). Residential and health care transition patterns among older Medicare beneficiaries over time. *The Gerontologist, 51*, 2, 170-178. doi: 1093/geront/gnq105
- Schillinger, D., Piette, J., Grumbach, K., et al. (2003). Closing the loop: physician communication with diabetic patients who have low health literacy. *Archives of Internal Medicine, 163*,1: 83-90.
- Shrank, W.H., Polinski, J., Avorn, J. (2007). Quality indicators for medication use in vulnerable elders. *Journal of the American Geriatric Society, 55*,52, 5573-5382. doi: 10.11/j.1532-5415.2007.01345x
- Slone Survey (2006). *Patterns of medication use in the United States*. Slone Epidemiology Center: Boston University.
- Starfield, B., Hyde, J., Ge´rvas, J., & Heath, I. (2008). The concept of prevention: a good idea gone astray? *Journal of Epidemiology and Community Health, 62* ,7, 580-583.
- Steinman, M., Landefeld, C., Rosenthal, G., Berthenthal, D., Sen, S., & Kaboli, P.(2006). Polypharmacy and prescribing quality in older people. *Journal of the American Society of Geriatrics, 54*,10, 1516-1523. doi 10.1111/j.1532-5415.2006.00889.x
- Tessier, E.G., Henneman, E.A., Nathanson, B., Plotkin, K., & Heelon, M. (2010). Pharmacy-nursing intervention to improve accuracy and completeness of medication histories. *American Journal of Health-System Pharmacy, 57*, 607-611. doi 10.2146/ajhp090104
- The Free Dictionary. Activities of Daily Living. Retrieved from <http://medical-dictionary.thefreedictionary.com/activities+of+daily+living>
- The Free Dictionary. Instrumental Activities of Daily Living. Retrieved from <http://medical-dictionary.thefreedictionary.com/instrumental+activities+of+daily+living>

US Census Bureau (2011). <http://quickfacts.census.gov/qfd/states/25/25011.html>

US Department of Health, & Human Services. CLASS retrieved from <http://www.hhs.gov/>

US Department of Health, & Human Services. (2010). *Healthy people 2020* Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=31>

WHO (2004). Pharmacovigilance: ensuring the safe use of medicines. *WHO Policy*

*Perspectives in Medicine*. doi: WHO/EDM/2004.8

Zhan, C., Correa-de-Araujo, R., Bierman, A.S., Sangl, J., Miller, M., Wickizer, S. W., & Stryer,

D. (2005). Suboptimal prescribing in elderly outpatients: potentially harmful drug-drug and drug-disease combinations. *Journal of American Geriatrics Society*, 53,2, 262-267.

doi: 10.1111/j.1532-5415.2005.53112.

Zwicker, D., & Fulmer, T. (2008). *Medication: nursing standard of practice protocol: reducing adverse drug events*. Retrieved from

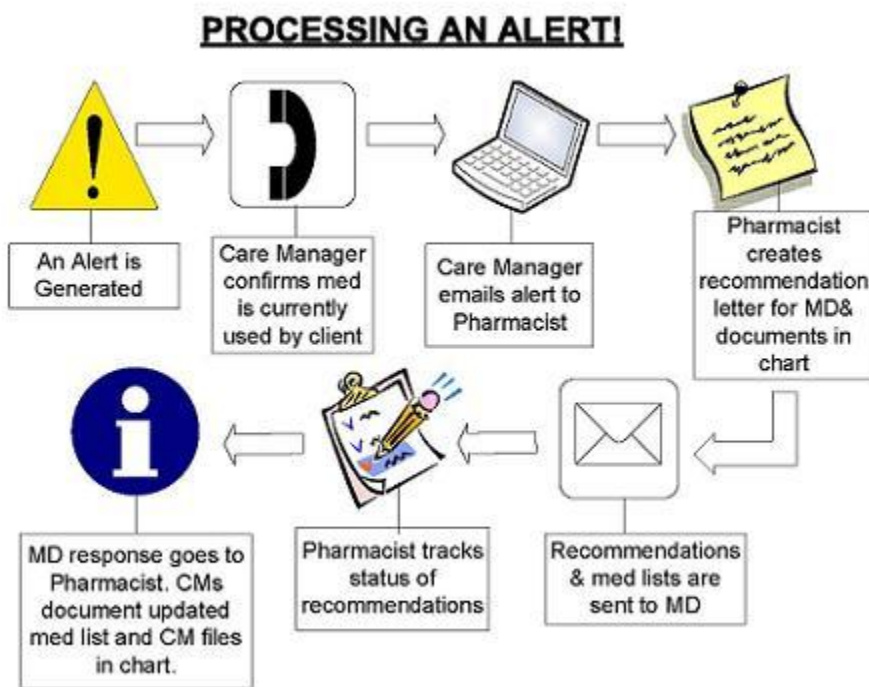
[http://consultgerim.org/topics/medication/want\\_to\\_know\\_more](http://consultgerim.org/topics/medication/want_to_know_more)

## Appendix A

### The HomeMeds System

**Core elements:** The HomeMeds evidence-based model contains the following core elements:

- *Risk screening* by protocols to identify potential errors and medication-related problems
- *Assessment* of the client's condition and adherence based on established guidelines
- *Consultation* with a pharmacist (or nurse practitioner) to develop a plan of action based on protocols
- *Follow-up* with physician and client to improve medication use



**Software risk screening tool:** HomeMeds for care management agencies was adapted from the home health model to work effectively in hybrid medical/social or simply social model programs. HomeMeds now incorporates a computerized risk assessment and alert system that helps care managers identify potential medication-related problems among their clients. This reduces the need for pharmacist consultation, limiting it to only those clients whose risk



screening indicates a potential problem. Using the software also enables programs to provide clients with an editable comprehensive medication list that they can take to all of their appointments.

Although currently available only in a standalone version, it has been designed to facilitate integration with other electronic health record systems.

Taken Directly from HomeMeds website: [http://www.homemeds.org/landing\\_pages/19,3.html](http://www.homemeds.org/landing_pages/19,3.html)

## Appendix B

### IRB Approval University of Massachusetts Amherst



University of Massachusetts Amherst  
108 Research Administration Bldg.  
70 Butterfield Terrace  
Amherst, MA 01003-9242

Research Compliance  
Human Research Protection Office (HRPO)  
Telephone: (413) 545-3428  
FAX: (413) 577-1728

#### Certification of Human Subjects Approval

**Date:** February 28, 2012  
**To:** Raeann LeBlanc, Nursing  
**Other Investigator:** Jean Elizabeth Swinney, Nursing  
**From:** Priscilla Clarkson, Chair, UMASS IRB

Protocol Title: An Informatics Guided Medication Safety Intervention  
Protocol ID: 2012-1229  
Review Type: EXPEDITED - NEW  
Paragraph ID: 7  
Approval Date: 02/28/2012  
Expiration Date: 02/27/2013  
OGCA #:

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide Assurance # 00003909. Approval is granted with the understanding that investigator(s) are responsible for:

**Modifications** - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must have completed CITI training.

**Consent forms** - A copy of the approved, validated, consent form (with the IRB stamp) must be used to consent each subject. Investigators must retain copies of signed consent documents for six (6) years after close of the grant, or three (3) years if unfunded.

**Adverse Event Reporting** - Adverse events occurring in the course of the protocol must be reported in e-protocol as soon as possible, but no later than five (5) working days.

**Continuing Review** - Studies that received Full Board or Expedited approval must be reviewed three weeks prior to expiration, or six weeks for Full Board. Renewal Reports are submitted through e-protocol.

**Completion Reports** - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

Consent form (when applicable) will be stamped and sent in a separate e-mail. Use only IRB approved copies of the consent forms, questionnaires, letters, advertisements etc. in your research.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful project.

## Appendix C

## IRB Approval Commonwealth of Massachusetts Executive Office of Elder Affairs



*The Commonwealth of Massachusetts*  
*Executive Office of Elder Affairs*  
*One Ashburton Place, Boston, MA 02108*

DEVAL L. PATRICK  
Governor

TIMOTHY P. MURRAY  
Lieutenant Governor

ANN L. HARTSTEIN  
Secretary

SANDRA K. ALBRIGHT  
Undersecretary

March 31, 2012

[rgenleb@gmail.com](mailto:rgenleb@gmail.com)

Tel: (617) 727-7750  
Fax: (617) 727-9368  
TTY/TTD 1-800-872-0166  
[www.mass.gov/elder](http://www.mass.gov/elder)

Subject: To improve medication safety through focused assessment and medication related education for community dwelling adults.

Dear Ms. LeBlanc:

On behalf of the Executive Office of Elder Affairs, thank you for submitting your proposal for review by the Elder Rights Review Committee (ERRC). The ERRC reviewed your proposal and informed consent and recommended approval of your project with the inclusion of the following language in the informed consent:

Your decision to participate, refusal to participate, or withdrawal from the study at any time will not affect services that you receive or could receive from programs provided by the Executive Office of Elder Affairs, Aging Service Access Points (ASAPs), Area Agencies on Aging (AAAs), and Councils on Aging (COAs). This study is not sponsored by any of these organizations.

In accordance with EOEI PI-03-17 and republished through PI-04-05, I approve the administration of your survey at sites or in programs that are receiving funds from the Executive Office of Elder Affairs.

We would appreciate receiving a copy of your final report so we may keep abreast of local studies undertaken about elders. If you have any further questions about the elder rights review process, please contact Siobhan Coyle at (617) 222-7562 or [Siobhan.coyle@state.ma.us](mailto:Siobhan.coyle@state.ma.us).

Sincerely,

A handwritten signature in black ink, appearing to read 'Ann L. Hartstein'.

Ann L. Hartstein

## Appendix D

### Consent Form for Participation in a Research Study

#### University of Massachusetts Amherst

**Researcher(s):** Raeann G LeBlanc, DNP Candidate, Professor Jean Swinney, Chair, Professor Jeungok Choi, co-Chair

**Study Title:** An Informatics Guided Homecare Intervention for Community Dwelling Older Adults

---

#### 1. WHAT IS THIS FORM?

This form is called a Consent Form. It will give you information about the study project so you can make an informed decision about participation in this research.

#### 2. WHO IS ELIGIBLE TO PARTICIPATE?

Male and female adults age 65 or above who are clients of Franklin County Home Care Corporation.

#### 3. WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this research study is to conduct a review and assessment of your medications. A computer based medication screening system will be used. The name of this computer system is *HomeMeds* and it screens for medication problems and safety concerns. The researcher will ask you questions about your medications and type the answers into a computer laptop. The researcher will review with you how you take your medications, the time, dose, and frequency. This review of your medications and health information, once input into the computer system, will assess all your medications together. A medication list will be created and a report generated that lists any issues identified. With your permission, this report will be

shared with your Primary Care Provider, given to you, and kept on file in your Franklin County Home Care record.

#### **4. WHERE WILL THE STUDY TAKE PLACE AND HOW LONG WILL IT LAST?**

This project will take place between March, 2012- May, 2012 and visits will take place in your home. There will be one initial visit taking a maximum of sixty minutes and one follow up visit taking a maximum of sixty minutes. If you get tired during either visit, the researcher can come back at another time.

#### **5. WHAT WILL I BE ASKED TO DO?**

If you agree to take part in this project, you will be asked to share information about your medications and health. You will be asked to answer questions about how you manage your medications. This information will be kept confidential.

Session 1 (60 minutes). At the initial visit that will take place in your home between yourself and the researcher, the study will be described. You will have time to answer any questions. You will be asked to complete the informed consent and a form for the permission to share medical information from these visits with your Primary Care Provider. Next, you will be asked to complete a short survey on your understanding of health related information. Then you will be asked to show the researcher the medications you take and answer health related questions that the researcher will input into the *HomeMeds* software system on a laptop computer. Following this, a short set of questions on how you manage your medications will be asked. You will show the researcher the dose, time, and frequency of the medications you take. At the completion of Session 1, a medication list will be provided to you and the reports of the *HomeMeds* assessment given to you, your Primary Care Provider, and on record in your FCHCC

chart. An appointment will be made for one follow up home visit within 2 weeks time. A telephone call will be made to confirm this appointment 1 week prior by the researcher.

Session 2 (60 minutes). At this home visit, the researcher will review with you your medication list to see if any changes were made from the last visit. A repeat assessment of the short set of questions on how you manage your medications will be asked again. You will show the researcher the dose, time, and frequency of the medications you take. At this time based on your identified needs, the researcher will discuss any possible referrals for additional services available to you from FCHCC for medication management. This will be the final visit.

## **6. WHAT ARE MY BENEFITS OF BEING IN THIS STUDY?**

You may not directly benefit from this research; however, it is expected that, by participating, important information about your health and medications will, with your permission, be provided to your Primary Care Provider and adjustments may be made in your medications that could promote your health. In addition, through participating in this project, you may qualify for further support services (such as a medication dispensing system, or a nurse-coaching visit) through Franklin County Home Care Corporation. You may also learn ways to manage your medications that could improve your health.

## **7. WHAT ARE MY RISKS OF BEING IN THIS STUDY?**

We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study. Interviews and assessments of your medications and your health do take time and that may pose an inconvenience of up to a total of one and one half hours.

## **8. HOW WILL MY PERSONAL INFORMATION BE PROTECTED?**

The following procedures will be used to protect the confidentiality of your study records. Data will be input into a computer software system and the computer double password protected. This data will be associated with a study number and not with any personal information. Any healthcare information shared with your healthcare provider will only be shared with your permission and following the HIPAA Privacy Rules that all healthcare providers are required to follow in the exchanged of any patient related health information. The researcher will keep all study records, including any codes to your data, in a secure location in a locked file cabinet. Research records will be labeled with a code. A master key that links names and codes will be maintained in a separate and secure location. The master key will be destroyed after the close of the study in 2015. All electronic files, including the database records and spreadsheets containing identifiable information, will be password protected. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords. At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

## **9. WHAT IF I HAVE QUESTIONS?**

Take as long as you like before you make a decision. I will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the researcher, Raeann G LeBlanc at (413)545-6630. If you have any questions concerning your rights as a research subject, you may contact the University of Massachusetts Amherst Human Research Protection Office (HRPO) at (413) 545-3428 or [humansubjects@ora.umass.edu](mailto:humansubjects@ora.umass.edu)."

## **10. CAN I STOP BEING IN THE STUDY?**

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

Your decision to participate, refusal to participate, or withdrawal from the study at any time will not affect services that you receive or could receive from programs provided by the Executive Office of Elder Affairs, Aging Service Access Points (ASAPs), Area Agencies on Aging (AAAs), and Councils on Aging (COAs). This study is not sponsored by any of these organizations.

### **11. WHAT IF I AM INJURED?**

FCHCC does not have a program for compensating subjects for injury or complications related to human subjects research, but the study personnel will assist you in getting treatment.

### **12. SUBJECT STATEMENT OF VOLUNTARY CONSENT**

When signing this form, I am agreeing to voluntarily enter this study. I have had a chance to read this consent form, and it was explained to me in a language that I use and understand. I have had the opportunity to ask questions and have received satisfactory answers. I understand that I can withdraw at any time. A copy of this signed Informed Consent Form has been given to me.

\_\_\_\_\_  
Participant Name (Print)

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

By signing below, I indicate that the participant has read and, to the best of my knowledge, understands the details contained in this document and has been given a copy.

\_\_\_\_\_  
Name of Person

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Obtaining Consent (Print)



## **Appendix E**

### **Home Meds – Questions Soft-Ware Information System Prompts**

- Name, Date of Birth, Address and Telephone Number
- Name of Primary Care Provider
- Name of Pharmacies used
- Name of all medications taken, dosage, route, time
- If any of the following have occurred – falls, dizziness, confusion
- If client has been to the ED, hospital, or nursing home in the last 3 months
- Physical assessment measurement of Blood Pressure and heart rate (lying, sitting & standing)
- Assessment of pain
- Use of alcohol and drinks per day
- Conditions/surgeries
- Allergies

**Appendix F****Project Protocol****Step 1**

\_\_\_\_\_ Referral/approval received from Case Manager for a FCHCC client.

\_\_\_\_\_ Telephone call to client – agreement to be involved

\_\_\_\_\_ Schedule Home Visit 1

\_\_\_\_\_ Provide client contact information

**Step 2**

\_\_\_\_\_ Home Visit 1 – Date: \_\_\_\_\_ Time: \_\_\_\_\_

\_\_\_\_\_ Obtain informed consent

\_\_\_\_\_ Obtain agreement to share medical information with PCP

If yes to all above continue to next steps.

**Step 3**

\_\_\_\_\_ Review current medication list per participant report

\_\_\_\_\_ Utilize HomeMeds informatics system for complete medication review

\_\_\_\_\_ Review medication list and clients understanding of medication list (when, why, what to report for side effects)

\_\_\_\_\_ Complete DRUGS (brief assessment of medication management)

\_\_\_\_\_ Complete Short Survey of Information Literacy (brief assessment of health literacy)

\_\_\_\_\_ Complete home visit and schedule follow up visit- Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Step 4**

- \_\_\_\_\_ Prior to return visit communicate with Primary Care Provider based on HomeMeds report for medication related concerns identified in assessment.  
Request updated medication list per Primary Care Provider.
- \_\_\_\_\_ Document number attempts to reach Primary Care Provider if issue is an urgent alert\_\_\_\_\_

### **Step 5**

#### **Follow Up Home Visit**

- \_\_\_\_\_ Identify if client reported follow up with Primary Care Provider or any medication changes since last home visit
- \_\_\_\_\_ Identify if client has had any transfers of care to hospital or Emergency Department
- \_\_\_\_\_ Repeat DRUGS (brief assessment of medication management)
- \_\_\_\_\_ Complete Medication List /Personal Medication Record
- \_\_\_\_\_ Provide education on list, symptoms of drug related problems and who to report to (falls, dizziness, nausea)
- \_\_\_\_\_ Teach/back assessment of education component
- \_\_\_\_\_ Review medication list and clients understanding of medication list (when, why, what to report for side effects)
- \_\_\_\_\_ Thank client for their participation
- \_\_\_\_\_ Provide contact information and any referral for further medication management supports if found on assessment to FCHCC

Name: \_\_\_\_\_ Signature: \_\_\_\_\_  
Date of Completion: \_\_\_\_\_

## Appendix G

### Goals, Objectives, and Outcome Indicators

Goal 1: Decrease risk of adverse medication events for community dwelling older adults through comprehensive assessment and medication adjustments.

Objectives	Outcome Measures	Met
Enrolled adults will receive an assessment by advanced practice nurse of polypharmacy, inappropriate drug use, drug classification duplication through use of HomeMeds Informatics system by March 2012.	90% of the enrolled participants will receive an assessment of polypharmacy, inappropriate drug use, drug classification duplication through HomeMeds Informatics system by March 2012.	Met. 100% of enrolled participants received a HomeMeds assessment by April 2012.
Enrolled adults will receive a report of medication assessment and this report will be generated to their Primary Care Provider by March 2012.	Enrolled participants will receive a report of medications and identified issues (polypharmacy, risk, and drug related side effects) that will be generated to their Primary Care Provider by March 2012.	Met. 100% completed by April 2012.
Primary Care Providers of enrolled adults will	70% of enrolled clients with an identified need for a medication	Met. Only 2 clients had an immediate need for a

<p>acknowledge receipt of medication assessment and adjust medications based on assessment findings by April 2012.</p>	<p>management change will receive additional recommendations from their Primary Care Provider based on the medication assessment by April 2012.</p>	<p>medication management change and this was met in both cases within 1 week of call placed to Primary Care Provider.</p>
<p>Enrolled adults will receive a reconciled and or updated medication list.</p>	<p>70% of participants will have a reconciled and or updated medication by April 2012.</p>	<p>Met. 100% of intervention group received a medication list and all have been mailed to Primary Care Providers for reconciliation, pending.</p>
<p>Enrolled adults will understand the changes in their medication regimen in keeping an updated medication list.</p>	<p>80% of patients enrolled will verbally explain their medication list, indication of medication, and one important side effect to report by April 2012.</p>	<p>Met. 100% of those in the intervention group.</p>
<p>Enrolled adults will demonstrate a reduced risk of an adverse medication effect.</p>	<p>80% of patients enrolled with report no Emergency Department transfer for a medication related problem during the evaluation period and a reported reduction in side effects by April 2012.</p>	<p>Met. 100% of participants enrolled reported no ED transfer for a medication related problem.</p>

Goal 2: Decrease risk of adverse medication events for community dwelling older adults through improved medication management and medication understanding.

<b>Objectives</b>	<b>Outcome Measures</b>	<b>Met</b>
Enrolled adults will complete the Drug Regimen Unassisted Grading Scale (DRUGS)	90% of enrolled patients will complete DRUGS in providing measurement of independence in medication management by February 2012.	Met. 100% by April 2012.
Enrolled adults will complete the Short Test of Functional Health Literacy (STOFHLA).	90% of enrolled patients will complete STOFHLA in providing measurement of ability to understand and basic health information by February 2012.	Not Met. 60% of enrolled participants completed the STOFHLA. The primary reason for not completing was visual deficits despite the large font test being employed.
Home care adults identified as having a need for additional medication management assistance will be identified and referral to additional resources made through communication with case manager by April 2012	80% of home care adults identified will receive a referral for additional homecare assistance with medication management by April 2012.	Met. Of 4 referrals identified all 4 were made. These referrals ranged from need for an item such as a medication box, to a need for additional medication management

		formal support.
--	--	-----------------

Goal 3 : Decrease risk of adverse medication events for community dwelling older adults through improved record keeping of medication list and maintenance of the list.

<b>Objectives</b>	<b>Outcome Measures</b>	<b>Met/Not Met</b>
Enrolled adults will complete a list of their medication schedule.	90% of enrolled adults will complete a list of their medication schedule after first home care visit.	Not Met. Medication lists were provided. Having participants complete a medication list was difficult due to number of medications, physical deficits.
Enrolled adults will express through teach-back their understanding of maintaining an up-to-date medication list.	90% of enrolled adults will express through teach-back their understanding of maintaining an up-to-date medication list after first home care visit.	Met. 100% intervention group.
Enrolled adults will express through teach-back bringing the medication list with them to all medical appointments/transfer of care.	80% of enrolled adults will express through teach-back bringing the medication list with them to all medical appointments/transfer of care after first home care visit.	Met. 100%

## Appendix H

## Letter of Institutional Support



**Franklin County Home Care Corporation**

*Area Agency on Aging*

330 Montague City Road, Suite 1  
Turners Falls, MA 01376 - 2530

Telephone (413) 773-5555  
(800) 732-4636

FAX (413) 772-1084

TDD (413) 772-6566

Website [www.fchcc.org](http://www.fchcc.org)

December 22, 2011

DnP Graduate Committee  
University of Massachusetts  
Skinner Hall  
651 North Pleasant Street  
Amherst, MA 01003

DnP Graduate Committee:

Franklin County Home Care Corporation supports the work of one of your students and DnP candidates in the Public Health Nurse Leadership Program, Raeann LeBlanc, BA, RN, MSN, APRN-BC. Ms. LeBlanc anticipates completion of her degree in 2012 (Doctorate of Nursing Practice, Public Health Nurse Leader).

We have been fortunate to work with Ms. LeBlanc during the Fall and look forward to working with her during the Spring semester. FCHCC will provide support as needed for the program which she is conducting entitled Medication Review and Management—An Informatics Guided Homecare Intervention for Frail Community Dwelling Older Adults.

The issue of medication safety is a critical element to the stability of elders residing in their homes and community settings. FCHCC works with many elders who are frail, have chronic conditions, many are nursing facility eligible from a clinical standpoint and/or have cognitive issues. This project will be very helpful to our consumers, their caregivers and will further the work of care transitions across the continuum of settings.

Do not hesitate to contact me if you have questions or need additional information.

Thank you,

A handwritten signature in black ink that reads 'Roseann Martoccia'. The signature is written in a cursive style with a large initial 'R'.

Roseann Martoccia  
Executive Director



Assistance. Advocacy. Answers on Aging.



**Appendix I****Time Line**

<b>Time</b>	<b>Activity</b>	<b>Person Responsible</b>
<b>Pre-Program</b> December 2011	Finalize institutional support with FCHCC; Completed needs assessment/gap analysis; Pre-program evaluation with community leaders/expert panel; Submit pilot proposal with acceptance by Doctoral Committee Members: Dr. Swinney, Dr. Choi and designated mentor Dr. Susan Kemble; Set up Computer Information System – HomeMeds contract. Identify Primary Care Providers and Case Managers to notify of the program and complete mailing.	Doctoral Candidate  Doctoral Committee Members
January 2012	In-service to FCHCC staff and vendors on medication safety and this project. Complete training through Partners in Care Foundation on the HomeMeds system.	Doctoral Candidate
February-March 2012	Obtained IRB approval University of Massachusetts, Amherst and Massachusetts Office of Elder Affairs, Boston.	Doctoral Candidate
April 2012	Complete recruitment and assessments (maximum 50 as defined by HomeMeds contract) and generate data analysis reports from HomeMeds. All reports to Primary Care Provider and telephone call to review findings. Communications update 1 due (FCHCC executive leadership, Doctoral Committee).	Doctoral Candidate
April 2012	Complete contact to Primary Care Providers and Case Managers by telephone to address issues with medications if identified. Send follow up letter. Make referral to FCHCC client services if specific issues found in management of medications (nursing, dispensing systems etc., cue reminders).	Doctoral Candidate
April 2012	Follow up home visit and assessment. Evaluate medication changes, medication list use and accuracy, provide education component. Communications update 2 due.	Doctoral Candidate
May 2012	Data collection completed. Data evaluation and analyses. Compilation of written evaluation report. Communications update 3 due. A public presentation of the project study design has been presented at the Eastern Nursing Research Society and an additional presentation will take place for the FCHCC prior to the end of May.	Doctoral Candidate
June 2012	Ongoing presentation of findings to community agency and participants. Determine sustainability of project.	Doctoral Candidate
<b>Post-Program</b> prior to January 2013	Final paper for publication. Begin Phase 2 of project. Ongoing work with Massachusetts Executive Office of Elder Affairs and Franklin County HomeCare Corporation and Partners in Care integrating HomeMeds soft-ware into Harmony to integrate medication reviews in client records.	Doctoral Candidate

**Appendix J****Costs**

<b>Item</b>	<b>Cost</b>
<b>Computer Information Systems</b>	
HomeMeds Informatics Program (yearly license) <i>(\$200 Fee for pilot testing)</i>	\$200.00
Lap Top <i>(Not needed to purchase for pilot)</i>	\$900
Telephone (mobile) & use	\$200
TOHFLA <i>(DNP candidate purchase)</i>	\$75
<b>Materials &amp; Mailing</b>	
Copying/Printing	\$250
<b>Personnel</b>	
Geriatric Nurse Practitioner <i>(Volunteer for pilot)</i>	\$55/hour x 20/week x 3 months = \$13,200
<b>Transportation (rural area)</b>	
\$.55/mile x 60 miles x 50 trips (home visits)	\$1980 (\$1650)
<b>Meetings/Presentations</b>	
(2) Meetings with Refreshments for 20 attendees Simple – fruit/beverages	\$200
Space <i>(Not needed for pilot)</i>	\$500
<b>Total Estimated Cost</b>	\$17,505.00
<b>Total Estimated Cost for Pilot (services volunteered)</b>	\$2,905.00
<b>Total Actual Costs</b>	<b>\$2,575.00 (for pilot)</b>