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Assessing Knowledge of General Principles of Geriatric Pharmacology Among
Registered Nurses

A Senior Honors Thesis

Submitted in Partial Fulfillment of the Requirements
for Graduation in the College Honors Program

By
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*Educational use of this paper is permitted for the purpose of providing future
students a model example of an Honors senior thesis project.*

Abstract

This study was carried out to look at one potential cause for the large number of problems associated with medication mismanagement of hospitalized older adults. The purpose of this study was to assess the knowledge of general principles of geriatric pharmacology among registered nurses. A questionnaire was developed which focused on basic aspects of geriatric pharmacology. The questionnaire was administered to registered nurses working on units that admit a large number of older adults, from one local hospital. Results showed that overall, registered nurses were not as knowledgeable as they should be in terms of geriatric pharmacology and therefore, may often be unable to help prevent adverse drug reactions in the hospitalized older adult population. Implications for further research and focused education of acute care registered nurses are discussed.

Introduction

In the United States, the population of older adults is rapidly expanding. By the year 2030, the number of individuals within this age group is expected to increase by at least twenty-five percent (Rocchiccioli, Sanford, & Caplinger, 2007). Because individuals are living longer, it is common for older adults to be diagnosed with multiple chronic diseases, or co-morbidities. A common method of managing these co-morbidities is through the use of medications. Often, older adults are required to take at least one, and sometimes several medications for each co-morbidity. This often results in older adults taking multiple medications several times a day. This use of multiple medications simultaneously is known as polypharmacy (Planton & Edlund, 2010). Although medications are meant to be beneficial, they are complex chemical compounds and when mismanaged, they can instead cause more problems for the older adult. Although the use of polypharmacy is not unusual in other age groups, the aging process alters the way in which medications are tolerated by the body, creating an increased risk for complications such as drug toxicity and adverse drug reactions in the older adult population (Rochon, 2013). The biological changes associated with aging that affect the absorption, metabolism, distribution, and excretion of medications, combined with the often increased need for multiple medications, puts older adults at high risk for adverse drug reactions associated with polypharmacy (Steinman et al., 2006).

In addition, older adults are sometimes prescribed medications that are contraindicated, unnecessary, or of the wrong dose, which increases the likelihood of adverse drug reactions (ADRs) (Sergi, De Rui, Sarti & Manzato, 2011). These adverse

drug reactions may lead to confusion, falls, arrhythmias, and even death, in older adults. Problems related to polypharmacy are one of the leading causes of hospitalization in older adults (Rocchiccioli et al., 2007). In fact, the rate of hospitalization due to problems related to medication use for older adults is seven times higher than for younger adults (Hale et al., 2008). Therefore, the proper management of medications for these individuals is imperative to the maintenance of their optimal level of functioning, safety, and overall health.

One way to properly manage medications is through appropriate prescribing and meticulous monitoring of the older adult's medication regimen. Clinical tools such as the Beers Criteria and the Improved Prescribing for the Elderly Tool (IPET) are available to guide health care providers in the proper management of the older adult's medication regimen (George & Jacobs, 2011). The Beers Criteria consists of a list of thoroughly researched medications in which the risks of their use in older adults largely outweighs the benefits, and are considered to be potentially inappropriate medications for older adults (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). The IPET is another validated screening tool that has been used in both hospitals and community settings in an attempt to reduce the amount of adverse drug reactions in older adults. The IPET contains fourteen different categories of contraindicated medications and known drug-disease interactions (Barry, O' Keefe, O' Connor & O' Mahoney, 2006). Yet, these potentially dangerous medications continue to be prescribed and administered to older adults. Studies have suggested that 7.2 billion dollars or more, annually, are spent in relation to the use of potentially inappropriate medications (The American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). Also, as stated above, adverse drug reactions have been found to be a large contributing factor in hospitalization for older adults, accounting for

up to twenty-eight percent of acute hospital admissions for this patient population (Planton & Edlund, 2010).

Despite the availability of these tools, the question remains: Why are there so many adverse outcomes due to medication use in older adults? There may be many reasons for this issue, perhaps beginning with a lack of knowledge of principles of geriatric pharmacology among health care providers, including registered nurses (RNs). A large proportion of care for older adults in the acute care setting is given by registered nurses. Although unable to prescribe medications, nurses are responsible for assuring the safe preparation and administration of medications, as well as monitoring for indications and effects of medications. Nurses are also responsible for knowing how to properly identify adverse drug reactions common to older adults. Yet, if registered nurses are unaware of many of the general principles of pharmacology for older adults, they are missing their opportunity to intervene for the well being of the patient if the patient's medications have the potential to cause known adverse reactions. Therefore, to explore a potential reason for the high rate of adverse events related to medication use in older adults in the acute care setting, the purpose of this research thesis is to answer the following question: "How well known are the principles of geriatric pharmacology among registered nurses in the acute care setting?"

I hypothesized that registered nurses do not have adequate knowledge of pharmacology specific to older adults and therefore are not a useful line of defense in preventing and reducing adverse drug reactions.

Review of the Literature

A review of the literature reveals that a great deal of research has been done on strategies to reduce problems associated with polypharmacy in older adults. However, the majority of this research has focused on physicians and those responsible for

prescribing medications (Planton & Edlund, 2010). There is a lack of research focusing on the involvement of RNs in regards to this issue. This is a startling finding, for RNs provide a great percentage of care to older adults in the acute care setting. They spend the majority of time in direct contact with these patients. RNs also play an extremely important role in their medication management during hospitalization. RNs are constantly viewing the patient's medication administration record. They are aware of medications prescribed, ordered dosages, and administration times. Nurses are also responsible for doing frequent patient assessments and are in a position to identify negative reactions to a medication regimen.

Although most studies seem to neglect the RNs role in this problem, one particular study, done by Bergqvist, Ulfvarson, and Karlssen (2009), does examine the nurse's ability to impact problems associated with pharmacology. This study examined the ability of registered nurses to identify clinically significant drug related problems after receiving a training class on the basics of geriatric pharmacology. The results of the study were promising and showed that after the training class, registered nurses were able to detect 86 clinically significant drug related problems that had not been detected through routine care by other medical professionals. However, the authors also stated that they were unable to find any randomized studies aimed at decreasing drug-related readmissions of older adults that also evaluated the role of the RN (Bergqvist et al., 2009).

Theoretical Framework

The theoretical framework of the American Association of Critical Care Nurses (AACN) Synergy Model for Patient Care has guided the research question and accompanying design. This model posits that the needs of patients and their families

provide the driving force behind the development of appropriate nurse competencies (American Association of Critical Care Nurses, 2013). Synergy is accomplished when those specific patient and family needs are in harmony with the health care system's, and the nurse's competencies. This model asserts that the more complex a patient's condition, the more critical their needs. These needs then drive the development of more competent nursing practice.

When considering the specific patient population central to my thesis, the AACN Synergy Model for Patient Care was extremely appropriate. As previously discussed, older adults often have multiple co-morbidities and an overall decline in the majority of body systems. Appropriately managing the care of these patients can be a very complex process. Therefore, the intricate needs of these patients demand nursing care that is competent in a wide-array of issues, including pharmacology. In order to provide optimal care to the older adult patients, the Synergy Model for Patient Care can be used to explain the importance of having nurses well versed in the principles of geriatric pharmacology. Only then can nurses provide knowledgeable, capable care to meet the needs of older adult patients.

Methodology

Design

In order to answer the research question, a quantitative design was used, with data collected via a questionnaire. After a thorough review of the literature concerning prevalent concepts and themes regarding general principles of geriatric pharmacology, a 12 item, multiple choice questionnaire was developed specifically for this study. The questions included in the questionnaire were designed to assess the knowledge of general

principles of geriatric pharmacology among registered nurses. Once the questionnaire was developed it was evaluated by two registered nurses, working on a cardiac step down unit, who care primarily for older adults. These RNs did not participate in the study but provided feedback about the questionnaire. Based on their suggestions, one question was reworded to improve its clarity. For the study, the questionnaire was administered, to registered nurses on hospital units that admit a large proportion of older adult at one large local hospital. The directors of six in-patient care units were asked for permission to recruit their staff to participate in the study. Approval was obtained from directors of three units - a medical/surgical unit, an orthopedic unit, and a rehabilitation unit.

Sampling

In order to be a participant, one must have been a registered nurse at the time of the study. The participant must have been working on a unit that cares for a large population of older adult patients, and must have also been 18 years of age or older.

Data Collection

The questionnaire included demographic information, such as the participant's highest level of education, number of years working as a registered nurse, and the type of unit. The questions were intended to assess knowledge pertaining to biological changes in the older adult, potentially inappropriate medications, and the proper method of medication reconciliation. Questionnaires were left in the break room of each of the three units for three weeks. Sixty questionnaires were distributed, with twenty provided to each unit. Participants were instructed to complete the questionnaires independently, with no help from outside resources. Completed questionnaires were placed in a one-way collection box that eliminated the potential for tampering with completed questionnaires.

It should be noted that researchers were not present during the completion of the questionnaires. Completed questionnaires were retrieved from the collection boxes by the author at the end of the three weeks.

Data Analysis

Data from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS), version 19. Descriptive statistics were used to analyze demographic data including type of unit, educational levels, and years of experience as an RN. To determine the results of the questionnaire, frequencies were calculated on the responses to each question and a total score was calculated for each participant. Means among groups on the demographic variables were compared using analysis of variance (ANOVA), with the *p* value set at 0.05, to determine statistical significance.

Ethical Considerations

Permission to conduct this study was granted by the Institutional Review Board at The College at Brockport, State University of New York. Permission was also granted by the Clinical Nursing Research Center, at the hospital where data was collected. Informed consent was gained from the participants by an introduction letter attached to the front of each questionnaire. The letter included the purpose of the study, instructions, associated risks and benefits, and informed the reader that completion of the questionnaire would act as informed consent.

Results

Fifteen RNs completed questionnaires for a response rate of 25%. Three nurses worked on an orthopedic unit, six nurses worked on a general medical surgical unit, and six nurses worked on a rehabilitation unit. The breakdown by unit of completed

questionnaires was three from the orthopedic unit, six from the medical surgical unit, and six from the rehabilitation unit. In terms of level of education, three participants had their associate's degree, eight had their bachelor's degree, and four had their master's degree. Total years of experience were divided into either less than five years of experience as a registered nurse, or greater than five years. Eight of the participants had less than five years of experience, while seven participants had greater than five years of experience as a registered nurse. Each question was then broken down into the percentage of registered nurses that answered each question correctly. Of the 12 questions, there were five questions that less than half of the registered nurses answered correctly. One question was not answered correctly by any of the participants. Total scores of each participant were also determined. Scores ranged from five questions to ten questions answered correctly. The mean score was 7.33 questions answered correctly by participants, with a mode score of 7.

No significant differences in questionnaire scores were found among the different units ($p = .450$). No significant differences were found in total score by education level ($p = .260$), but results trended toward the more education the lower the score, as evidenced by the difference in mean scores between degrees. Associate degree RN mean score was 8, Bachelor's degree mean score was 7.63 and the Master's degree mean score was 6.25. Lastly, there was no significant difference in total score by years of experience (less than 5 years compared to greater than 5 years) ($p = 0.391$).

Discussion

This study and its findings bring forth several implications for future research and clinical practice. The findings of the study support the initial research hypothesis. It

appears that registered nurses are not as knowledgeable in important general principles of geriatric pharmacology as they should be. This means that in a position where they could be a useful line of defense in reducing and eliminating problems related to medication management in older adults, registered nurses are not well equipped with the knowledge necessary to do so. The type of unit, education, and more experience do not necessarily mean that nurses are knowledgeable in geriatric pharmacology. Therefore, it is necessary to assess all nurses' knowledge level when working with older adults.

Another implication of this study is that education regarding geriatric pharmacology needs to be provided to all registered nurses working with older adults. Because this is one of the first studies to assess the registered nurse's knowledge of this subject it is difficult to compare the findings to previous research. However, Bergvist, Ulfvarson, and Karlssen (2009), showed that after educational classes pertaining to geriatric pharmacology, registered nurses were able to detect many potential medication problems in their elderly patients. RNs may also benefit from formal education classes that teach about clinical tools such as the Beers Criteria. In one study, researchers examined the occurrence of drug related problems in older adults that were prescribed potentially inappropriate medications, as identified by the Beer's Criteria, versus outcomes in a comparison group that was not taking any of the identified inappropriate medications. Results showed that the group that had been prescribed one or more potentially inappropriate medications had an increased risk of drug related problems (Fick, Mion, Beers & Waller, 2008). The findings suggest that the Beers Criteria is in fact a valid resource and therefore, it is a useful tool that nurses may take into consideration when assessing the medication regimen of older adults. If educational programs are

provided to all registered nurses working with older adults, this may be a positive and effective step in reducing ADRs in the older adults during hospitalization.

Based on the findings of this study, and the continual existence of issues related to issues of medication management in older adult patients, it is recommended that further studies be done to explore the role of the registered nurse in regard to this problem. This study needs to be replicated using a larger sample size to support internal validity. It should also be repeated in different locations in order to further support its validity. If these findings are consistent throughout, this only provides greater reason to better educate the country's registered nurses in the area of geriatric pharmacology.

Limitations

There are several limitations of this study that warrant discussion. The sample size in this study was quite small. This creates the potential for a type 2 error. The results of this study demonstrate that there is no difference in scores but in actuality there may be. Our sample size is too small to make a determination. Only 15 registered nurses were used in the study's sample. Although the 25% response rate is actually a reasonable response rate, a larger sample size may have provided more valid results and produced more statistically significant findings. Also, the sample used was a convenience sample. While the hospital used in the study is a large hospital in western New York, it was used primarily because of its proximity to the location of the researcher. Using only one hospital is also a limitation. By using only one hospital, there were only three specific units that fit the inclusion criteria and that agreed to participate in the study. Increasing the sample size and sampling hospitals in multiple locations would have increased the validity of the results. Another limitation is using a self-made questionnaire. If it had

been possible to use a previously made survey that was found to accurately assess registered nurses' knowledge of general principals of geriatric pharmacology, this too would have increased the study's validity and reliability. Face validity of the questionnaire was established by having two acute care nurses with experience in caring for older adults evaluate the questions. Another limitation that could have compromised the integrity of this study was that I was not able to monitor participants while they completed the questionnaire. Therefore, it is possible that some participants could have discussed the information with others while taking it, or consulted outside resources without the researcher's knowledge. This fact has the potential to alter the outcome of the study.

Conclusion

Problems related to the complexity of proper medication management in the older adult population is a serious health care concern. Due to the prevalence of this problem, steps have been taken, such as the development of the Beers Criteria, to address the problem. However, the problem still exists, and with the older adult population growing at a rapid rate, the problem must be examined from perspectives that transcend the prescribing provider. Registered nurses have been overlooked as a potential solution to reducing the problem of adverse drug reactions in older adults. Research is lacking in regards to the registered nurse's role in properly managing geriatric medication regimens, even though it is the registered nurse who spends the majority of time with the older adult patient during hospitalization. This study suggests that even if the registered nurse could play a vital role in reducing the problems related to pharmacology in the elderly, they often do not have adequate knowledge to do so. Therefore, all registered nurses working

with older adults, regardless of the type of unit worked on, their level of education, or years of experience, need to receive greater education concerning geriatric pharmacology.

If the problem of adverse drug reactions in older adults is ever to be properly managed the health care industry must equip some of its greatest lines of defense, registered nurses, with the tools necessary to create positive change.

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