Nursing Stroke Education Pathway (NSEP):

A Quality Improvement Project to Enhance Documentation Accuracy and Compliance

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Abstract

Background

Greater than 795,000 people suffer a stroke each year in the United States causing it to be the fifth leading cause of death and leading to an economic burden of $34 billion per year. (Centers for Disease Control and Prevention [CDC], 2020).

Local Problem

A CARF audit of a local inpatient rehabilitation unit noted deficiencies in stroke education and required an action plan to remediate problems.

Purpose

The aim of this quality improvement project was to determine if the system change of implementation of the Nursing Stroke Education Pathway (NSEP) in the EHR improved nurse adherence with use of pathway and increased nurse confidence in education documentation.

Design

Participants for this quality improvement project were a convenience sample of 17 nurses employed at the inpatient rehabilitation unit. The project looked to compare retrospective data with prospective data regarding documentation, provision of patient stroke education, and adherence to NSEP.

Methods

Utilizing the Plan Do Study Act method, the lead project investigator was able to developed the NSEP within Epic to promote standardization and consistency of patient education. Retrospective chart review of patients discharged from the inpatient rehabilitation with a primary diagnosis of stroke were reviewed for accuracy of personal stroke risk factors, co-learner documentation, and stroke booklet provision. Intervention measures were gathered prospectively

following the implementation of the NSEP. A survey on patient education and documentation was completed by participants pre- and post-intervention.

Results

Improvements were seen in accurate documentation of personal stroke risk factors, use of discharge binders, and documentation of co-learners. Time spent on patient teaching, understanding of education mandates, ease of documentation, and clarity of education improved.

Conclusion

Stroke education provided to patients, education documentation, and documentation efficiency are improved using the NSEP. Additional study is needed in areas including the sequence of educational topic provision, educational material layout, and additional locations of study.

Clinical Relevance

NSEP can expand to include additional disease processes such as diabetes, asthma, and chronic obstructive pulmonary disease. NSEP may be incorporated into other healthcare organizations, including hospitals, home health, skilled nursing facilities, and outpatient rehabilitation.

Keywords

stroke, rehabilitation nursing, electronic health records, quality improvement, data accuracy

Key Practice Points

- Findings of this QI project suggest rehabilitation nurses should use stroke education pathways for consistent and accurate documentation.

- QI project findings are consistent with the ability of electronic health records to adapt to the unique educational provision by rehabilitation nurses in specialized centers.

- The findings of this QI project indicate a possible manner for improving stroke education by relieving time constraints for rehabilitation nurses.

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Strokes are the result of cellular death secondary to a failure of blood circulation to the brain due to a blockage within a blood vessel (thrombosis, stenosis, embolism) or bleeding from a ruptured blood vessel (National Institute of Neurological Disorders and Stroke [NINDS], 2020). The neurologic effects of strokes can include dysfunction of emotions, problem solving, judgement, and memory. Visual deficits, sensory changes, hemiplegia, hemiparesis, dysphagia, dysarthria, or aphasia may also be potential stroke consequences (NINDS, 2020).

Greater than 795,000 people suffer a stroke each year in the United States causing it to be the fifth leading cause of death (Centers for Disease Control and Prevention [CDC], 2020). Prior stroke survivors who experience a recurrent stroke make up nearly one-quarter of the yearly stroke totals (CDC, 2020). Associated employment absences, medications, and ongoing medical care resulting from strokes have an economic burden of $34 billion per year in the U.S. (CDC, 2020). Tackling the prevention and effects of strokes to improve population health outcomes can be used to decrease the economic burden (İçağasıoğlu et al., 2017). Goals of Healthy People 2020 include the use of prevention, detection, and risk factor modification of stroke and heart attack to improve cardiovascular health and quality of life (Office of Disease Prevention and Health Promotion [ODPHP], n.d.).

Educational and behavioral interventions should be discussed with patients by medical professionals to improve modifiable risk factors to decrease the risk of stroke (ODPHP, n.d.). The integrated services (including patient education and monitoring), multidisciplinary collaboration, systems of knowledge management, and quality management of organizational interventions can produce clinical benefit (Bridgwood et al., 2018). Learning needs and

readiness should be assessed, individualized, and revised at each stage in a patient's care (Mountain et al., 2020; Cameron, 2013). The information addressed, including areas of ongoing patient needs, should be documented in the patient's electronic health record (EHR) to facilitate knowledge transfer among healthcare staff (Mountain et al., 2020).

Patient education is essential in fulfilling the requirements for the Commission on Accreditation of Rehabilitation Facilities (CARF). CARF is the accrediting body for rehabilitation facilities at over 28,000 locations and incorporates specialty programs, including stroke (CARF, n.d.). CARF stroke specialty programs focus on the unique needs of a stroke patient, including lessening impairments and complications post-stroke, enhancing activity abilities, maximizing quality of life, reducing environmental obstacles, and preventing subsequent strokes (CARF, 2020). CARF requires that nurses and clinicians provide medical management that includes assessing a patient's strengths, weaknesses, and support (CARF, n.d.). Therefore, the standardization of education is necessary to provide error-free documentation to accrediting surveyors. Documentation standardization streamlines patient data and improves EHR effectiveness (Elliott et al., 2018.

Review of Literature

Studies revealed common themes in stroke education including stroke knowledge deficit, program design methodologies to enhance provision of education to stroke patients, and barriers to education (Anand et al., 2017; Ashraf et al., 2015; Benoit et al., 2020; Bridgwood et al, 2018; Cameron, 2013; Chan et al., 2015; Doody et al., 2018; Elliott et al., 2020; Etter et al., 2020; Ing et al., 2015; Jack et al., 2013; Kamalakannan et al., 2016; Livne et al., 2017; Lynch et al., 2015; Mitchell et al., 2017; Mountain et al., 2020; Noah, 2017; Ozakgul & Asti, 2018; Riese et al., 2017; Robinson & Kersey, 2018; Winstein et al., 2016); Vincent-Onabaio & Moses, 2016). The

timing of stroke education to promote optimal understanding and retention is best completed

throughout the patient's hospital stay and using standardized patient education improves patient

outcomes (Riese et al., 2017). Standardizing patient education in EHR improves compliance with

stroke management and decreases documentation time (Etter et al., 2020; Noah & Thomas,

2017).

Stroke Knowledge Deficits

Patients and caregivers report not feeling adequately knowledgeable regarding strokes,

post-stroke care, and poor stroke knowledge as a cause of delay in seeking emergent care (Ing et

al., 2015). Caregivers express concerns regarding inadequate stroke knowledge before patient

hospitalization, feeling inadequately educated before discharge, experiencing difficulty

understanding stroke education, and being given educational information that was not helpful

(Ing et al., 2015). When the caregivers cannot be present for aspects of education, they report

dissatisfaction with education methods and concerns about being inadequately prepared for

future care requirements and changes needed after discharge to home (Ing et al., 2015; Roy et al.,

2015; Kamalakannan et al., 2016). Patients and caregivers continue to have issues with recalling

risk factors even after their stroke, and that knowledge is necessary to lower the risk of having a

secondary stroke (Vincent-Onabajo & Moses, 2016).

A lack of understanding of stroke symptoms, combined with symptoms associated with

other pre-existing conditions, cause patients confusion and lead to delays in seeking treatment

(Ashraf et al., 2015; Soto-Camara et al., 2020). Education sessions improve knowledge of stroke

disease processes in patients who have experienced minor strokes or transient ischemic attacks,

so they are more likely to present earlier for treatment (Benoit et al., 2020; Soto-Camara et al.,

2020). Educational sessions implemented at initial stroke hospitalization allow the patient to

draw from existing knowledge in the face of an acute change in health status (Soto-Camara et al., 2020).

Education Design

Educational program implementation improves caregiver knowledge of care for stroke patients (Anand, Sumeet, & George, 2017). The Re-Engineered Discharge project (Project RED) is a program comprised of 11 steps to achieve the goals that patients discharged from the hospital receive standardized education, care coordination, and follow-up care (Mitchell et al., 2017). Analysis of the project revealed substantial evidence that the 11 steps decrease hospital readmissions, improve patients' understanding of their disease process, and increase feelings of preparedness at discharge (Mitchell et al., 2017). The provision of patient education about this diagnosis throughout a hospital admission is one component of those steps.

Effective education includes information regarding medications, physical care needs, emotional care needs, available resources, and referrals (Winstein et al., 2016). Individualized instruction should consist of interventions presented to patients and caregivers over five to nine sessions (Winstein et al., 2016). The education focus should include caregiver education to improve patient independence, maintain caregiver health, and establish coping mechanisms (Ozakul & Asti, 2018).

The consensus among nurses is that patients should not be provided with excess education before they are ready to learn, during an acute medical change, or during a single session (Roy, Gasquoine, Caldwell, & Nash, 2015). Education should be provided while the patient is hospitalized, during rehabilitation, and weaved into home care and support programs (Ozakul & Asti, 2018).

Education sessions and multidimensional implementation are more effective teaching

methods than providing only printed materials for the patient to review (Lynch et al., 2016).

Patient education methods may include video, counseling groups, and brochures. While all

options improve stroke education understanding in the short-term, none improved long-term

outcomes (Chan et al., 2015). A combination approach to stroke education integrating all

methods of instruction was the only approach shown to help patients retain education three

months after the provision of information (Chan et al., 2015).

Nursing Barriers to Education

A bridge is necessary between nurses, stroke knowledge, their understanding of how

information should be relayed to patients and caregivers, and how education is currently

provided (Roy, Gasquoine, Caldwell, & Nash, 2015). Nursing perception of barriers to providing

patient education includes workload, time constraints, communication difficulties with patients,

lack of educational materials, inadequate knowledge, and organizational culture (Livne,

Peterfreund, & Sheps, 2017). Burnout rates increase when staff report higher stress from lack of

time and feeling overburdened (Robinson & Kersey, 2018). Barriers impact professional

confidence and require a supportive atmosphere to foster growth and learning (Makarem et al.,

2019).

Barriers to Patient Education

Patient barriers to the retention of education include memory deficits during

hospitalization and lack of review of provided education materials (Ing et al., 2015). Most

patients who have experienced an intracranial hemorrhage report not remembering all or some of

their hospitalization (Ing et al., 2015). Patients are also noted to lack knowledge about their

rehabilitation goals, lack of self-motivation and experience difficulty taking ownership of goals,

and do not fully understand the role of nursing in the rehabilitation process (Loft et al., 2017).

Purpose

Synthesizing the knowledge drawn from stroke education, standardized documentation, education design, and barriers to education, and recognizing the need to have an organized and scheduled EHR template containing patient education documentation, an innovative Nursing Stroke Education Pathway (NSEP) was designed for implementation to meet CARF standards. This pathway provided nurses with the ability to review, in a systematic manner, the stroke education that patients and caregivers need to understand such as signs and symptoms of a stroke, activating emergency assistance, stroke risk factors, medications, physical and emotional changes, use of assistive devices, community resources and life after stroke (CDC, 2020; NINDS, 2020; American Stroke Association, n.d.). The aim of this quality improvement project was to determine if the system change of implementation of the NSEP in the EHR improved nurse adherence with use of pathway and increased nurse confidence in education documentation.

Methods

The project was a three-month quality improvement project that compared historical EHR data and prospective data regarding stroke education and documentation. The setting for this quality improvement project was a 15-bed inpatient rehabilitation unit staffed with 17 patient-care nurses located within a not-for-profit hospital located in North Carolina that utilized Epic software for electronic health records (EHR). The participants included 13 registered nurses and four licensed practical nurses practicing on the rehabilitation unit. Participants cared for patients with a primary diagnosis of stroke (ischemic or hemorrhagic) who were admitted to the rehabilitation unit with varying degrees of disability, lengths of stay, and family/caregiver support. During the three-month project implementation period, 31 patients were admitted to the

rehabilitation unit. The ability to provide error-free documentation of education to CARF surveyors has been an area of difficulty for the project site.

Measures

Nurse Adherence with Use of NSEP

The primary outcome of this project was nursing adherence with all components of the NSEP. This was reviewed every two weeks by comparing the rehabilitation length of stay to the pathway documentation to determine if the correct days had been charted. For example, a six-day length of stay should have pathway documentation for day six completed in the EHR. Percentages were calculated for three process measures using retrospective chart reviews and prospective data collection to determine pathway adherence. These process measures included individualized stroke risk factors, documentation of stroke booklet delivery, and co -learner assessment and documentation.

Individualized Stroke Education Documentation

Individualized personal stroke risk factor documentation was defined as nursing documentation of patient education on patient specific individual risk factors in EHR on the day prior to discharge.

Provision of Stroke Booklet to Patients

To fulfill the criteria for correct stroke booklet provision, EHR documentation was required to show that stroke booklets were provided no more than two times in the 24 hours after patient admission. Documentation for the remainder of the patient stay could not include the provision of stroke booklet unless a reason was provided for the need for another booklet. Assessment of stroke booklet documentation evaluated nursing adherence to NSEP.

Co-Learner Documentation

Co-learner documentation was determined to be correct if learning assessments and documentation were recorded in the EHR on at least two people involved in the patient's care. The co-learners could be the patient, family member, friend, or paid caregiver.

Use of Discharge Binders by Nurses

Educational handouts corresponding to the NSEP were encouraged to be placed in a discharge binder after they were reviewed with the patient. The use of discharge binders by nurses was assessed through manual weekly binder reviews.

Nurse Confidence in Education Documentation

The secondary outcome of this project was nurse confidence in documentation using the NSEP. A nursing survey created by Bergh, Johansson, Persson, Karlsson, & Friberg was used to determine "nurses' beliefs and knowledge, education environment, healthcare organization, interdisciplinary cooperation and collegial teamwork, and patient education activities." The survey provided a tool to identify patient education barriers and was modified and used with permission from the authors for this quality improvement project.

Surveys were completed by nurses pre- and post-intervention to gauge their perceived ability to determine patient educational topics, identify patient teaching mandates, document education, individualize documentation, and frequency of discharge binder updates. The survey also assessed the amount of time that nurses reported being able to provide patient education.

Procedure

This project investigated the system change of implementation of the NSEP within EHR to improve education accuracy, documentation, and discharge folder use on an inpatient rehabilitation unit.

While developing the NSEP, a multidisciplinary team was consulted that included the rehabilitation therapy director, rehabilitation nursing director, stroke quality coordinator, Epic ClinDoc credentialed trainer, and Epic builder.

Interdisciplinary collaboration occurred daily between the medical director, physician assistant, nursing, physical therapy, occupational therapy, speech therapy, and social work as required by most insurance companies. Further, the collaboration follows the recommendations of the Commission on Accreditation of Rehabilitation Facilities (CARF). The interprofessional partnership for stroke education was rendered by each discipline while working together to reinforce the information and assist the patient and caregiver understanding and abilities.

Ethical Considerations

This quality improvement project received except classification by the Institutional Review Board (IRB) at Lenoir-Rhyne University, Hickory, North Carolina. The project implementation site required no IRB approval.

Interventions

Retrospective chart reviews were completed to gather data regarding the accuracy of documentation of personal stroke risk factors for patients who were discharged from inpatient rehabilitation for the three months prior to project implementation. Additional data was gathered to determine appropriate documentation of stroke booklet provision, co-learners, and length of time in rehabilitation. The same data was collected during the three months project implementation period to determine accuracy changes.

Nursing staff were required to complete a computer-based learning (CBL) module created to educate nurses on using the NSEP, including editing personal risk factors, assessing learner and co-learner, determining daily education, and updating discharge folders. Ninety-four

percent compliance for CBL completion was achieved.

Two education sessions were held at the change of shift, once at the start of the project and once at the halfway point, to answer all questions and provide additional hands-on training and troubleshooting. Utilizing the Plan-Do-Check-Act Cycle, weekly monitoring was completed to determine barriers and allow further technical and educational feedback and support for the nurses (Mann, 2014). Compliance deficiencies were analyzed once per month with a subsequent action plan involving individual re-education for specific nurses.

A survey, which used questions with a mixture of Likert scale and nominal answers, was completed by nurses pre- and post-intervention to gather data regarding self-assessment of discharge binder use, ability to determine patient education topics, priority of patient education, and time spent on patient education.

Data Analysis

Nurse Compliance with Use of NSEP

Percentages were calculated to the frequency of NSEP compliance accuracy. Accuracy percentages were compared weekly for each nurse.

Individualized Stroke Education Documentation

The statistical mean and standard deviation were calculated from pre- and post-intervention measures. Accuracy percentages of individualized stroke education documentation were calculated and compared after completion of project implementation. The Wilcoxon Signed-Rank Test was used to compare differences in pre- and post-intervention data.

Provision of Stroke Booklet to Patients

The measures of the provision of stroke booklets were used to calculate the mean, standard deviation, and accuracy percentages for pre- and post-intervention data. Differences in

pre- and post-implementation data were compared using The Wilcoxon Signed-Rank Test.

Co-Learner Documentation

Compliance with the documentation of a co-learner was determined through manual review of EHR every two weeks. The Wilcoxon Signed-Rank Test was then used to compare the samples.

Use of Discharge Binders by Nurses

Pre-implementation and post-intervention nursing self-assessment survey results were tabulated for the use of discharge binders. The average score was calculated, and the percentage of change was documented.

Nurse Confidence Education Documentation

The ability of nurses to determine shift education topics was assessed using calculation of mean and percentage of change between pre- and post-intervention data.

Results

Sixty-one percent of participants completed the NSEP in its entirety. Data analysis showed accurate documentation of personal stroke risk factor documentation improved by 67%, stroke booklets provision improved by 59%, and documentation of a co-learner improved by 47% following project implementation (see Figure 1).

The Wilcoxon Signed-Rank Test results showed a statistical difference in the data measurements of accurate personal risk factor documentation, stroke booklet provision, and co-learner documentation with an alpha value of 0.05 and $p < .001$. This indicates that the differences in the pre- and post-implementation data were not due to random variation.

The results of the nursing survey showed a 15% increase in perception of having time for patient teaching during daily work, an 8% increase in documenting nursing activities of patient

teaching in the record, and a 16% increase in evaluation of the teaching. A 25% increase was noted in the nurses' belief that patient teaching has a high priority in their daily work. On average, there was an 11% increase in the percentage of each shift spent on patient education (see Figure 2).

The ability to look at the patient's medical history to determine their individual stroke risk factors without leaving the patient education documentation section of the EHR had an 18% improvement. The perceived level of knowledge on documenting personalized stroke risk factors improved by 10% at the project conclusion. A 21% improvement was seen in the knowledge of how to mark incorrect stroke risk factors as "not applicable." Notably, the ease and clarity of stroke education documentation in the EHR were found to be improved by 30% and 38%, respectively.

From an organizational standpoint, there was a 14% increase in knowing the nursing mandate of patient teaching and information. Nurses' report of providing written or printed information to patients daily improved by 25% after project implementation. This may have contributed to the 40% increase in the percentage of nurses updating or reviewing the discharge binder with education documents.

Discussion

Deficiencies in education knowledge, compliance and documentation accuracy have implications on patient outcomes (İçağasıoğlu et al., 2017; Riese et al., 2017; Chan et al., 2015). During this project, the causes of stroke education compliance and documentation accuracy deficits were noted to be multifactorial as shown in Figure 3. This quality improvement project addressed education deficiencies for staff and patients through the creation of the NSEP which was designed to be used throughout the hospital admission for improved information

preservation (Ozakul & Asti, 2018; Roy, Gasquoine, Caldwell, & Nash, 2015; Winstein et al., 2016).

During this quality improvement project, the analyzed data correlated the quality improvement process of implementing the NSEP into the electronic health record for use by nurses with the adherence to stroke education documentation pathway and nursing satisfaction. Consistent education provided by nursing staff throughout a patient's hospitalization is necessary for knowledge retention and patient/caregiver satisfaction (Ing et al., 2015; Kamalakannan et al., 2016; Roy et al., 2015). The results of this project support prior studies indicating that structured documentation can improve consistencies between education and care provided along with the documentation of those activities (Doody et al., 2018).

The improvement in nursing confidence seen at the conclusion of the project suggests that the NSEP provided a foundation and navigation tool for understanding, providing, and documenting accurate stroke education. The pathway also fosters an environment that is supportive of learning which encourages increased professional confidence (Makarem et al., 2019). Learning fosters the ability to step outside of comfort zones to try something new such as determining patient support systems and determining designated co-learners.

The inability to document a co-learner for some patients due to a lack of social support was an unanticipated issue with the documentation noticed by nursing staff during project implementation. While the goal is that patients accepted to the rehabilitation unit have family or caregiver support available upon discharge, this did not always occur as anticipated due to a lack of family availability or willingness. Documentation of learning needs and readiness of the co-learner did increase despite that issue. Improvement in co-learner documentation supports prior

research indicating that caregivers desire to be present for education (Ing et al., 2015; Roy et al., 2015; Kamalakannan et al., 2016.

This project can be replicated to assess the effect of the NSEP with a larger number of participants to promote improved patient education practices. Replication can be completed on a hospital-wide basis, outsourced to home health care, or incorporated into insurance chronic disease management programs.

Limitations

Limitations for this project include a small sample size, variances in employment status, individual reception of documentation education, and comfort with the use of EHR technologies. Nursing surveys were compared as overall group totals rather than as individual nurse responses. The compliance rate of survey completion post-implementation was lower than pre-implementation, which may skew the results of the nursing survey. The internal validity of the project could have been limited by having only a single person providing documentation education, retrieving, and documenting data and responses. Compliance data was derived from EHR, but it also relied on nurse self-reporting, which could be biased.

Conclusions

The data gathered from this project has shown that the NSEP can improve nursing documentation and accuracy. It also allowed for a more significant time to be spent with the patient to provide education. The NSEP was shown to alleviate nursing confusion on education topics and streamline the provision of educational materials to patients. This is a sustainable process change that can be continued. Updates to the educational material and pathway may be necessary if education requirements change.

Future studies on the sequencing of topics within the NSEP may serve to strengthen any pathway updates. Consistency with education will assist patients in carryover understanding of topics and prevent gaps in patient education. Studies of the NSEP at alternative healthcare sites could be used to test whether the process change would be a sustainable and useful practice over a variety of settings. Additional studies with a larger number of participants would validate the findings that documentation accuracy was improved through use of the NSEP. The improved documentation accuracy could be studied for organizational risk reduction.

References

Agency for Healthcare Research and Quality, Rockville, MD. (2013). *AHRQ Publication No.*

    12(13)-0084. https://www.ahrq.gov/sites/default/files/publications/files/redtoolkit.pdf

Alimohammadlou, M., & Eslamloo, F. (2016). Relationship between Total Quality Management,

    Knowledge Transfer and Knowledge Diffusion in the Academic Settings. *Procedia -*

    Social and Behavioral Sciences, 230, 104-111. doi:10.1016/j.sbspro.2016.09.013

American Stroke Association. (n.d.). Things You Should Know: Your Risk for Stroke and How

    to Be Prepared. Retrieved from https://www.stroke.org/-/media/stroke-files/ais-patient-

    resources/things-you-should-know-your-risk-for-stroke-and-how-to-be-

    prepared.pdf?la=en

Anand, L., Sumeet, S., & George, R. (2017). "Effectiveness of education programme on

    knowledge among caregivers of stroke patients." *International Journal of Nursing*

    Education, *9*(4), 6–11. https://doi.org/10.5958/0974-9357.2017.00088.5.

Ashraf, V.V., Maneesh, M., Praveenkumar, R., Saifudheen, K. & Girija, A.S. (2015). Factors

    delaying hospital arrival of patients with acute stroke. *Annals of Indian Academy of*

    *Neurology, (18)*2. 162-166.

Benoit, C., Lopex, D., Loiseau, M., Labreuche, J., Kyheng, M., Bourdain, F. & Lapergue, B.

    (2020). Impact of a pre-discharge education session on stroke knowledge: A randomized

    trial. *Journal of Stroke & Cerebrovascular Disease, 29*(12). 105272.

    https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105272

Bergh, A. L., Johansson, I., Persson, E., Karlsson, J., & Friberg, F. (2015). Nurses 'Patient

    Education Questionnaire – development and validation process. *Journal of Research in*

    Nursing, *20*(3), 181-200. https://doi.org/10.1177/1744987114531583

Bridgwood, B., Lager, K. E., Mistri, A. K., Khunti, K., Wilson, A. D., & Modi, P. (2018).

Interventions for improving modifiable risk factor control in the secondary prevention of

stroke. *Cochrane Database of Systematic Reviews*.

https://doi.org/10.1002/14651858.cd009103.pub3

Cameron, V. (2013). *"*Best Practices for Stroke Patient and Family Education in the Acute Care

Setting: A Literature Review*". MedSurg Nursing*, 22(1). 51-55.

CARF International. (n.d.). 2020 Medical Rehabilitation Program Descriptions. Retrieved on

July 31, 2020 from http://carf.org/Programs/Medical/

CARF International. (n.d.). Stroke Specialty Programs.

http://www.carf.org/Programs/ProgramDescriptions/Stroke-Specialty-Program/.

Centers for Disease Control and Prevention. (2020). Stroke Facts.

https://www.cdc.gov/stroke/facts.htm

Chan, Y.F., Richardson, L.D., Nagurka, R., Hao, K., Zaets, S.B., Brimacombe, M.B., Bentley,

S., & Levine, S.R. (2015). Stroke education in an emergency department waiting room: A

comparison of methods. *Health Promotion Perspectives, 5*(1), 34-41.

https://doi.org/10.15171/hpp.2015.005

Doody, O., Bailey, M.E., Moran, S. & Creaven, A.M. (2018). An evaluative audit of the

introduction of new nursing document within a specialist palliative care inpatient unit in

Ireland. *Nursing and Palliative Care, 3*(4), 1-4. https://doi.org/10.15761/NPC.1000196

Elliott, L., Weil, J., Dykstra, E., Calinski, R., Schurman, J., & Conn, L. (2018). Standardizing

documentation: A place for everything. *MEDSURG Nursing, 27*(1), 32-37.

Etter, M., Dawood, J., Kafka, A., & Scherer, K. (2020). Standardized documentation improves

stroke guideline compliance (57). *Neurology, 94*(15).

Hasnain, S. S., Jasimuddin, S. M., & Fuller-Love, N. (2016). Exploring Causes, Taxonomies,

    Mechanisms and Barriers Influencing Knowledge Transfer. *Information Resources*

    Management Journal, 29(1), 39-56. https/doi.org/10.4018/irmj.2016010103

İçağasıoğlu, A., Baklacıoğlu, H. Ş., Mesci, E., Yumuşakhuylu, Y., Murat, S., & Mesci, N.

    (2017). Economic burden of stroke. *Turkish journal of physical medicine and*

    rehabilitation, 63(2), 155–159. https://doi.org/10.5606/tftrd.2017.183

Ing, M.M., Linton, K.F., Vento, M.A., Nakagawa, K. (2015). Investigation of Stroke Needs

    (INVISION) Study: Stroke Awareness and Education. *Hawaii Journal of Medicine &*

    Public Health, 74(4): 141-145.

Jack B.W., Paasche-Orlow M.K., Mitchell S.M., et al. (2013). An overview of the Re-

    Engineered Discharge (RED) Toolkit. *Agency for Healthcare Research and Quality,*

    Rockville, MD. https://www.ahrq.gov/sites/default/files/publications/files/redtoolkit.pdf

Kamalakannan, S., Venkata, M. G., Prost, A., Natarajan, S., Pant, H., Chitalurri, N., … Kuper,

    H. (2016). Rehabilitation needs of stroke survivors after discharge from hospital in India.

    Archives of Physical Medicine and Rehabilitation, 97(9).

    https://doi.org/10.1016/j.apmr.2016.02.008

Livne, Y., Peterfreund, I., & Sheps, J. (2017). Barriers to patient education and their relationship

    to nurses 'perceptions of patient education climate. *Clinical Nursing Studies, 5*(4), 65-72.

    https://doi.org/10.5430/cns.v5n4p65

Loft, M.I., Martinsen, B., Esbensen, B.A., Mathiesen, L.L., Iversen, H.K., & Poulsen, I. (2017).

    Strengthening the role and functions of nursing staff in inpatient stroke rehabilitation:

    developing a complex intervention using the Behavior Change Wheel. *International*

Journal of Qualitative Studies on Health and Well-Being, 12(1), 1-15.

https://doi.org/10.1080/17482631.2017.1392218

Lynch, E. A., Cadilhac, D. A., Luker, J. A., & Hillier, S. L. (2015). Education-only versus a

multifaceted intervention for improving assessment of rehabilitation needs after stroke; a

cluster randomised trial. *Implementation Science, 11*(1). doi:10.1186/s13012-016-0487-2

Makarem, A., Heshmati-Nabavi, F., Afshar, L., Yazdani, S., Pouresmail, Z., & Hoseinpour, Z.

(2019). The Comparison of Professional Confidence in Nursing Students and Clinical

Nurses: A Cross-Sectional Study. *Iranian Journal of Nursing and Midwifery Research,

24*(4), 261–267. https://doi.org/10.4103/ijnmr.IJNMR_102_17

Mann, D. (2014). *Creating a lean culture: Tools to sustain lean conversions (3ʳᵈ ed.).* Boca

Raton, FL: Taylor & Francis Group, LLC.

Mitchell, S. E., Weigel, G. M., Laurens, V., Martin, J., & Jack, B. W. (2017). Implementation

and adaptation of the Re-Engineered Discharge (RED) in five California hospitals: a

qualitative research study. *BMC health services research, 17*(1), 291.

https://doi.org/10.1186/s12913-017-2242-z

Mountain, A., Patrice Lindsay, M., Teasell, R., Salbach, N. M., de Jong, A., Foley, N., Bhogal,

S., Bains, N., Bowes, R., Cheung, D., Corriveau, H., Joseph, L., Lesko, D., Millar, A.,

Parappilly, B., Pikula, A., Scarfone, D., Rochette, A., Taylor, T., … Cameron, J. I.

(2020). Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery, and

Community Participation following Stroke. Part Two: Transitions and Community

Participation Following Stroke. International Journal of Stroke, 15(7), 789–806.

https://doi.org/10.1177/1747493019897847

National Institute of Neurological Disorders and Stroke. (2020). Brain Basics: Preventing Stroke.

	https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Preventing-Stroke

Noah, C., & Thomas, L. (2017). Using an electronic health record to standardize documentation

	in an emergency observation unit: OJNI. *On - Line Journal of Nursing Informatics, 21*(1)

	https://search.proquest.com/scholarly-journals/using-electronic-health-record-

	standardize/docview/1984370256/se-2?accountid=13505

Office of Disease Prevention and Health Promotion (n.d.). Heart Disease and Stroke. Healthy

	People 2020. *U.S. Department of Health and Human Services*.

	https://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-stroke

Ozakgul, A.A. & Asti, T.A. (2018). The Effect of Training Provided to Relative of Stroke

	Patients on the Life Quality, Anxiety, and Depressive Symptom Levels of Patients and

	Their Relatives. *The Journal of Neurological and Neurosurgical Nursing, 7*(2): 56-63.

Riese, C., Weiß, B., Borges, U., J., Beylich, A., Dengler, R., Hermes-moll, K., Welslau, M., &

	Baumann, W. (2017). Effectiveness of a standardized patient education program on

	therapy-related side effects and unplanned therapy interruptions in oral cancer therapy: A

	cluster-randomized controlled trial. *Supportive Care in Cancer, 25*(11), 3475-3483.

	http://doi.org/10.1007/s00520-017-3770-0

Robinson, K.E. & Kersey, J.A. (2018). Novel electronic health record (EHR) education

	intervention in large healthcare organization improves quality, efficiency, time, and

	impact on burnout. *Medicine (Baltimore), 97*(38), e12319.

	https://doi.org/10.1097/MD.0000000000012319

Roy, D., Gasquoine, S., Caldwell, S., & Nash, D. (2015). Health Professional and Family

	Perceptions of Post-Stroke Information. *Nursing Praxis in New Zealand*, 31(2), 7–24.

Soto-Camara, R., Gonzalez-Bernal, J.J., Gonzalez-Santos, J., Aguilar-Parra, J.M., Trigueros, R. & Lopez-Liria, R. (2020). Knowledge on signs and risk factors in stroke patients. *Journal of Clinical Medicine, 9,* 2557. doi:10.3390/jcm9082557

Winstein, C. J., Stein, J., Arena, R., Bates, B., Cherney, L. R., Cramer, S. C., … Zorowitz, R. D. (2016). Guidelines for Adult Stroke Rehabilitation and Recovery. *Stroke*, *47*(6), e98–e169. https://doi.org/10.1161/str.0000000000000098
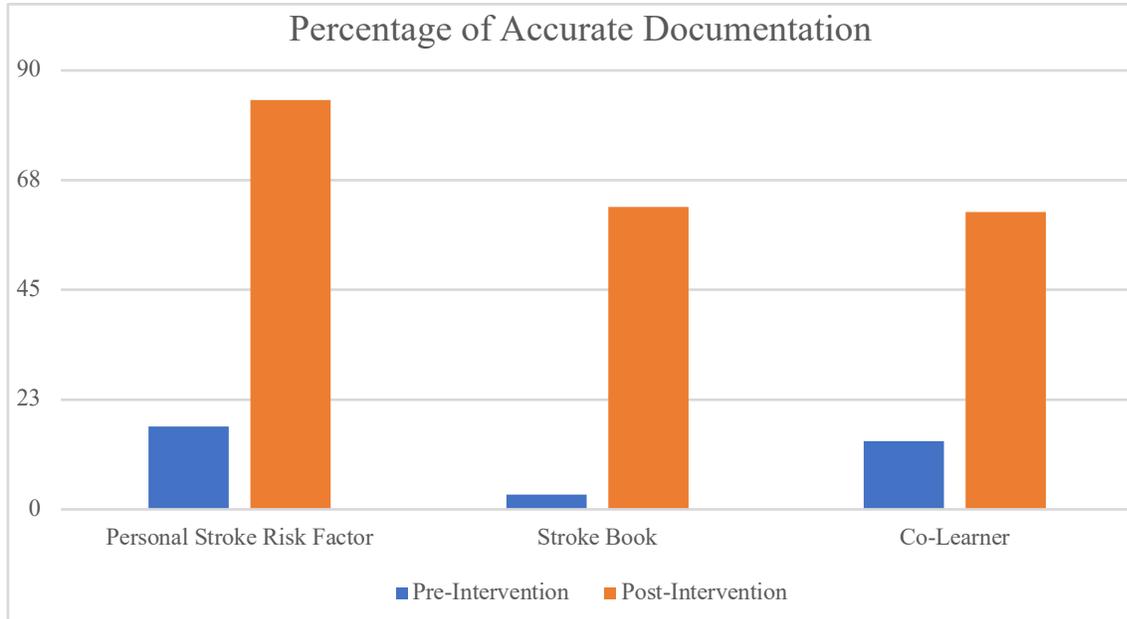
Vincent-Onabajo, G., & Moses, T. (2016). Knowledge of Stroke Risk Factors among Stroke Survivors in Nigeria. *Stroke Research and Treatment*, *2016*, 1–5. https://doi.org/10.1155/2016/1902151
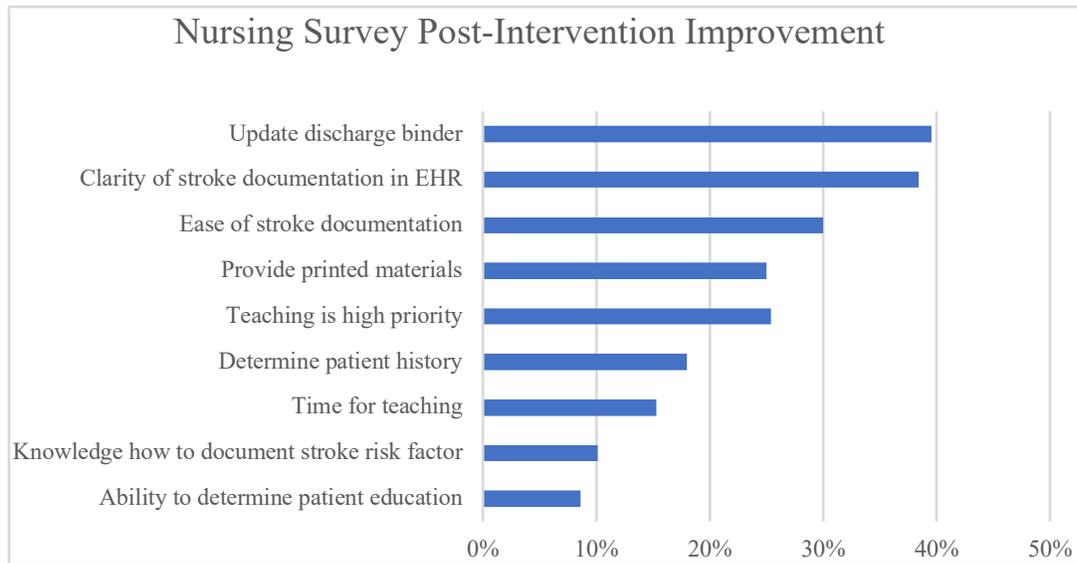
Figure 1

Percentage of Accurate Documentation in Electronic Health Record

Figure 2

Post-Intervention Nursing Survey Improvement

Nursing Survey Post-Intervention Improvement

Figure 3

Stroke Education Compliance Deficits

Leadership
- Unclear guidance on stroke education requirements
- Designation of patient education compliance review and remediation staff
- Knowledge of educational limitations perceived by staff

Staff
- Lack of knowledge on how to print from clinical references section
- Lack of understanding of education topics reviewed by accrediting board
- Lack of knowledge of shift education requirements
- Noncompliance with updating discharge binders
- Difficulty educating caregiver during limited visitation time(s)

Patients
- Rehabilitation time requirements
- Fatigue from increased physical and mental exercises
- Memory deficits associated with diagnosis and/or hospitalization
- Lack of consistent or available caregiver

Policy
- No clear expectations for daily patient education topics

Process
- Lack of guidance on materials to be included in discharge binders
- Lack of time delegated for patient education
- Difficulty determining recently documented education
- COVID-19 visitor restrictions
- Inability to remove "Select All" feature

Equipment
- Computers with low battery life
- Printer drivers not staying saved on computers
- Lack of centrally located education materials

Stroke Education Accuracy and Compliance Rate Deficits