
Entrepreneurial Program of Research and Service to Improve Nursing Home Care

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This is a methodological article intended to demonstrate the integration of multiple goals, multiple projects with diverse foci, and multiple funding sources to develop an entrepreneurial program of research and service to directly affect and improve the quality of care of older adults, particularly nursing home residents. Examples that illustrate how clinical ideas build on one another and how the research ideas and results build on one another are provided. Results from one study are applied to the next and are also applied to the development of service delivery initiatives to test results in the real world. Descriptions of the Quality Improvement Program for Missouri and the Aging in Place Project are detailed to illustrate real-world application of research to practice.

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One need only consider ongoing news stories (Baker, 2005) to confirm the need for research to improve the quality of care for our nation's

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elders in long-term care settings, particularly nursing homes. The nursing home industry has been plagued by scandals and consumer demands for reform for decades. The Institute of Medicine has undertaken multiple studies with similar conclusions: The quality of care and staffing in nursing homes must be improved (Committee on Improving Quality in Care, Institute of Medicine, 2001; Committee on Nursing Home Regulation, 1986; Committee on the Adequacy of Nurse Staffing in Hospitals and Nursing Homes, 1996).

Consumer demands are also clear—they want alternatives to nursing homes with quality care delivered to them in the setting of their choice (Marek & Rantz, 2000; Rantz, Marek, & Zwygart-Stauffacher, 2000). This is a methodological article intended to demonstrate the integration of multiple goals, multiple projects with diverse foci, and multiple funding sources to develop an entrepreneurial program of research and service to directly affect and improve the quality of care of older adults, particularly nursing home residents.

Vision

The program of research and service that is the topic of this article was sparked by a commitment to help older people get high-quality care they need and have the care delivered in a way elders will want and more likely accept. An oft-heard quip in research team meetings is, “My goal in life is to see that every older lady in a nursing home gets helped to the bathroom when she wants.” The foundation for the research and service program is a real desire to never hear staff in a care setting say, “It’s OK, dear, you are wearing a diaper; you don’t have to worry about going to the bathroom.” Statements such as this one, sometimes heard while observing nursing home care, are the antithesis of characteristics discovered in research findings that illustrate high-quality long-term care for older people. It is what members of the research team conducting this program of research envision never encountering in high-quality traditional nursing homes and new facilities for the future of long-term care committed to excellent care.

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Goals of the Research Program

Faced with a desire to influence the quality of care for older adults, the obvious question that follows is, "Where to start?" A small interdisciplinary group of three nurses with gerontological specialties and a physician geriatrician met for an initial brain-storming session to determine common interests in gerontological research. From this initial meeting in 1993, others were solicited to join a research team at the Sinclair School of Nursing (SSON), University of Missouri–Columbia (MU) devoted to conducting research that would help nursing homes in the state of Missouri deliver high-quality services to residents. A broad invitation was cast to many schools and colleges on the MU campus, and researchers from nursing, medicine, health economics, social work, statistics, and health informatics started coming together every month for lively discussions about the complex problems of nursing home care and measuring quality of care. Initial research team goals were broad: (a) to improve the quality of care for nursing home residents and (b) to focus on the use of nursing home Minimum Data Set (MDS) data for quality improvement and for monitoring resident outcomes of care. One team member approached regulators at the Missouri Division of Aging about ways to use MDS data to help improve the quality of care in Missouri nursing facilities. In 1993, through the interest and vision of staff of the Missouri Division of Aging who wanted to find new ways to improve Missouri nursing facilities, the research team began analyzing MDS data. The official name for the team became the MU MDS and Quality Research Team.

Work toward the research program goals started with quantitative analyses of resident-level assessment data for Missouri nursing facilities, particularly measuring quality indicators (QIs) derived from MDS data (Rantz et al., 1996; Zimmerman et al., 1995). These early analyses sparked a line of qualitative research to better define quality of nursing home care and develop an instrument to measure quality of care by quickly touring nursing facilities (Rantz & Mehr, 2001; Rantz, Mehr, et al., 2000). Relationships were cultivated with state and federal officials who were interested and visionary about the potential for quality improvement initiatives to help the long-term care industry.

Conceptual Framework

Research and practice endeavors need theoretical guidance. Fairly early in the team's development of research ideas, hours were spent in a team meeting drawing how research ideas would look from a theoretical perspective.

Figure 1
Theoretical Research Model of Quality of Nursing Home Care



The model that emerged was refined in subsequent meetings, and it still guides the research program. Figure 1 is the team's "quality outcomes" theoretical model that describes relationships of quality outcomes and key processes that contribute to quality of nursing home care. The concept of care quality is multidimensional, so studies are planned with multiple measures and usually multiple methods to measure several aspects of quality.

The model illustrates how both resident and facility attributes of quality contribute to outcomes; it also illustrates the relationships among quality measures. To elucidate what other researchers typically refer to as the facility attributes of quality (the oval on the left side of the model), the team developed the Observable Indicators of Quality instrument as a way to measure these attributes of quality (Rantz & Mehr, 2001; Rantz, Mehr, et al., 2000; Rantz, Popejoy, & Zwygart-Stauffacher, 2001; Rantz, Zwygart-Stauffacher, et al., 2005). Resident attributes of quality (the oval on the right side of the model) are measured by using MDS QIs; these are resident-level outcome measures, derived from MDS data, such as pressure ulcers, incontinence, weight loss, activity level, and others.

The oval in the center of the model, key processes of care delivery, not only influences both facility and resident attributes of care quality but also ultimately affects quality outcomes. A large field study has been conducted by the team to observe the processes of care delivery and determine the systems of care that are most influential to improve the fundamentals of care delivery and result in improved resident outcomes (Rantz,

Grando, et al., 2003; Rantz, Hicks, et al., 2003; Rantz, Hicks, Grando, et al., 2004)

The loops at the sides of the model illustrate how feedback intervention studies and processes of care intervention studies targeted to staff can affect changes in key processes of care delivery. These changes in turn can improve both facility and resident attributes of quality and ultimately improve quality outcomes. Results of a randomized clinical intervention study conducted by the team have verified that feedback intervention (the left loop on the model) using expert advanced practice nurse consultation with data-driven MDS QI feedback reports to the staff of nursing homes does result in staff changing key processes of care delivery and improving resident outcomes as the model implies (Rantz, Popejoy, Petroski, et al., 2001). A multilevel bundled process-of-care delivery intervention study commenced in 2005; the intervention is targeted to staff (the right loop on the model) and is designed to ultimately improve resident quality-of-care outcomes.

Resources and Partnerships

Since 1994, the team has continuously worked within a cooperative agreement with the Missouri Division of Aging, now the Missouri Department of Health and Senior Services. The initial cooperative agreement funded complex MDS data set management, analyses, and pilot quality improvement initiatives that state officials were anxious to test outside the survey process to improve the care and services for nursing home residents in the state. As the cooperative work has advanced, members of the team have been viewed as researchers and clinical experts who are an asset to state officials, responsive to requests for analyses to inform public policy and removed from official survey responsibilities so that team members can readily help facilities without the perceived threat of regulatory oversight. From the team's point of view, developing an ongoing relationship with state officials was essential to grounding the research program in ways that could potentially make a difference to residents in the state's facilities.

Grant Funding

As pilot analytic work with MDS QIs and understanding quality of care moved ahead, team members began writing grant proposals to federal and private foundations to fund specific research ideas and interests, all in the general area of quality of care in nursing homes. Persistence with re-submissions resulted in success. As one of the team's consultants claimed,

“Yes, you can be successful with state and federal contracts, but you must obtain NIH [National Institutes of Health] funding to have a credible research program.” The team took her advice seriously and persisted with several targeted ideas, and team members have had continuous NIH funding since 1996, some clinically focused (a study of outcomes of lower respiratory infections in nursing home residents and a study testing the effects of position and compression on venous ulcers), others health systems focused (nursing care process, outcomes, and costs; working conditions and quality of care; a new measure of nursing home quality of care) and intervention studies (technology to improve medication safety, technology to improve quality of care, and a multilevel intervention to improve nursing home outcomes).

Multiple Funding Sources

Multiple funding sources are essential to continuing the multifaceted work of the research program, pursuing multiple ideas simultaneously. Overlapping study timelines are helpful so that continuity of research and field staff is maintained. Keeping new ideas coming and new proposals in the pipeline is essential. Maintaining momentum with new ideas to funding agencies seems to be self-fulfilling, research informs practice, and practice informs new research ideas. It may be a common idea, but it works. However, keeping the pipeline of proposals filled is simply hard work. While a current study is funded and the research is in progress, the next idea must be developed and submitted with sufficient time for resubmission(s) before the end of the current study's funding. Concurrent lines of related research serve two purposes (beyond study aims). Concurrent lines inform new proposals with a broader range of ideas and provide overlapping funding streams, keeping experienced research staff employed while moving from one project to the next.

Writing the results for publication is necessary work that must be done. Results must be shared and published to be useful to others in the field and to study staff as they prepare the next proposal's preliminary work justification. It takes a commitment to hours at the computer, writing and rewriting.

Table 1 is a summary of key studies and funding sources. The studies have a broad range of both qualitative and quantitative methods, with most including cost, quality, and staffing analyses. Cost, quality, and staffing are included in most of the team's work because these are such relevant issues to policy makers, consumers, and researchers. Finding ways to improve the

Table 1
Summary of Key Research Projects

Research Projects	Participants and Additional Funding
Understanding nursing home quality and quality of care instrument development Developed a theoretical model of nursing home quality of care (provider focus groups; Rantz, Mehr, et al., 1998)	Rantz, principal investigator (PI), with team
Consumer focus groups refined the theoretical model of nursing home care quality (Rantz, Zwygart-Stauffacher, Mehr, et al., 1999)	Rantz, PI, with team
Developed and field tested Observable Indicators of Nursing Home Care Quality instrument Versions 1-4 (Rantz, Mehr, et al., 2000)	Rantz, PI, with team
Version 5 (Rantz, Jensdotir, et al., 2002; Rantz & Mehr, 2001; Rantz, Popejoy, & Zwygart-Stauffacher, 2001)	
Residential care version (Aud, Rantz, Zwygart-Stauffacher, & Manion, 2004)	
A new measure of nursing home care quality (Rantz, Zwygart-Stauffacher, et al., 2005)	National Institute of Nursing Research (NINR) funded, in progress, Rantz, PI
Using Minimum Data Set (MDS) quality indicators (QIs) to interpret and improve quality of care in nursing homes	
Used Missouri MDS data set to study quality of care, assisted with management of the Missouri MDS data set, analyzed MDS QIs (Rantz et al., 1996; Rantz, Miller, Popejoy, & Zwygart-Stauffacher, 2002; Rantz, Popejoy, et al., 1997)	Missouri Department of Health and Senior Services (MODHSS) funded; Rantz, PI, with team
QI validation of MDS QIs in Missouri nursing homes (Karon & Roberts, 1999; Rantz, Popejoy, et al., 1997)	MODHSS funded; Rantz, PI, with team and University of Wisconsin Center for Health Systems Research and Analysis staff
Determined thresholds of quality performance for MDS QIs (Rantz, Petroski, et al., 1997, 2000)	MODHSS funded; Rantz, PI, with team

Improving quality of care in nursing homes	NINR funded, Rantz, PI
Nursing care processes, outcomes, and cost in nursing homes (Hicks et al., 1997; Hicks, Rantz, Petroski, & Mukamel, 2004; Rantz, Grando, et al., 2003; Rantz, Hicks, Grando, et al., 2004; Rantz, Hicks, Petroski, et al., 2003, 2004)	
Outcomes of lower respiratory infections in nursing home residents (Mehr, Binder, Kruse, Zweig, Madsen, & D'Agostino, 2001; Mehr, Binder, Kruse, Zweig, Madsen, Popejoy, et al., 2001)	Agency for Healthcare Research and Quality (AHRQ) funded, Mehr, PI
Venous ulcers: testing effects of position and compression (Siem, Wipke-Tevis, Rantz, & Popejoy, 2003; Wipke-Tevis et al., 2000, 2004)	NINR funded, Wipke-Tevis, PI
Nursing home working conditions and performance (Scott, Vojir, Jones, & Moore, 2005; Scott-Cawiezell, in press; Scott-Cawiezell et al., in press)	AHRQ funded, Scott-Cawiezell, PI
Intervention studies to improve quality of care in nursing homes and for elders	
Quality improvement feedback intervention with MDS QI reports in Missouri nursing homes (Popejoy et al., 2000; Rantz & Popejoy, 1998; Rantz, Popejoy, Petroski, et al., 2001)	MODHSS funded; Rantz, PI
Statewide quality improvement program for Missouri (Manion et al., 2003; Rantz, 2002; Rantz, Vogelsmeier, et al., 2003)	MODHSS funded and in progress; Rantz, PI
Aging in place: a comparison of institutional and community-based care (Marek et al., 2005)	Centers for Medicare and Medicaid (CMS) funded, Marek, PI
Evaluation of the use of bedside technology to improve quality of care in nursing facilities (Alexander & Rantz, 2005; Alexander, Rantz, Flesner, Diekemper, & Siem, 2005)	CMS funded, in progress, Rantz, PI
Technology to improve medication safety in nursing homes (Vogelsmeier, Scott-Cawiezell, & Zellmer, 2005)	AHRQ funded, in progress, Scott-Cawiezell, PI
Technology interventions for elders with mobility and cognitive impairments (Demiris et al., 2004, in press; Rantz, Marek, Aud, Tyrer, et al., 2005)	National Science Foundation funded, in progress, Skubic, PI
Multilevel intervention to improve nursing home outcomes	NINR funded, in progress, Rantz, PI
Technology to enhance aging in place at TigerPlace	AOA funded, in progress, Rantz, PI

quality of care for residents of long-term care services must be done within the context of cost and staffing, critical elements to the care delivery industry.

Interactive Research and Service Trajectories

MDS QIs and Feedback Reports

The pilot work with MDS QI analyses that began in 1993 (Hicks et al., 1997; Rantz et al., 1996; Rantz, Popejoy, et al., 1997) led to the development of feedback reports of the MDS QIs for all Missouri nursing homes to use to monitor each facility's quality of care (Rantz, Petroski, et al., 1997; Rantz & Popejoy, 1998; Rantz, Popejoy, Zwygart-Stauffacher, Wipke-Tevis, & Grando, 1999; Rantz, Zwygart-Stauffacher, Mehr, et al., 1999). State regulators were interested in finding a way for MDS data to be of benefit to nursing homes that were mandated to provide the data to state regulators. Nursing home staff complained to regulators there was little or no benefit to their organizations for the nursing effort expended to collect the MDS resident assessment data for each resident on admission and every quarter. The research team studied ways to configure data into meaningful reports that summarized important quality-of-care issues (falls, incontinence, skin breakdown, poly-pharmacy, weight loss, and others). Expert panels were convened to set standards from which facilities could benchmark their performance with expert-set thresholds for each of the QIs on the report and with other facilities in the state (Rantz, Petroski, et al., 1997, 2000). The feedback reports were named the "show-me" reports, illustrating the state's effort in their development.

Randomized Clinical Trial of Feedback Reports

MDS QI feedback reports, show-me reports, led to a randomized clinical trial beginning in 1997 of on-site technical assistance with an advanced practice nurse to help facilities implement quality improvement programs and improve resident outcomes of care (Popejoy et al., 2000; Rantz, Miller, Popejoy, & Zwygart-Stauffacher, 2002; Rantz, Popejoy, Petroski, et al., 2001). This clinical trial elucidated how much support and feedback it takes to help facilities make changes in their care delivery that result in improved resident outcomes. In the study, facilities that embraced quality improvement worked with an advanced practice nurse expert on site at least twice in a year and had follow-up phone contact between visits that were able to demonstrate improved resident outcomes for falls, behavioral symptoms, little or no activity, and pressure ulcers (overall and for low-risk residents). Results indi-

cated that simply providing comparative feedback reports of quality-of-care issues is not enough to improve resident outcomes; facilities need data-driven, on-site expert nurse consultation to improve (Rantz, Popejoy, Petroski, et al., 2001).

Statewide Program for Quality Improvement

The success of the randomized clinical trial resulted in developing a state-sponsored cooperative program in 1999 with the Missouri Department of Health and Senior Services and the SSON to provide on-site technical assistance and support to facilities throughout the state (Rantz, 2002; Rantz, Vogelsmeier, et al., 2003). The Quality Improvement Program for Missouri (QIPMO) uses the show-me reports the team designed (now electronically available to all Missouri nursing facilities) and nurses expert in gerontological nursing from the SSON to assist facilities throughout the state to develop quality improvement teams and improve care. For example, a QIPMO nurse schedules a site visit to a nursing facility so that key clinical staff can meet as a quality improvement team; if staff need help downloading the show-me report, the nurse helps them download the latest report, and together they review each indicator to see where there are potential problems that need attention. If trends are detected in problems such as increasing restraints, pressure ulcers, or other indicators, the team determines ways they will examine what is happening with their care delivery, make changes in the care processes, and set up a follow-up evaluation to be sure the care changes have stuck, that practices really have changed as they intended. The facility's team schedules follow up times with the QIPMO nurse to help them with the next issue.

Cooperative Work With Federal Initiatives

The QIPMO program has been recognized nationally for its effectiveness and pioneering effort to translate research to practice, helping nursing facilities improve clinical care delivery (Rantz, 2002; Rantz, Vogelsmeier, et al., 2003). Since 2002, QIPMO has worked cooperatively with Missouri's federally recognized Quality Improvement Organization (QIO) to carry out federal initiatives to improve quality of care in nursing homes (Centers for Medicare and Medicaid [CMS], 2004; Editor, 2002). It is important that QIPMO collaborate with the federal QIO initiative so that the state and federal initiatives complement and gain synergy from combining efforts. In the QIO federal initiative, the quality improvement processes are more targeted, focusing on specific clinical measures such as pressure ulcers, pain, decline

in activities of daily living, restraints, or depression. In the state QIPMO program, all clinical topics (typically focused on 1 or more of the 30 QIs displayed in the show-me report), care planning, and MDS-related questions can be addressed as requested by facility staff. The nurses actually wear two name tags, illustrating their combined roles as QIPMO nurses from the SSON and from the QIO.

In mid-2005, Scott-Cawiezell's work on measuring organizational capacity to create and sustain improvement will play a key role in the QIO federal initiative nationwide (Scott, Vojir, Jones, & Moore, 2005; Scott-Cawiezell, in press; Scott-Cawiezell et al., in press). As a member of our research team, she is assisting QIPMO and QIO nurses to learn expanded strategies to help facility staff build the organizational capacity to create and sustain improvement in clinical care. Not only are the QIPMO and QIO nurses translating clinical research into practice as they work with Missouri facilities, they are using the latest organizational research-based approaches to help facilities make real organizational change.

These examples illustrate how the clinical ideas build on one another and how the research ideas and results also build on one another. What is learned from one study is applied to the next, and it is also applied to the development of service delivery initiatives to test results in the real world.

New Long-Term Care Service Delivery Model

Another real-world application has been the Aging in Place Project (AIP), initiated in 1996. SSON faculty and administration had a vision of starting a new model of long-term care (Marek & Rantz, 2000; Rantz, 2003; Rantz, Marek, et al., 2000). Older adults in the team's research projects kept explaining that they wanted to stay at home as long as possible; they feared moving to a nursing home. SSON faculty and administration decided to develop and evaluate services for seniors to *age in place in the home environment of their choice with supportive health care services as needed*. The AIP project required two Missouri state statute changes to be able to implement it as a new model of long-term care in four pilot sites in the state.

In 1999, a department within the SSON was formed, and it established Senior Care, a licensed home health agency. A \$2 million grant was obtained from the federal CMS to conduct an evaluation about the effectiveness of aging in place for frail older adults (Marek et al., 2005; Marek, Rantz, & Porter, 2004). Results of the outcome analysis of the evaluation reveal that nurse community-based care coordination enhances the clinical outcomes of long-term care participants. Cost analyses are underway at this time.

In 2004, construction of TigerPlace, specially designed elder housing of 33 apartments, was completed, and it is located just a few miles from the SSON. Americare Systems, Inc., of Sikeston, Missouri, owns TigerPlace and operates the facility in affiliation with the SSON (Rantz & Marek, 2004; Rantz, Marek, Aud, Johnson, et al., 2005; Vlessides, 2004). A central feature of TigerPlace is a wellness center, operated by Senior Care, where there is ongoing assessment of resident needs and health promotion activities including exercise and health classes to help residents remain active and vital.

Senior Care provides an array of home health services at TigerPlace such as medication management, assistance with activities of daily living, and care coordination of health conditions with residents' physicians and other health care providers. Senior Care also provides Medicare home care when residents need and qualify for that service.

Pets are welcome at TigerPlace. Several residents have come with their family pets. The building design and programming accommodate this feature well. For example, each apartment has an exterior door for easy outdoor access for guests and pets, screened-in porches, and wide window sills for cats to enjoy. Further, the building has a veterinary exam room for pets to have regular health care and treatment by students and faculty of the MU College of Veterinary Medicine (Rantz, Marek, Aud, Johnson, et al., 2005; Vlessides, 2004). Other MU activities are accommodated with space that includes two large community rooms, an exercise room, a wellness center, a clinic space for resident use with health care providers, and office space for Senior Care. Space is multipurpose and shared for education, research, and practice activities involving MU faculty and students with the residents of TigerPlace. Most recently, the MU Center of Excellence in Aging moved its monthly research seminars to TigerPlace to include residents with MU faculty in discussions about the latest aging research.

Research at TigerPlace

Research activities at TigerPlace are in progress. First, a state evaluation of aging in place is underway. Clinical outcomes, resident satisfaction, and costs are being evaluated. A multidisciplinary research team with SSON, computer engineering, and health informatics faculty is collaborating on developing and testing technology to help older adults age in place (Demiris et al., 2004, in press; Rantz, Marek, Aud, Tyrer, et al., 2005). Research funded by the National Science Foundation is underway, and additional funding from the Administration on Aging has just been received in fall 2005 for technology applications for each resident apartment to monitor gait, activities, and, in some cases, vital signs.

Challenges

The road for the journey of the research team advancing this program of research has not been without pitfalls. Challenges include competing values when implementing practice changes in the real world of long-term care. Simply knowing from study results what is likely to work best for more cost-effective care or for improved resident outcomes is not easily adopted by facility staff. Staff have competing obligations and limited time available for getting things done right, as suggested by research findings guiding evidence-based practice.

Faculty in the SSON face enormous challenges from the academic mission competing with the practice mission. It is difficult for faculty to embrace the challenges of a practice such as Senior Care, the SSON home health agency, that is a 24-7, continual operation serving clients in our community. Academic work requires time for teaching, preparation, and rigid schedules for time with students. These demands conflict with the intermittent and unpredictable demands of clients in the practice. For faculty with research responsibilities, time for grant writing and grant activities competes with the unpredictable demands of the practice. Balancing competing demands is the key to successfully integrating practice responsibilities with traditional faculty roles. Having nursing and administrative staff whose primary role is the practice is essential to the success of integrating research, education, and practice demands and competing roles.

From the research perspective, getting to the so what question is a continual challenge. A SSON colleague, getting to what he sees as the bottom line for all research endeavors, often pointedly asks researchers and students, "So what?" For the research team described in this article, that question continues to be posed with each project. What difference can these results make to clinical practice? Can results be useful to public policy makers or to consumers? If my family needed long-term care, how could the research results make sure that they get the best possible care? How can long-term care staff be helped to improve their systems of care? How can the entire organization be improved to help residents get better care? What new models of care can be developed? Can outcomes of older adults be improved by providing care and services in new or different ways? What are the costs of care delivered in different ways? Are families and elders more satisfied when they get care and services in new delivery models than in traditional approaches? Asking the tough "so what" question keeps the research team grounded in the reality that research ideas must make a difference to elders and those who care for them in multiple settings.

Summary

The journey of a research team pursuing a research program was articulated to help others who are interested in developing a research and service program that makes a difference to a population such as older adults. Teams are wonderful things; the resulting energy and productivity are more than simply adding people to the team one by one. With high-performing research and service teams, productivity and success become multiplied, not simply added, as success breeds success. Others are encouraged to form entrepreneurial programs of research and service to improve the care of a population of their interest.

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