Report

Development and Implementation of Virtual Stroke Nurse Certification: SINN-ECHO Model for Low and Middle Income Countries

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Abstract: *Background:* Patients treated in specialized stroke care units and received discharge education are reported to have better medication adherence and reduced risk of stroke recurrence. Comprehensive stroke care necessitates specialized stroke nurses to provide evidence-based stroke care and education. *Methods:* The Virtual Stroke Nurse Certification Course by SINN-ECHO collaboration was to train and certify nurses working in the neurology- stroke area to improve quality of care. The course curriculum includes nine modules, case presentations, procedure demonstrations, videos, care pathways, care plans, and extensive discussions. The mean pre-test and post-test scores difference was calculated, and 't' test was done for statistical significance. The score difference of more than or three defined as improved knowledge as a result of participation in the course. Chi^2 test was done to find out the association between knowledge improvement and basic characteristics of the participants. *Results:* Recruited 30 participants 74.1% females. The mean age of participants was 37.89±9.04 years and the mean years of experience were 14.80 (9.50) years. The mean years of experience in the neurology or stroke unit was 7.5 (8.02) years. The mean post-test score 19.3 (3.37) was significantly higher ($p<0.001$) compared to pre-test score 16.33 (3.1). Around 60% of the participants have a score difference of more than three between pre-test and post-test. More than 90% of participants agreed that their objectives for participation in the course were met, and it improved their knowledge. The Virtual platform provided by ECHO reduced the feeling of professional isolation of more than 70% of the participants. More than 80% of the participant expressed that they would recommend this course to their colleagues. *Conclusion:* Implementation of Virtual Stroke Nurses Certification Course through ECHO model was proven to effectively improve participants' confidence and competency in stroke care.

Keywords: Stroke Nurse, Virtual, SINN-ECHO, Stroke Nurse Certification, Online Training, Stroke Outcome

1. Introduction

Comprehensive stroke care aims at emergency and acute management of stroke, ongoing care and management, rehabilitation, and follow-up services. It also incorporates intensive caregiver education and training for home care, medication adherence, and risk factor control. Studies have shown that patients treated in specialized stroke care units and received discharge education have high medication adherence and reduced risk of stroke recurrence [1]. Nurses working in acute stroke services have a wide-ranging role that includes assessment, identification, monitoring, rehabilitation, psychological support, and end-of-life care. Comprehensive stroke care requires specialized stroke nurses to provide evidence-based stroke care and education.

The Society of Indian Neuroscience Nurses (SINN) was established and registered as a society in India in 1978. Its vision is to train and empower neuroscience nurses to be recognized as essential members of the health care team to cater to the needs of the public. SINN serves as a platform for sharing knowledge and expertise among nurses who work in neurology and neurosurgery specialty to influence and advance their education and practice to improve the people's health and connect our members with our collective passion, power, and purpose [2].

Reaching out to the neuro nurses working all over India was the major hurdle faced by the SINN. The post covid new normal way of reaching out far through the online platform for knowledge sharing and upgrading skills of health workers in the rural area for better patient care was modelled by the Project ECHO (Project Extension for Community Healthcare Outcomes) from 2003 onwards. This model was developed by Dr. Sanjeev Arora at the Health Sciences Center, University of New Mexico. The main objective was to move knowledge rather than the patients or healthcare providers [3-5]. This project utilized a virtual hub and spoke team model for training and upskilling care providers at faraway places with experts in the field, usually from an academic centre or a quaternary care centre located in the urban area. This project was initially developed to assist the primary care providers of rural Mexico in caring for patients infected with Hepatitis C, but now widely used to train and develop health care workers in managing a variety of other medical conditions in the virtual model [4, 5].

The Society of Indian Neuroscience Nurses (SINN), in collaboration with the Project Extension for Community Healthcare Outcomes (ECHO project), developed and implemented a Virtual Stroke Nurse Certification (VSNC). Studies have shown that floating and lack of specialization can lead to sub-standard care and the chance of medical errors. This course was aimed at enhancing the competency of nurses working all over India; to provide comprehensive, high-quality, evidence-based stroke care to all patients admitted with stroke, to increase the capability of nurses working in peripheries to identify early warning signs of stroke and facilitate early referrals, stroke rehabilitation and follow up at local hospitals. It also aimed to enhance nurses' communication or teaching skills to impart health teaching to the patients and family, which is vital to prevent complications and recurrence of stroke.

2. Methodology

Virtual Stroke Nurse Certification Course was envisioned as a pilot project by the society in 2020, and the education modules were developed by a team of experts in stroke care, neurology, and nursing. The collaboration with the ECHO project provided the virtual platform for this course. The Selected executives from SINN underwent ECHO Immersion Training, a comprehensive program to equip the team for the smooth conduction of the course. Course directors, facilitators, and co-ordinators were selected from SINN executives. An ECHO lead was present throughout the designing and implementation of the course.
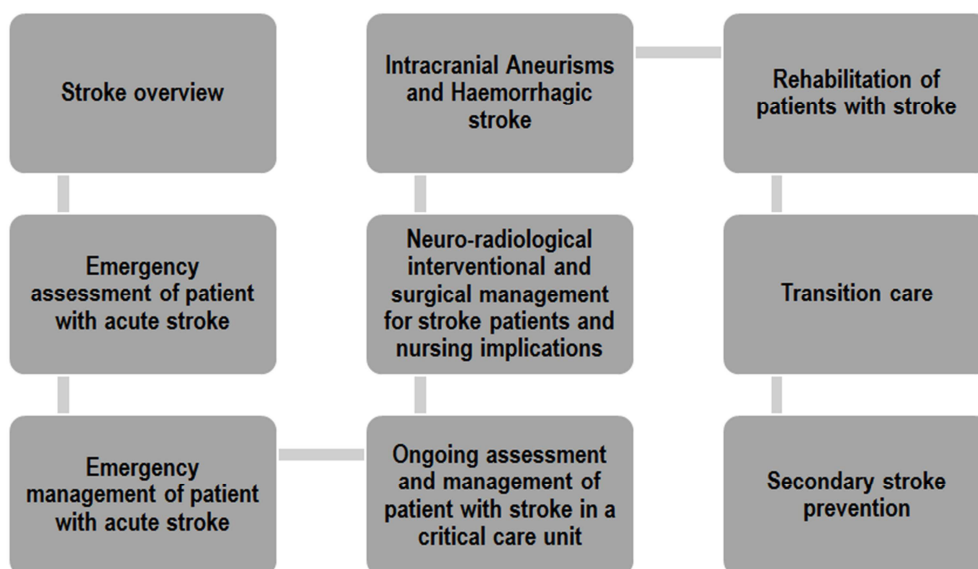

Figure 1. Virtual Stroke nursing certification Course SINN-ECHO: Course Modules.

The course consists of a comprehensive stroke care curriculum with nine modules (Figure 1). The modules were delivered to the participants through SINN-ECHO collaboration model for online training (Figure 2) where the hub team consisted of co-ordinators and experts from SINN, facilitators from ECHO, and expert faculties from selected institutes and spoke consisted of the participants who attended the course. This model ensured the delivery of modules in an effective and efficient way by including online teaching methodologies such as case presentations, procedure demonstrations, videos, care pathways, care plans, extensive

discussions and home assignments. The modules were designed meticulously with topics from basic anatomy and physiology to the most advanced and evidence-based treatment and rehabilitation strategies and nursing practices. We also thoroughly emphasized nutrition, stroke rehabilitation, secondary stroke prevention, home care, and strategies to manage the family caregiver burden. The topics within each module were selected to provide detailed information on medical management and nursing management; the qualities and skills needed for a stroke nurse. The module was circulated among experts in the field for face validity and content validity.
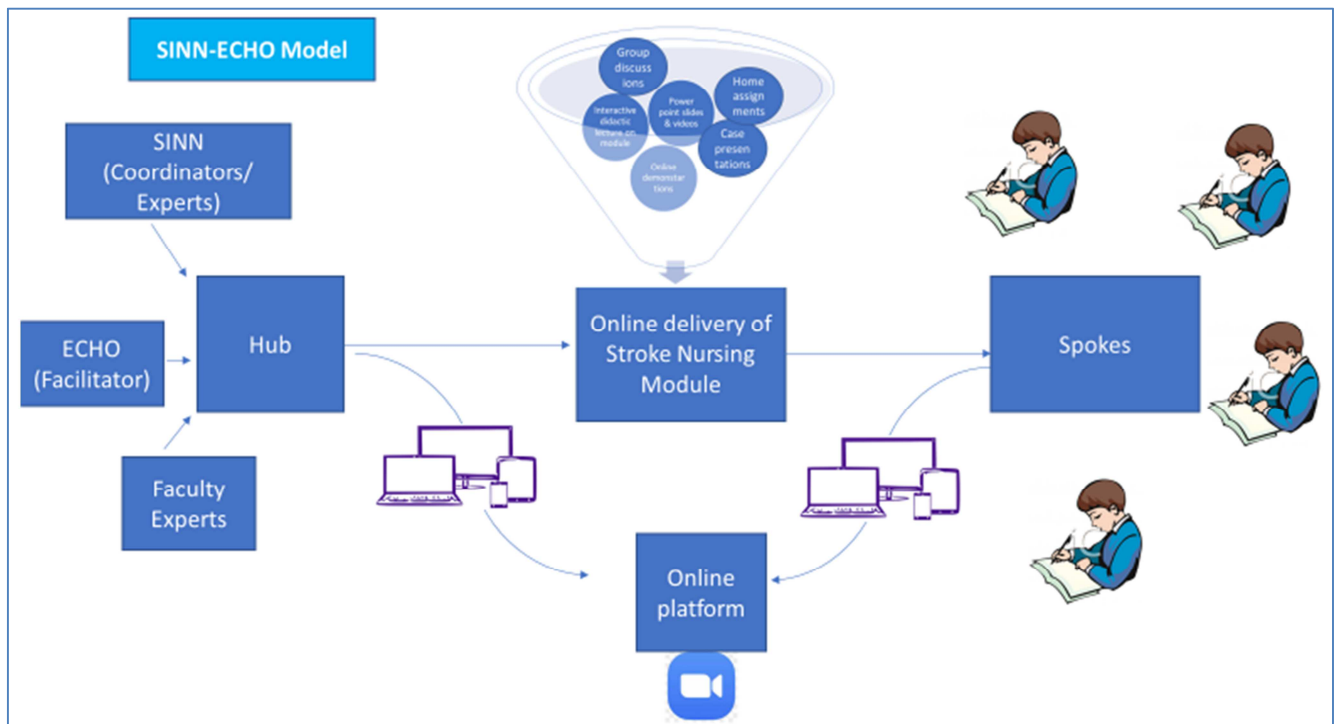

Figure 2. SINN-ECHO collaboration model for online training.

While providing the virtual platform, the ECHO quality control team assured that the sessions were at par with the standards. Sessions were planned weekly for two hours. Each day sessions were begun with a narrative summary of previous sessions. The teaching methods included detailed didactic lectures followed by case presentations and group discussions by the participants. We provided a case template to all the participants to ensure uniformity and complete coverage of patient details. The faculties were selected from central government academic and quaternary care centres with extensive clinical expertise and academic qualifications. The case presentations were followed by discussion, and input for developing standard operating protocols was welcomed.

A pre-test was conducted on the first day, and a post-test was conducted seven days after the last session. The pre-test and post-test included 25 multiple-choice questions. The maximum score was 25. We recruited 30 participants for the course from selected institutions all over India. Enrolment in this course was completely free of cost. Nurses working in the

neurology department or stroke units were recruited. Nurses working in rural areas were given priority. Feedback was collected from all the participants after each module and narrative feedback was collected at the end of the course from those ready to share feedback.

The data on characteristics of the participants and pre-test and post-test scores were entered in excel. Univariate and bivariate analyses were done. The mean pre-test and post-test scores were calculated, and the 't' test was done to find any statistically significant difference. The score difference of more than or three between pre-test and post-test scores is defined as improved knowledge as a result of participation in the course. Ch^2 test was done to find out the association between knowledge improvement and basic characteristics of the participants.

3. Results

Even though we recruited 30 participants, only 27 were able

to complete pre-test and post-test. Three participants were not able to attend all the modules. Around 60% of the participants attended the complete nine modules, 25% attended eight modules, and the rest attended seven modules.

The demographic and professional characteristics of the participants are displayed in table 1. Females constituted 74.1% of the sample. The mean age of participants was 37.89±9.04 years and the mean years of experience were 14.80 (9.50) years. The mean years of experience in the neurology or stroke unit were 7.5 (8.02) years.

Table 1. Participant's characteristics.

n=27			
Variables	**Characteristics**	**Frequency (f)**	**Percentage (%)**
Gender	Female	20	74.1
	Male	7	25.9
Highest academic qualification	Basic Nursing	4	14.8
	Graduation	13	48.1
	Post-graduation and above	10	37
Working Institution	Public	20	74.1
	Private	7	25.9

	Mean±SD	**Minimum-Maximum**
Age (Years)	37.89±9.04	22 - 62
Years of experience	14.80±9.50	0 - 38
Years of experience in neurology/stroke	7.50±8.02	0 -34

3.1. Comparison of Pre-Test and Post-Test Scores

The highest pre-test score was 22, and that of the post-test was 25. The mean post-test score of 19.3 (3.37) was significantly higher as compared to the mean pre-test score of 16.33 (3.1) ($p < 0.001$). Around 60% of the participants have a score difference of more than three between pre-test and post-test. The rest have either no improvement of score in post-test or improvement of fewer than three points.

3.2. Factors Associated with Improvement in Course Participation

The participants' demographic and professional characteristics were assessed in relation to their improvement in course performance. But none of the variables was found to be significantly associated with their performance in course. The participants' characteristics and their course performance are shown in table 2.

Table 2. Participants' characteristics and their course performance.

Variables	characteristics	Improvement		Ch^2	P-value
		Yes	**No**		
Gender	Female	14	6	3.69	0.05
	Male	2	5		
Age	<=30	3	1	0.48	0.49
	>30	13	10		
Qualification	Basic Nursing	3	1		
	Graduation	7	6	0.57	0.75
	Masters and above	6	4		
Institution	Public	13	7	1.03	0.30
	Private	3	4		
Years of experience	<5 years	3	1	4.01	0.14
	5-10 years	1	4		
	>10 years	12	6		
Years of experience in Neurology	5 years	8	5	0.08	0.96
	5-10 years	5	4		
	>10 years	3	2		

3.3. Feedback from Participants

We analysed 120 randomly selected feedback forms out of 222 submitted by the participants throughout the course. More than 90% of participants agreed that their objectives for participation in the course were met, and it improved their knowledge. The Virtual platform provided by ECHO reduced the feeling of professional isolation of more than 70% of the participants. More than 80% of the participant expressed that they would recommend this course to their colleagues.

4. Discussion

We could successfully develop and implement a Virtual Stroke Nurse Certification Course which resulted in significant improvement in the stroke competency of the nurses who participated in the program. Even though we have

enrolled 30 participants only, 27 were able to complete the entire course successfully. The reason for attrition was a mandatory duty in COVID areas, COVID-19 infection to self or family members, which caused an absence to more than three modules. The Characteristics of the participants like age, gender, highest academic qualification, total years of experience, and years of experience in neurology were not associated with their performance in this course. The feedback from the participants showed it was systematically planned, very well organized, and implemented successfully, and helped to improve their knowledge and confidence in caring for patients with stroke.

The course modules were comprehensive and covered all the aspects of stroke care, from prevention to rehabilitation and secondary stroke prevention. The participants had actively participated in the case study presentations and discussions. Our faculty team included neurologists, neurosurgeon, neuro-radiologist, neuro-nurses, physiotherapist, and dietician. Since faculties were experts in stroke care and various bench marking institutions, the discussions were so focused and informative and helped identify the best practices from several institutions. The module was delivered using the principles adopted from various teaching-learning theories. The previous session debriefing was done at the beginning of every session, followed by the expert's session, a case presentation by the participant, group discussion, and recapitulation led by the co-ordinator. The Weekly sessions, case discussions, and home assignments helped improve constructive learning, self-learning, and learning retention. The live sessions, directly from the resource persons to the participants, helped maintaining quality of sessions in contrast to the cascade sessions [6].

Implementing the Virtual Stroke Nurse Certification Course by adopting the ECHO model proved to improve participants' competency in stroke care effectively. The ECHO model was validated as an effective tool in imparting knowledge and increasing knowledge and skill level by previous studies [3]. ECHO model is also proven as effective as in-person training in improving knowledge [7]. We are not recommending replacing in-person training with the virtual mode all the time, but ECHO Model can be adopted as an effective tool when distance and time are crucial in implementing specific essential projects that can be the game-changer in improving the clinical outcome by filling the gap between theory and practice.

The ECHO immersion program for the SINN executives before the organization of this training program helped at all steps from the designing of modules till the completion of the course. The roles and responsibilities of every person involved in the course were planned and described in advance. The ECHO lead who attended each session facilitated proper control of the virtual platform. The facilitators kept track of the discussions and presentations and encouraged active discussion and co-learning. They insisted on virtual learning etiquettes and ensured that a formal teaching-learning decorum was maintained throughout the online sessions. The course co-ordinators and directors ensured topics in each module were assigned to qualified faculties.

The virtual platform provided by the ECHO model is very cost-effective as well. The ECHO model utilizes the Zoom web conferencing platform, which is freely downloadable. The smartphones are universal now; by simply downloading the application, spokes could join the meetings. One of the significant problems associated with in-person training programs is the availability and convenience of the experts. The experts and the spokes in our course participated in the meeting online by staying wherever they are, even while they are out of the station. The virtual platform didn't cause any inconveniences related to travel, away from home, or outside accommodation to the faculty or participants.

Specialization in specific areas of nursing practice often lacks because of floating and task shifting. The extended role of a nurse is the activity concerned with patient care, delegated to a nurse by a doctor in the hospital of community based on the health system need. This creates a lack of job satisfaction in many nurses. In comparison, the expanded role of nurses is the new roles assumed by the nurses within the boundaries of their professional practice. This course provided nurses with an opportunity to specialize in stroke care to improve their self-esteem and professional identity. The Independent and expanded role of nurses essentially contributes not only to the clinical outcome of the patients but also to the nurses' occupational prestige [8]. One systematic review showed that stroke center certification is also associated with increased compliance with recommended protocols and care pathways [9].

Studies have brought out the lack of proper information on risk factor control, medication adherence, and rehabilitation among stroke survivors and their caregivers and which leads to poor risk factor control, medication nonadherence, and inadequate utilization of rehabilitation services [10, 11]. The current physician population ratio in India is 1:1456, whereas the WHO recommendation was 1:1000 [12]. The desired neurologist population ratio is far beyond the requirement. Various studies have shown that the education interventions given by doctors, nurses, or physiotherapists are equally effective in behaviour modification [13, 14]. In areas with limited resources for follow-up care of stroke survivors, specialised nurses can be utilised to screen for risk factor control, provide education on home care and rehabilitation, and appropriate referrals as indicated [10, 11]. The previous study on the effect of nurse-led follow-up clinics on re-admission rates showed no difference in re-admission rates either led by nurses or physicians [15]. Therefore, equipping nurses with the necessary competency to expand their practice is the need of this era, and as a society of neuro nurses, we could do our best in comprehensive stroke care. With good planning and collaboration, it is a feasible intervention for developing countries like India, where the shortage of doctors is a threat to healthcare delivery. The ECHO model can be utilized as a convenient, cost-effective method to train healthcare workers on a large scale within a short period to achieve best practices.

5. Conclusion

Implementation of Virtual Stroke Nurses Certification Course through ECHO model was proven to effectively improve participants' confidence and competency in stroke care. It could negotiate spatial barriers and proved to be cost-effective. The crucial role of specialized nurses, especially in low-resource settings, is vital to augment healthcare delivery, which is essential to achieving sustainable developmental goals.

Ethical Considerations

Consent from individual participants was obtained to use the information for publication.

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