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Improving Nurses Knowledge of Delirium and Implementation of the R.A.D.A.R. Screening

Tool at two Post Acute Care Facilities in the United States

Kanah Lewallen

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Abstract

Delirium in post acute care patients is under-recognized and linked to poor patient outcomes. Nurses in the post acute care setting are currently not using a standardized tool for assessing delirium, but the literature suggests they should do this routinely. The purposes of this study were to evaluate methods for improving the management of delirium in post acute care and to evaluate the implementation of a new screening tool for delirium (Recognizing Active Delirium As Routine or R.A.D.A.R.). This quasi-experimental study was conducted at two post acute care facilities in an urban location. The study included the implementation of a delirium education program, as well as information on the administration of the R.A.D.A.R. Delirium knowledge improvement was evaluated by comparing pre and post test scores. The post test scores were measured twice; the first time immediately after the education session, and then three months later. The results demonstrated that the nurses' knowledge of delirium improved significantly at both post tests ($p < .05$). To evaluate the reliability of the nurses' administration of the R.A.D.A.R. tool, interrater reliability was tested using Cohen's Kappa, which found a significant level of agreement between the nursing staff and the PI (Kappa = 0.634). This pilot study found that a delirium education session can improve nurses' knowledge of delirium and that they can maintain the knowledge gained over time. The study also identifies that the R.A.D.A.R. screening tool was administered reliably. These findings suggest that the methods utilized for this project could have implications for improving the care of the patient in the post acute care setting who is at risk for delirium.

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Tool at two Post Acute Care Facilities in the United States

Delirium, a condition occurring in geriatric patients across the continuum of healthcare, is frequently under-recognized, especially in the post acute care setting (Voyer et al., 2012). In the geriatric population, changes in mental status can be dismissed as part of aging or having dementia. However, neither of these beliefs is accurate, and each can put patients at risk for decreased quality of life and increased mortality.

The incidence of delirium across practice settings varies greatly, with rates for the elderly person in an intensive care unit being as high as 87% (Saxena & Lawley, 2009). In the post acute care setting, also known as skilled nursing facility, long term care facility, and sub-acute care facility, delirium has an incidence of 34% (Arinzon, Peisakh, Schrire, & Berner, 2011). The variable incidence of delirium in different levels of care is helpful in understanding that as the severity or acuity increases, so does the risk of delirium.

Delirium is associated with increased rates of mortality. For patients admitted to post acute care with delirium, the mortality rate at one year is 34% (Kiely et al., 2009). In addition to high mortality rates, delirium is also associated with significant morbidity and functional loss. Because the delirious patient is under recognized or not accurately diagnosed, this patient often requires additional and/or more complex care than is readily available in the high patient-to-staff ratio environment of many post acute care facilities (Kiely et al., 2009). A delirious patient can often require one-on-one care, which is not readily available in the post acute care setting.

Across the care continuum, delirium costs are estimated at \$38 billion to \$152 billion per year (Leslie, Marcantonio, Zhang, Leo-Summers, & Inouye, 2008). Because of concerns about increasing health care costs combined with limited funding for Medicare and Medicaid services,

a focus on a problem as costly as delirium would be beneficial to the health care system as a whole. Benefits could also include decreased mortality, morbidity, workload, and re-hospitalizations. In geriatric patients who have delirium, their ability to return to their prior level of function or prior living situation diminishes with the diagnosis resulting in an increased financial burden.

The purpose of this study is to measure the impact of education on the knowledge of delirium in the post acute care setting. Preliminary studies have validated a tool (Recognizing Active Delirium As Routine or R.A.D.A.R.) to assess for delirium in post acute care in Canada. This project evaluated two questions. The first question: Do post acute care nurses who receive education on delirium score higher on post test scores than the same nurses scored on a pretest? Secondly: Do nurses who have received education on the R.A.D.A.R. tool, administer the tool correctly in comparison to the geriatric advanced practice nurse?

Background

The Diagnostic and Statistical Manual of Mental Disorders diagnosis of delirium focuses on inattention, acute onset, change from baseline, and a fluctuating course (American Psychiatric Association, 2013). Not only is it important for diagnosticians to identify patients with delirium, but also it is even more important for the bedside nurse to identify patients who are having symptoms of delirium. According to Marcantonio et al. (2005), one-third to two-thirds of patients with delirium are not diagnosed as having delirium. Under-diagnosing such a large percentage of this costly and deadly disorder is not only detrimental to this population, but also an expensive burden to the health care system. To address this problem, Voyer (2014b), a leading researcher on delirium in post acute care, has validated a new screening tool for delirium in post acute care. The findings from this study have not been published yet. See figure 1 for an

example of the R.A.D.A.R. tool. This tool has the potential to make a significant impact on the early recognition of delirium in post acute care facilities in the United States.

Addressing the problem of under-diagnosis in the post acute care setting starts with improving the knowledge of the staff who provide the direct care to the patients. There currently is no established effective model of care. However, the components needed for a delirium education model have been identified by experts and include: support for the program from both administration and the users, effective clinical leadership to ensure proper delivery and appropriate adaptation, a sense of ownership among delirium model users, and practical hands-on training for staff (Voyer et al. 2013). No improvement in prevention or detection of delirium can occur if the nurses at the bedside are not knowledgeable about and skilled in assessment of this disorder.

Delirium research has led to two categories that help nurses and providers understand and identify patients with delirium (Inouye, 1999). These categories are identified as predisposing factors and precipitating factors. The predisposing factors are the conditions the patient already has at baseline that increase the patient's at risk for delirium. The precipitating factors are potential insults that the patient may experience during acute and post acute care admissions. The concepts of predisposing and precipitating factors are the basis of the theoretical foundation for this project.

Theoretical Foundation

The Multifactorial Model of Delirium (MMD) (see figure 2) uses predisposing and precipitating factors to assist nurses and providers with earlier recognition of delirium (Inouye 1999). The model has two vertical lines that represent the predisposing and precipitating factors respectively. The severity of the factors increases on the vertical lines, with the most severe

factors near the top of the vertical lines. The individual assessing the patient can identify the most severe risk on each vertical line. Once the two highest risk factors are selected, a line can then be drawn between the two vertical lines to identify the individual patient's level of risk for delirium. The model's layout provides visual clarity to the caregiver to understand the risk of delirium.

With earlier recognition, progression of delirium can be slowed or halted. The predisposing and precipitating factors plus specific indicators for delirium make the MMD helpful to the nurse and provider in looking at the complexities of each individual patient. Although this model has been used more extensively in the acute care setting than in the post acute care setting, it can be a guide to help nurses and providers to individualize assessments and interventions for the geriatric patient who may be at risk for delirium.

Change Theory

To support the interventions of this project, Lewin's change theory was incorporated into the study design (Lewin, 1974). The Lewin change theory was useful in another study that incorporated a new delirium assessment method into registered nurses clinical practice at an acute care facility (Lacko, Bryan, Dellasega, & Salerno, 1999). Lewin's change theory has three sections, which include unfreezing, change, and refreezing (see figure 3) (Lewin, 1974).

The first stage of unfreezing was achieved during the nursing education sessions. The education sessions provided the nursing staff with the evidence of a need to change practice. This newly presented evidence promoted awareness and motivated the nurses to change their assessment practice. The change stage of the theory was incorporated into the education of the new delirium assessment tool and during the applied experience of using the screening tool. For this stage the principal investigator (PI) conducted weekly rounding at each facility to support

the staff. For the final stage of the theory, the staff nurses and the agency administration considered the incorporation of the R.A.D.A.R. tool. This action to incorporate or to not incorporate the screening tool is the refreezing stage of Lewin's change theory. The focus of this stage is that the nursing staff and administration will feel empowered to make the decision to continue or not continue using the R.A.D.A.R. tool. The refreezing section occurred after the completion of the project.

This model promoted practice change with the application of the three stages of change throughout the education process by collaborating with the staff nurses. This study found that the Lewin change theory was useful in developing and implementing the program, and ultimately the staff nurses decided at the point of re-freezing to continue with the new delirium assessment.

Evaluation Theory

An evaluation theory was used to guide the development, application, and evaluation of this project. This theory was the Promoting Action on Research Implementation in Health Services (PARIHS) framework (Stetler, Damschroder, Helfrich, & Hagedorn, 2011) (see figure 4). The PARIHS model identifies the components that take evidence-based practice and successfully implement it into practice. The model's three core components, evidence, context and facilitation, work together to achieve successful implementation by providing an evaluation format that includes interventions, measurement, and outcomes. The three core components mentioned above are laid out in a circular format and direct the researcher on a tiered approach that takes into consideration the macro, meso, and micro levels of evaluation. The literature supports the use of this model in all phases of an implementation project (Stetler et al., 2011), and while it has not been used in post acute care, it has the components needed to function in that

environment. A study evaluating its appropriateness in the post acute care setting will be beneficial to identify if the model can be incorporated into different practice settings.

Methodology

Design

This study was a pre/post test quasi-experimental study. The study evaluated the following variables: one pre and two post test scores, interrater reliability, percentage of time the nurses completed the screening tool, nurse's perception of the R.A.D.A.R. tool, and demographics of the nurses. Approval for this study was received from the Belmont University Institutional Review Board. Dr. Voyer gave permission for the R.A.D.A.R. tool to be used in this study. Although the education session was mandatory, participation in the project was voluntary. The nurses were recruited via the facilities internal messaging system and immediately prior to a mandatory delirium education session. The nurses who expressed interest in participating in the study consented prior to the education session. The PI was available during the consenting process to answer questions.

Sample

The participants for this project included nurses providing direct patient care at Bethany Health & Rehabilitation (Bethany) and Trevecca Health & Rehabilitation (Trevecca). These facilities are located in Nashville, TN. Trevecca has a patient capacity of 240, while Bethany has a patient capacity of 180. The patient population includes both long-term care patients and post acute care patients. The inclusion criteria for the project included nurses who were full time or part time at Trevecca or Bethany and were providing direct patient care. The exclusion criteria excluded nurses who were not providing direct patient care or were not permitted to administer regularly scheduled medications. This was a pilot project and power calculations were not used.

Sixty nurses participated in the study, 35 from Trevecca and 25 from Bethany (see figure 5). The participant demographics are included in table 1. Of the nurses at both facilities, 42 were licensed practical nurses and 18 were registered nurses. Of the 18 registered nurses, seven had a bachelor of science in nursing degree. Group means included 7.79 years of experience in geriatrics (SD 7.97 and range 0-30), 9.53 years of experience as a nurse (SD 10.11 and range 0-43), and 39.30 years of nurse age (SD 11.07 and 21-64). The sample included 54 full-time nurses, four part-time nurses and two PRN nurses. There were 54 female participants and six male participants. Thirty-six participants completed the final post test and feasibility questionnaire administered three months after the initial administration. The PI conducted 117 interrater reliability assessments during the bedside nurses' medication administration.

Intervention

The PI, a geriatric advanced practice nurse, provided education sessions to all nurses at both facilities. This one-hour education session was mandatory for all nurses. The nurses who attended the education sessions were given the opportunity to participate in the study. The sessions were offered over a two-week period at varying times of day and days of the week in an effort to capture all nursing shifts and rotations. The education sessions included both general delirium knowledge and a video on how to administer the R.A.D.A.R. (Voyer, 2014a). This video included case scenarios with nurses administering the R.A.D.A.R. To minimize variance, the same material was used at each in-service and the PI provided all in-services.

The R.A.D.A.R. is comprised of three questions related to the patient's condition: 1) was the patient drowsy? 2) did the patient have trouble following your instructions?, and 3) were the patient's movements slowed down? (Voyer, 2014b). A positive answer to any one question indicates a positive screening for delirium. The R.A.D.A.R. tool was in a paper format, but

because both facilities use electronic charting and do not have paper charting, the tool had to be incorporated into the electronic medical record (EMR) at both facilities. The training sessions included information on how to document the R.A.D.A.R. in the EMR. After completion of all education sessions, the nurses incorporated the R.A.D.A.R. tool in their documentation. The nurses administered the R.A.D.A.R. on all patients once each shift during medication administration. The results of the R.A.D.A.R. were then documented on the medication administration record (MAR).

While the in-services were mandatory, participation in the project was optional. Those nurses participating in the study were consented, completed the pre-test and demographic questionnaire, then attended the same education session as those nurses who chose not to participate in the study. The post test was first administered after the education session and once again after the nurses had been using the R.A.D.A.R. for approximately three months. Following the delirium education session, and after the nurses had been using the R.A.D.A.R. tool for two months, the PI measured nurses' accuracy in using the R.A.D.A.R. and determined interrater reliability. At the completion of the study, a dichotomous questionnaire was administered to assess the nurses' perception of the R.A.D.A.R. tool.

The PI provided project support through bi-weekly rounding with the nursing staff. This strategy allowed the PI the opportunity to answer questions the nursing staff had and to reinforce presented delirium knowledge. Intermittently during the study period the PI provided additional handouts and flyers to the nursing staff. The flyers included information about the R.A.D.A.R. as well as predisposing and precipitating factors for delirium. Although approximately ten nurses were unable to attend the education sessions, this group received the educational handouts and

were encouraged to watch the video about the R.A.D.A.R. The PI was not able to track how many of these nurses watched the video.

Measurement

The pre/post test was a 15-question test that was developed by the John A. Hartford Foundation of Geriatric Nursing Excellence at the University of Iowa College of Nursing. The demographic questionnaire included eight items: age, gender, licensure (RN or LPN), education years, experience as a nurse, experience in geriatrics, employment status (part-time, full-time, or PRN), and nursing education (diploma, associate degree, bachelors degree, and masters degree). Two months after the education sessions, the PI established interrater reliability with the bedside nurses by responding to the three-item R.A.D.A.R. screening tool concurrently. At the end of the project the nurses completed a five-item dichotomous perception questionnaire. This was the same questionnaire used by Voyer and colleagues to assess nurses' perception of the R.A.D.A.R. in Quebec, Canada.

Procedure

The study used a convenience sampling with recruitment of participants prior to the nursing education sessions. Eighty-three nurses attended the education sessions (see figure 5). Of the eligible 83 nurses, 60 agreed to participate in the study, 36 completed the final post test and 35 completed the perception questionnaire. The interrater reliability assessments were also conducted as a convenience sample. During a four-week period two months after the education sessions, the PI accompanied the nursing staff at intermittent times during their medication administration. The choice of nurses was based on availability of the nurses at the time the PI was rounding. The PI conducted the interrater reliability assessments on different shifts and rotations.

Analysis Plan

Data were de-identified with a unique four-digit code assigned to each nurse and written on each questionnaire. The PI maintained confidentiality of the code sheet that correlated the unique code with the nurse's name. Statistical Package for the Social Sciences (SPSS version 22) was the program utilized to analyze the data. Once all data were keyed into SPSS, the code sheet was destroyed. The PI cleaned the data by identifying any missing data with a 999 code. If there were any missing answers on the pre/post test, the participant was excluded. Also, if the nurse completed the pre test, but neither of the post tests, their scores were excluded. The PI then conducted three repeated checks to confirm the data were keyed correctly.

A repeated measures ANOVA was used to analyze the pre and two post test scores. A t-test was used to analyze the pre test and first post test. The interrater reliability data was analyzed using Cohen's Kappa.

Findings

As stated in the introduction above, this project evaluated two questions: 1) do post acute care nurses who receive education on delirium score higher on post test scores than the same nurses scored on a pretest? and 2) do nurses who have received education on the R.A.D.A.R. tool, administer the tool correctly in comparison to the geriatric advanced practice nurse? The hypothesis for the first question was that nurses' test scores related to delirium knowledge improve after receiving delirium education. The hypothesis for the second question was that after receiving the education the nurses and the PI's R.A.D.A.R. test scores consistently correlated.

To test the first hypothesis that nurses' test scores related to delirium knowledge improve after receiving delirium education, a paired T-test and repeated measures ANOVA were conducted. The paired T-test of the scores for the pre test and first post test demonstrated the

nurses gained an average of 3.45 points (95% confidence interval, 2.73, 4.17) after receiving the education (N 56). There was a significant increase in knowledge when comparing the two test scores. This gain is statistically significant at $p \leq .05$ by the paired t-test (two tailed).

The difference between the pre test and two-post test scores was analyzed using repeated measures ANOVA (N 36). Testing for departures from normality was conducted to ensure the assumptions of ANOVA were met. After reviewing the frequencies, the data appeared to be close to normal and the means approximated the medians. The pre test was taken immediately before the education session with the first post test immediately after the education session and the final post test three months after the education session.

The repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean test scores were statistically significantly between pre and post test scores ($F(1.80, 57.67) = 24.64, P < 0.05$) (see table 2). Post hoc pair wise tests were used to compare the scores. The Bonferroni test revealed that delirium education increased delirium knowledge scores immediately after the education and three months following the education, with a $p < .05$, but there was not a statistically significant difference in scores between post test one and post test two (12.06 ± 2.150 vs $11.42 \pm 2.180, p = .52$)(see table 3). Therefore, we can accept the alternative hypothesis that the delirium education improved delirium knowledge both immediately after the education and three months after the education, but there was not significant evidence of change between the two post test periods.

To test the second hypothesis that the nurses' and PI's R.A.D.A.R. test scores consistently correlated after the nurses received delirium education, Cohen's Kappa was conducted to analyze the interrater reliability/correlation between the PI's R.A.D.A.R. score and the bedside nurses' R.A.D.A.R. score. Cohen's Kappa was used in the study from which this

project was piloted to evaluate interrater reliability, and for comparison purposes it was used in this study as well (Voyer, 2014b). The result of this analysis was a Kappa of 0.634, indicating a significant level of correlation between the R.A.D.A.R. scores of the bedside nurse and the PI (see table 4). This suggests that the measurement process is consistent between the nurses and the PI. The significance level of the Kappa was determined based on a commonly cited scale that has six levels of agreement, with 0.61-0.80 being the fifth highest level (Landis & Koch, 1977).

The final questionnaire administered to the participants evaluated the nurses' perception of the R.A.D.A.R. tool and was completed at the same time as the final post test. The responses to the perception questionnaire revealed that 80%-91.4% of the nurses 'agreed' with the five questions (see table 5).

Discussion

Both questions evaluated in this study were intended to further advance the knowledge of the assessment of delirium in post acute care. This study was developed with important concepts that have been identified as key in addressing the disorder of delirium. Voyer et al (2013) outlined components that are essential for successful implementation of a project of this type: support for the program from both administration and the users, effective clinical leadership, a sense of ownership among nursing staff, and practical hands-on training for staff. A key component of this study that proved beneficial was the clinical leadership of the PI throughout the implementation process. Not only did the PI receive positive feedback from the nurses after the education sessions, but also during weekly rounding. The close interaction between the PI and the nurses promoted practice change and knowledge improvement while facilitating a sense of ownership among the nursing staff and providing practical hands-on training.

The first question of this study asked whether delirium knowledge of bedside nurses in two post acute care facilities improved after receiving delirium education. This study found that the post acute care nurses' knowledge of delirium was improved with a focused delirium education session. The test scores improved immediately after the education session and three months after the education session, suggesting that the knowledge was maintained and there was no knowledge loss. Education was identified as a starting point to address this highly burdensome disease of delirium. The issue of delirium in this setting is well established and limited studies have focused on improving the knowledge of the bedside nurse. Without understanding delirium, the bedside nurse would be unable to assess for it. The delirium education sessions in this study educated the nurses on the basic concepts of delirium identified in the PI's literature review. The portion of the education session addressing delirium knowledge improvement was 20 minutes. This improved knowledge could provide improved recognition of delirium. Further studies need to be completed to evaluate if the improved knowledge has further impacts on delirium in post acute care. In addition, further studies are needed to evaluate whether the one-third to two-third percentage of under-recognition that was identified by Marcantonio et al. (2005) can be reduced with an improvement in the bedside nurse's knowledge of delirium.

The second question for this study asked whether nurses who have received education on the R.A.D.A.R. tool administer the tool correctly in comparison to the geriatric advanced practice nurse. The findings from this study suggest that the R.A.D.A.R. tool was administered accurately in the two post acute care facilities in which it was tested. During the education session the nurses watched a video that explained how to administer the tool (Voyer, 2014a). While the tool has been validated in Quebec, it had not been used in the United States prior to this study. After conducting 117 interrater reliability assessments, this study found that there was

a significant level of correlation between the nurses and the PI. Voyer (2014b) had similar findings in his study with interrater reliability demonstrating a significant level of correlation between research staff and the bedside nurse. While this pilot study utilized convenience sampling for the assessments, it does establish that the nurses at these facilities were accurately screening for delirium based on the interrater assessments.

This study also evaluated the nurses' perception of the R.A.D.A.R. tool using the same questions that Voyer (2014b) asked the nurses in his study. Both studies found that the nurses had a positive perception of the R.A.D.A.R. Nurses did not feel that the R.A.D.A.R. was too time consuming and they felt comfortable using it. See table 5 for the specific questions asked, as well as the nurses' responses from this study and Voyer's (2014b). In this study the nurses agreed with the questions between 80%-91% of the time. The first question asked if the R.A.D.A.R. items are easy to understand, and 86% of the nurses that answered the questionnaire agreed to this. Ninety-one percent of the nurses responded that the R.A.D.A.R. items were easy to answer the items by observing during the distribution of medication, that they had sufficient knowledge to answer the questions, and that the distribution of medication was a good time to carry out patient observation. These three responses suggest that the education session provided to the nurses gave them the knowledge they needed to feel confident in the assessment of delirium by using the R.A.D.A.R and that the suggested method of observing during the medication administration was appropriate. The final question asked whether completing the R.A.D.A.R resulted in an important increase in the nurses' workload. Eighty percent of the nurses responded that completing the R.A.D.A.R. did not result in an important increase in their workload. All of these findings suggest that it is feasible for the R.A.D.A.R. tool to be utilized as a routine screening for delirium by the post acute care nurse.

As noted in the last item of the questionnaire, 20% of the nurses in this study felt that the R.A.D.A.R. was a time burden, while only three percent of the nurses in the Voyer (2014b) study had such a response. The study conducted by Voyer (2014b) found that the R.A.D.A.R. in the paper form took just seven seconds, while answering the questions in the EMR in this study took approximately 15 seconds. Due to the busy workload of the nurses, it is important to streamline charting to make things more efficient and allow them to have more time for patient care. The information technology personnel at the facilities are working on the format of the R.A.D.A.R. tool to decrease the amount of time required to answer the three questions by decreasing the amount of 'clicking' required.

The theoretical frameworks used in this study proved to be helpful in its development and implementation. The MMD was useful during the education session in providing a visualization of delirium factors. The nurses expressed that the MMD allowed them to better understand the concepts of predisposing and precipitating factors. Lewin's Change Theory also proved beneficial. The nurses showed feelings of empowerment and acceptance of the pilot study knowing that they would impact the final phase of re-freezing to determine if the tool would continue to be used at their facility. The staff ultimately decided that the tool was beneficial and recommended continuation once some adjustments have been made. The facilities are working on modifying the incorporation of R.A.D.A.R. into the EMR so that it is more time efficient. The facilities plan to use the tool once the EMR adjustments are finalized. The PARIHS model also proved helpful in the process of implementing evidence based practice. This model's ease of use and simple steps to progress through the stages of implementation was helpful. The model will continue to be used as the R.A.D.A.R. tool is modified and re-implemented into the routine assessment and charting of the nursing staff.

The limitations to this study are identified in the areas of size and scope. This study was modeled after a large study (Voyer, 2014b) and was in no way a replication of that study. This pilot study only evaluated two post acute care facilities. The evaluation was limited to pre/post test scores and interrater reliability assessments. The interrater reliability checks, while helpful, were not randomized and small in quantity. The study also did not evaluate what nurse action occurred with a positive R.A.D.A.R. assessment. The follow up action from the nursing staff and the PI would be useful knowledge in future studies.

Further studies need to be completed to determine if the use of the R.A.D.A.R. tool increases notification to providers. In addition, it would be important to know if there is an earlier identification of delirium in facilities that use the R.A.D.A.R. tool. Protocols need to be developed and evaluated on the management of delirium in the post acute care setting. The protocols should be multifactorial, focusing on prevention, early recognition, and treatment.

Establishing the feasibility of the R.A.D.A.R. tool at these two post acute care facilities has implications for future practice. With this established feasibility, future work can be done to further evaluate the use of the R.A.D.A.R. tool in the United States. Further evaluation needs to be conducted to identify the impact of the tool on the care of the patient with delirium in post acute care. This study demonstrated the benefit of also providing education and support to nursing staff during the implementation of the R.A.D.A.R. tool.

References

- American Psychiatry Association. (2013). *Diagnostic and statistical manual of mental disorders*, (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Arinzon, Z., Peisakh, A., Schrire, S., & Berner, Y. N. (2011). Delirium in long-term care setting: indicator to severe morbidity. *Archives of Gerontology and Geriatrics*, 52(3), 270-275. doi: 10.1016/j.archger.2010.04.012
- Inouye, S. (1999). Predisposing and Precipitating Factors for Delirium in Hospitalized Older Patients. *Dementia and Geriatric Cognitive Disorders*, 10, 393-400.
- Kiely, D., Marcantonio, E., Inouye, S., Shaffer, M., Bergmann, M., Yang, F., . . . Jones, R. (2009). Persistent delirium predicts greater mortality. *Journal of the American Geriatric Society*, 57(1), 55-61. doi: 10.1111/j.1532-5415.2008.02092.x
- Lacko, L., Bryan, Y., Dellasega, C., & Salerno, F. (1999). Changing clinical practice through research: the case of delirium. *Clinical Nursing Research*, 8(3), 235-250.
- Landis, R., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159-174.
- Leslie, D., Marcantonio, E., Zhang, Y., Leo-Summers, L., & Inouye, S. (2008). One-year health care costs associated with delirium in the elderly population. *Archives of International Medicine*, 168(1), 27-32. doi: 10.1001/archinternmed.2007.4
- Lewin, K. (1974). *Frontiers in Human Dynamics in the Management of Organizations*. New York: Harper & Row.
- Marcantonio, E., Kiely, D., Simon, S., Orav, E., Jones, R., Murphy, K., & Bergmann, M. (2005). Outcomes of older people admitted to post acute facilities with delirium. *Journal of the American Geriatric Society*, 53(6), 963-969. doi: 10.1111/j.1532-5415.2005.53305.x

- Rycroft-Malone, J., Seers, K., Chandler, J., Hawkes, C., Crichton, N., Allen, C., ...Strunin, L. (2013). The role of evidence, context, and facilitation in an implementation trial: implications for the development of the PARIHS framework. *Implementation Science*, 8(28).
- Saxena, S., & Lawley, D. (2009). Delirium in the elderly: a clinical review. *Postgraduate Medical Journal*, 85, 405- 413. doi:10.1136/pgmj.2008.072025
- Stetler, C., Damschroder, L., Helfrich, C., & Hagedorn, H. (2011). A guide for applying a revised version of the PARIHS framework for implementation. *Implementation Science*, 6(99). doi: 10.1186/1748-5908-6-99
- Voyer, P. (2014a). Detecting delirium symptoms with R.A.D.A.R.: from its early development until today and beyond. Manuscript submitted for publication.
- Voyer, P., McCusker, J., Cole, M., Monette, J., Champouz, N., Minh, V., ... Raad, M. (2013). Feasibility and acceptability of a delirium prevention program for cognitively impaired long term care residents: a participatory approach. *Journal of the American Medical Directors Association*, 14(10), e1-e9.
- Voyer, P. (Producer). (2014b). R.A.D.A.R. video training [zip file]. Université Laval. Available from http://www.fsi.ulaval.ca/R.A.D.A.R./?page_id=54
- Voyer, P., Richeard, S., McCusker, J., Cole, M., Monette, J., Champoux, N., Ciampi, A., & Belzile, E. (2012). Detection of delirium and its symptoms by nurses working in a long term care facility. *Journal of the American Medical Directors Association*, 13, 264-271.

Figure 1

R.A.D.A.R. Paper Format

Logo of your institution

R.A.D.A.R.
 Recognizing Active Delirium As Routine
 © Philippe Voyer
www.fsi.ulaval.ca/radar



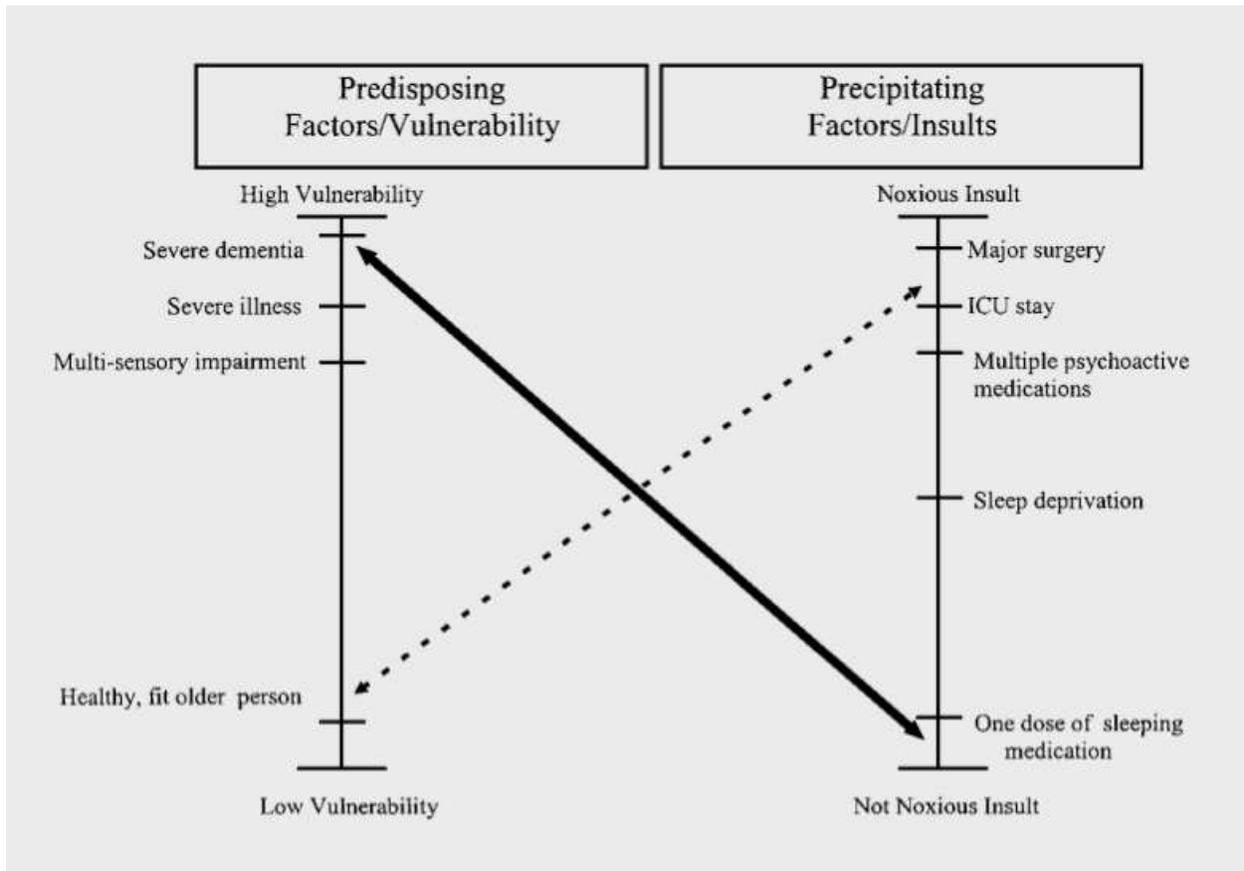
When you gave the patient his/her medication... (Check Yes or No)	Day 1			Day 2			Day 3			Day 4			Day 5			Day 6			Day 7			
	Yes	No	Initials																			
1. ...was the patient drowsy?	08:00																					
	12:00																					
	17:00																					
	HS																					
2. ... did the patient have trouble following your instructions?	08:00																					
	12:00																					
	17:00																					
	HS																					
3. ... were the patient's movements slowed down?	08:00																					
	12:00																					
	17:00																					
	HS																					

Name	Initials	Name	Initials	Name	Initials	Name	Initials

Used with permission (Voyer, 2014b)

Figure 2

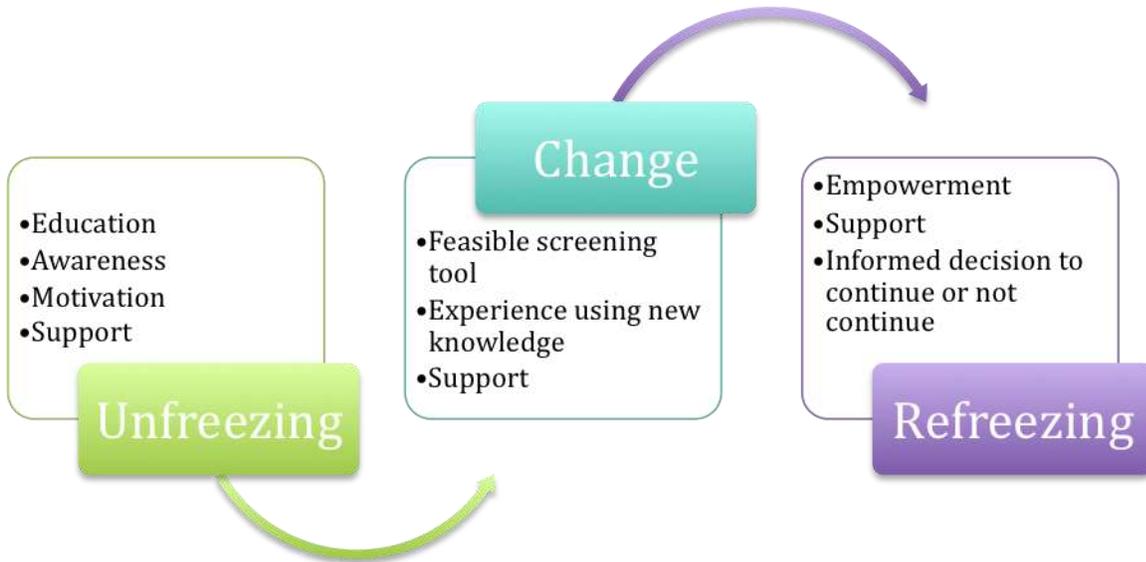
Multifactorial Model of Delirium



Permission pending (Inouye, 1999)

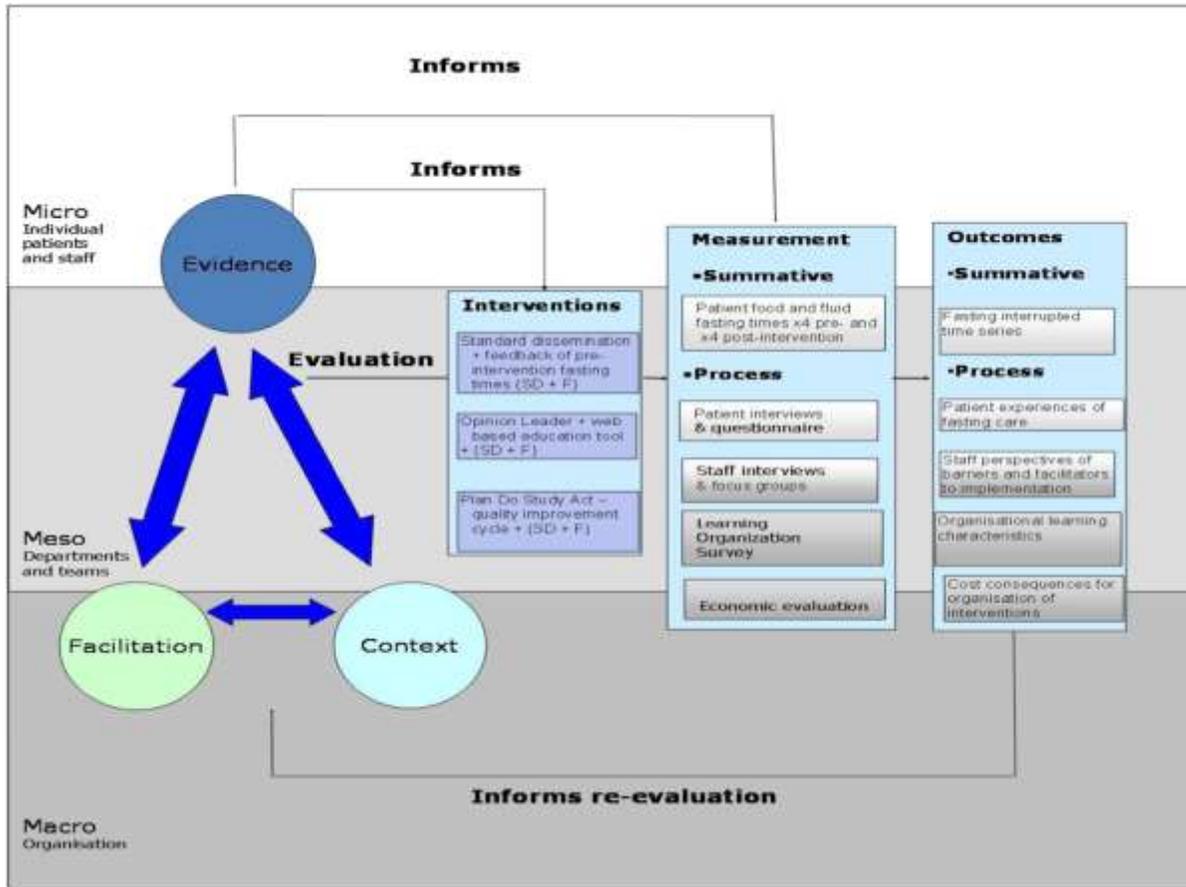
Figure 3

Lewin's Change Theory



Developed from Lewin's Change Theory (Lewin, 1974)

Figure 4
 PARIHS Study Evaluation Framework



Permission pending (Rycroft-Malone et al., 2013)

Figure 5

Study participants

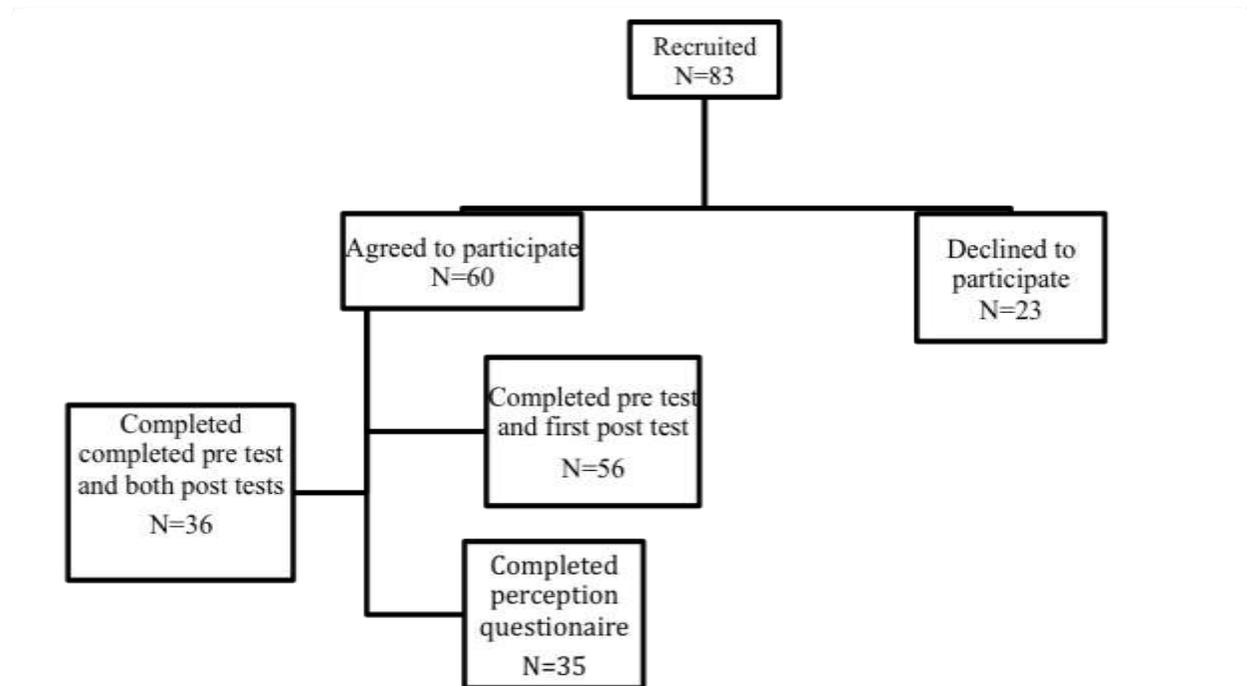


Table 1

Participant Demographics

Nurses' Characteristics	Mean (SD)	N (%)
Nursing facility:		
Trevecca		35 (58%)
Bethany		25 (41%)
Age	39.30 (11.04)	
Gender:		
Male		6 (10%)
Female		54 (90%)
Licensure:		
LPN		42 (70%)
RN		18 (30%)
Experience as a nurse (years)	9.528 (10.11)	
Experience in geriatrics (years)	7.80 (8.00)	
Employment Statues:		
Full time		54 (90%)
Part time		4 (6.7%)
PRN		2 (3.3%)
Nursing Education:		
Diploma		39 (65%)
Associate Degree		14 (23.3%)
Bachelor of Science in Nursing		7 (11.7%)
Master of Science in Nursing		0

Table 2

Repeated Measures ANOVA Tests of Within-Subjects Effects: Delirium Knowledge Assessment

	Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Test	Sphericity Assumed	244.505	2	122.253	24.643	.000	.435
	Greenhouse- Geisser	244.505	1.802	135.676	24.643	.000	.435
	Huynh-Feldt	244.505	1.903	128.476	24.643	.000	.435
	Lower-bound	244.505	1.000	244.505	24.643	.000	.435
Error (Test)	Sphericity Assumed	317.495	64	4.961			
	Greenhouse- Geisser	317.495	57.668	5.506			
	Huynh-Feldt	317.495	60.900	5.213			
	Lower-bound	317.495	32.000	9.922			

Table 3

Repeated Measures ANOVA Pair Wise Comparisons: Delirium Knowledge Assessment

(I) Test	(J) Test	Mean Difference e (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
1	2	-3.606*	.557	.000	-5.014	-2.198
	3	-2.970*	.618	.000	-4.530	-1.409
2	1	3.606*	.557	.000	2.198	5.014
	3	.636	.458	.523	-.521	1.794
3	1	2.970*	.618	.000	1.409	4.530
	2	-.636	.458	.523	-1.794	.521

Based on estimated marginal means

*. The mean difference is significant at the .05 level

b. Adjustment for multiple comparisons: Bonferroni.

Table 4

R.A.D.A.R. Interrater Reliability

Cohen's Kappa

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Measure of Agreement	Kappa	.634	.128	6.866	.000
N of Valid Cases		117			

a. Not assuming the null hypothesis.

b. Using the approximate standard error assuming the null hypothesis.

Table 5

Nurses' Perceptions of R.A.D.A.R.

Do you agree with the following statement	% of agree (n)	Voyer ^a study % of agree (n)
The R.A.D.A.R. items are easy to understand	86% (35)	96% (76)
It's easy to answer the R.A.D.A.R. items by observing the patient during his or her distribution of medication	91% (35)	96% (74)
I have sufficient knowledge to be able to answer the R.A.D.A.R. item	91% (35)	99% (77)
The distribution of medication is a good time to carry out patient observation	91% (35)	94% (74)
Completing the R.A.D.A.R. does not result in an important increase in my workload	80% (35)	96% (73)

This chart includes the results from the questionnaire in this study as well as the study by Voyer (2014b)