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Sajeesh Kumar
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Editors

Telenursing

Springer

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Series Preface

This series is directed to healthcare professionals leading the transformation of healthcare by using information and knowledge. For over 20 years, Health Informatics has offered a broad range of titles: some address specific professions such as nursing, medicine, and health administration; others cover special areas of practice such as trauma and radiology; still other books in the series focus on interdisciplinary issues, such as the computer based patient record, electronic health records, and networked healthcare systems. Editors and authors, eminent experts in their fields, offer their accounts of innovations in health infor-matics. Increasingly, these accounts go beyond hardware and software to address the role of information in influencing the transformation of healthcare delivery systems around the world. The series also increasingly focuses on the users of the information and systems: the organizational, behavioral, and societal changes that accompany the diffusion of infor-mation technology in health services environments.

Developments in healthcare delivery are constant; in recent years, bioinformatics has emerged as a new field in health informatics to support emerging and ongoing develop-ments in molecular biology. At the same time, further evolution of the field of health informatics is reflected in the introduction of concepts at the macro or health systems delivery level with major national initiatives related to electronic health records (EHR), data standards, and public health informatics.

These changes will continue to shape health services in the twenty-first century. By making full and creative use of the technology to tame data and to transform information, Health Informatics will foster the development and use of new knowledge in healthcare.

Kathryn J. Hannah
Marion J. Ball

Preface

Developments in telenursing are progressing at a great speed. As a consequence, there is a need for a broad overview of the field. This first ever book on telenursing is presented in such a way that it should make it accessible to anyone, independent of their knowledge of technology. The text is designed to be used by *all* professionals, including nurses, physi-cians, all allied health professionals and computer scientists.

In a very short time, driven by technical developments, the field of telenursing has become too extensive to be covered by only a small number of experts. Therefore, this *Telenursing* book has been written with chapter contributions from a host of renowned international authorities in telenursing (see the Table of Contents and the List of Contributors). This ensures that the subject matter focusing on recent advances in telenursing is truly up to date. Our guiding hope during this task was that as editors of multiple chapters we could still write with a single voice and keep the content coherent and simple. We hope that the clarity of this book makes up for any limitations in its comprehensiveness.

The editors took much care that this *Telenursing* book would not become merely a col-lection of separate chapters but, rather, would offer a consistent and structured overview of the field. We are aware that there is still considerable room for improvement and that cer-tain elements of telenursing are not fully covered, such as legal and reimbursement poli-cies. The editors invite readers to forward their valuable comments and feedback to further improve and expand future editions of this *Telenursing* book.

Books on theoretical and technical aspects inevitably use technical jargon, and this book is no exception. Although jargon is minimised, it cannot be eliminated without retreating to a more superficial level of coverage. The reader's understanding of the jargon will vary based on their backgrounds, but anyone with some background in computers, nursing and/or health would be able to understand most of the terms used. In any case, an attempt has been made to define all jargon terms in the Glossary.

This *Telenursing book* has been organised systematically. The format and length of each chapter are standardised, thus ensuring that the content is concise and easy to read. Every chapter provides a comprehensive list of citations and references for further reading. Figure drawings and clinical photographs throughout the book illustrate and illuminate the text well, providing its readers with high-quality visual reference material. Particularly useful features of this text are that each chapter has a summary of salient points for the reader.

The book consists of 17 chapters and begins with a brief introductory chapter explain-ing the basic concepts that are mainstay to telenursing, and subsequent chapters are built upon those foundations, through the experiences from various nations. Within each chap-ter, the goal is to provide a comprehensive overview of the topic. The final chapter covers future directions of telenursing.

This book would not have been possible without the contribution from various people. We acknowledge and appreciate the assistance of all reviewers and Ms. Latika Hans, edito-rial assistant from Bangalore, India. We would like to thank all authors for making this book possible through their contributions and constant support.

Sajeesh Kumar
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Telenursing in an Emerging Economy: An Overview

5

K. Ganapathy and Aditi Ravindra

Abbreviations

ASHA	Accredited Social Health Activist
CAPTOS	Child and Adolescent Psychological Telemedicine Outreach Service
CGFNS	Commission of Graduates of Foreign Nursing Schools
DIY	Do It Yourself
ECG	Electrocardiography
GDP	Gross Domestic Product
ISDN	Integrated Services Digital Network
NRHM	National Rural Health Mission, India
PDA	Personal Digital Assistant
VSAT	Very Small Aperture Terminal
WHO	World Health Organisation

5.1 Introduction

"Watson, come here I want you" said Alexander Graham Bell on 20 March 1876 when he inadvertently spilled battery acid on himself, while making the world's first telephone call. Little did Bell realize that this was also the world's first telemedical consultation.[12] Telemedicine has come a long way since then. Telemedicine, a method by which patients can be examined, investigated, monitored, and treated, with the patient and the health-care pro-vider physically located in different places, is slowly becoming an integral part of the health-care delivery system. Using available hardware and telemedicine software, and establishing connectivity through ISDN lines, broadband, or VSATs (very small aperture terminals), tele-health is making distance meaningless and geography history!![13] Clinical information can be

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transmitted from peripheral medical devices. These include among others a stethoscope, a pulse rate monitor, a blood pressure monitor, and an ECG monitor. This clinical data could initially be evaluated electronically by a nurse at a remote place, making a "telenurse" the first point of contact in the health-care delivery system. Thus, unnecessary traveling of patients and their escorts to health-care centers could be eliminated-.[15] It is in emerging economies,- with limited resources, that telenursing can be predominantly beneficial-. While telemedicine- in some form exists in most countries in the global south, telenursing is still in its infancy. It was Victor Hugo who once remarked "There is nothing more powerful than an idea whose time has come." Perhaps the time is now ripe for telenursing.

The International Council of Nurses (2007) has defined telenursing as the use of telemedicine technology, to deliver nursing care and conduct nursing practice.[34] Telemedicine in this case is defined as *tele* – "distance" and *mederi* – "healing," which encompasses the use of telephone, Internet, sensors, video, remote diagnostics, and/or other interactive technologies that allow interchange between patients and nurses or between nurses and other health-care providers. The Telenursing Working Group of the International Society for Telemedicine and e-Health has endorsed the necessity for the increased adoption of telehealth/telemedicine by nurses to ensure collaboration across disciplines (physicians, therapists, and other health-care team members) and with patients. Telenursing would also "export" nursing knowledge and expertise, using technology to those who need care, in accordance with the appropriate scope of nursing practice in the telenurses' country. Nurses are the single largest group of health-care providers internationally. Therefore, it is crucial that nurses are involved in the development, planning, implementation, and man-agement of telemedicine/telehealth and e-Health programs and policies at all levels.[34]

With telenursing becoming an expanding service in many western countries, the face of standard nursing practice is changing.[5,50] Telenursing offers help by assessing the health sta-tus of a caller.[41] It has often been hypothesized that it is easier to talk to a woman and hence telephone triage by women nurses is becoming well established. McDermott has reported on the reduction of costs and improved access to health care, for rural patients, through telenurs-ing.[48] Henderson has reported on distance emergency care in rural emergency departments using nurse practitioners.[25] With increasing availability of telenursing in an integrated health-care delivery system, legal issues are likely to emerge. Multi-state licensure is one such concern.[8] Studies in Québec to evaluate telenursing outcomes: satisfaction, self-care prac-tices, and cost savings have been reported by Hagan.[22] Satisfaction levels, specific knowl-edge and skills, telenurses' opinions on education in telehealth, their perceptions about the effectiveness of telenursing, and its future impact were reported in a survey of 719 nurses, from 36 countries, working with telehealth.[20] Telenursing in rural areas has also been shown to play an important role in Australia and other developed countries.[21,52]

5.1 Telemedicine in India

The Indian health-care industry is one of the biggest in the world, with every sixth individual on the planet being a consumer.[16] The doctor:population ratio is estimated to be 1:2,000. The Indian government spends only 0.9% of the GDP on health, of which prob-

ably 0.09% reaches the 700 million rural users.[2] Interestingly, the private sector domi-nates, by providing 80% of the health care. Despite establishing more medical colleges and recognizing- several hospitals as post-graduate training centers, lack of doctors, spe-cialists, and nursing and paramedical personnel continues to plague the system. Health care in India is indeed a paradox. While we are becoming the next global health tourism destination,- with world-class centers of excellence, 700 million Indians have no direct access to secondary- and tertiary medical expertise. Mahatma Gandhi once remarked "India lives in its villages." Seventy percent of the population, residing in rural areas, have limited access to medical care as 80% of the doctors live in the metros and the cit-ies. On the other hand, the tele-density of India is growing exponentially. In January 2009 it was 34.5%.[30] In April 2011 it was 71%. Telecommunication infrastructure in rural India is today a reality (the rural tele-density in September 2008 was around 13%), which probably cannot be said about the availability of doctors and nurses.[37] Recognizing this, the public and the private sector have realized that telemedicine could possibly be the solution to bridge the gap in health services between the "haves" and the "have-nots."[13] Today, there are approximately 550 telemedicine units located in suburban and rural India,[18] seeking telemedicine consultation from specialists, in almost 70 tertiary care hospitals. It can be assumed that about half a million teleconsultations have proba-bly taken place in India, the majority being in teleophthalmology.[4,49] The Apollo Telemedicine Networking Foundation, the largest and oldest multi-specialty telemedi-cine network in South Asia, has carried out about 68,000 teleconsultations in about 40 different specialties given to about 100 peripheral centers in India and overseas.

Fig. 5.1 Nurse transmitting clinical data from a village, through wireless-enabled van to a city-based consultant

Fig. 5.2 Advertisement of a nurse station at an Apollo pharmacy in India

A unique method of reaching out to the masses in India is through the use of well-equipped "hospital-on-wheels." This has been most successful in the field of ophthalmology. Trained nursing assistants and nurses are deployed to towns to deliver ophthalmic care, supervised by consultant ophthalmologists from the metros and the bigger cities. VSATs, 3G, WiMax, and broadband are used for communication.[4,49] Nurse practitioners on hospital-on-wheels are the first level of contact with the patient (Fig. 5.1). This system is now increasingly being used in pediatrics, mental health, and diabetology. Telenursing in the field of mental health has also been described.[59]

The Apollo Hospitals Group, the largest health-care provider in Asia, has recently introduced an innovative program of making available nurses in selected Apollo pharma-cies to facilitate health care (Fig. 5.2). It is proposed to link some of these pharmacies with the tertiary care center (Apollo Hospitals) through a telemedicine setup. A nurse stationed at the pharmacy would provide clinical information to a doctor and request for assistance. Trial runs have been carried out using a domiciliary telemedicine equipment to monitor blood pressure, ECG, and pulse rate of post-stroke patients. However, doctors were pre-ferred at the hospital end instead of nurses. In March 2011 a 24/7 medical response center performing tele triage functions, predominantly saffed by nurses has commenced.

Table 5.1 Distribution of health service providers and nurses in WHO regions and the world

WHO region	All health service providers	Nurses	Nurses as % of health service providers
Africa	136,000	773,368	56.87
Americas	12,460,000	4,053,504	32.53
South-east Asia	4,730,000	1,338,029	28.29
Europe	11,540,000	6,526,461	56.56
Eastern Mediterranean	1,580,000	631,527	39.97
Western Pacific	7,810,000	2,903,286	37.17
World	39,470,000	16,226,175	41.11

Source: The World Health Report (2006)

5.2 Nursing Care in India

Out of the 2,300 institutions recognized by the Nursing Council of India to train nurses, 660 produce graduate nurses and 77 produce post-graduate nurses.[33] The Nursing Council of India needs to incorporate telenursing into the mainstream of nursing education and nursing care. This alone will give a fillip for the growth and development of telenursing. The nurse-per-bed ratio in India is 0.87 as against the world average of 1.2, based on WHO data. With attrition rates increasing, an acute scarcity of trained nurses is anticipated. Setting up of nurs-ing colleges along with hospitals and integrating telemedicine technology into the nursing profession appear to be a plausible solution.[31] The first telenursing training center set up in Mysore, a city in southern India, is expected to increase efficiency and provide opportunities to medical and paramedical staff to enhance their knowledge.[31] Of the 30,000 nursing gradu-ates produced every year, many take the CGFNS (Commission of Graduates of Foreign Nursing Schools) examination and obtain lucrative offers from abroad.[36] It is estimated that 2.4 million nurses will be required in India in 2012; however, a shortfall of 50% is expected. A 2006 World Health Report indicates that although the absolute numbers are very low, nurses constitute a sizeable portion of all health service providers. The ratio is particularly high in Africa as can be seen from Table 5.1.[38]

5.3 Telenursing in India: The Way Forward

Nurses constitute the backbone of health-care systems. It is important that they be trained to increase their reach and provide their expertise hundreds of miles beyond where they reside. When there exists an acute shortage of qualified nurses in urban India, it will be difficult to identify "telenurses." A telenurse needs to be a multi-faceted personality with excellent com-munication skills, be tech savvy, and have quick thinking ability with technical knowledge.

For telenursing to take off in India, awareness in the nursing fraternity is essential. Recently, a few nursing training centers have introduced telemedicine in their teaching program. For a successful outcome, evangelists to espouse and champion the cause are vital. It will take more time for traditional India to accept a telenurse – an individual competent to take inde-pendent clinical decisions. Telenursing involves sharing of clinical information with other professional colleagues, including national and international experts. Continuing nursing education programs will be easier. Clinical skills can be learned and practiced through patient simulation. Telenursing provides opportunities for experienced nurses to share their experi-ence, without enduring the physical burden of "floor" nursing in hospitals.

A major incentive would be adequate compensation. In an Indian setting, it may not be easy to conceive and implement an innovative, self-sustaining, revenue-generating business model catering to all stakeholders. Development of a business model and integration of strat-egies with government plans are necessary. Issues such as driving force, target market, and expense sharing need to be examined in detail from both ideal and realistic points of view. Implementation strategies are crucial in ensuring that telenursing achieves the critical mass, essential for a successful take-off. Medical specialties where telenursing can function need to be identified. The necessity for verifying telenursing as a cost--effective health-care delivery system has been discussed.[63] Yun and Park, in a review of telenursing in Korea, classified other issues as systematic, economic, societal, and technical.[64] Development and regulatory challenges have to be considered.[23] Legal issues are equally important. The role of multi-state registration to support nursing practice is described by Clark et al.[10] For a country like Australia, with a population of less than 250,000, having eight individual nurses acts proba-bly suggests over regulation which may not be totally warranted.[10] However, for India, with the population reaching 1.2 billion, the need for stringent regulatory processes is eclipsed by lack of qualified health professionals. As individual state licensure for nurses is not manda-tory at present, legal and regulatory issues will not be a deterrent.

5.4

Homecare

A distinctive telenursing application is homecare. Systems that allow home monitoring of blood pressure, blood glucose, respiratory peak flow, and weight measurement are now freely available in advanced countries. Immobile patients, those who live in remote or difficult-to-reach places, and those with chronic ailments (including chronic obstructive pulmonary disease, [61] diabetes,[43,44] congestive heart disease, or Parkinson's or Alzheimer's disease) could stay at home. They could be "visited," monitored, and assisted regularly by a nurse via videoconferencing. Wounds, ostomies, and immediate post- surgical situa-tions can be electronically managed. Using telenursing, a nurse in the west electronically visits 12–16 patients instead of 5–7 per day. Call centers are operated by managed care organizations and staffed by registered nurses who act as case managers or perform patient triage, information, and counseling, as a means of regulating patient access and flow. This decreases visits to emergency rooms. Patient education and initial evaluation of results of medical tests and examinations could also be done. India, in the last few years, is witnessing well-trained qualified nurses providing care in a domiciliary setting. Traditionally in India, patients are more comfortable with formal nursing care than virtual

visits. The scenario in many advanced countries is different. Through interactive video systems, patients can contact on- call nurses at any time. Instructions can be obtained on how to change a wound dressing, take an insulin injection, or manage an increasing shortness of breath. With increasing availability of "across-the-counter" home monitoring devices, blood pressure,- pulse, and glucose monitors, the phrase DIY or "Do It Yourself" is becoming a slogan in health care. Nurses can provide virtual homecare, through accurate and timely information and support online. This ensures continuity of care. Allen et al. have demonstrated that telenursing visits could substitute for a substantial fraction of on-site home nursing visits. In the USA, employment in home health care is expected to increase 36% or more over the next 7 years. Forty-six percent of on-site nursing visits could be replaced by virtual visits.[1] Telenursing can reduce duration of hospital stays. In Denmark, hospital admissions and "bed days" reduced to 50% when nurses in a backpain clinic contacted patients telephonically. In another instance, in Iceland, a telephone-based nursing intervention supports mothers with difficult infants to reduce fatigue and distress. Innovative programs use telenursing to allow women with pregnancy-induced hypertension to remain at home.

The necessity of home telecare systems is growing owing to increase in chronic diseases, aged population (living alone), and medical expenses. It has been documented that a video visit is more cost effective in a geriatric population.[3,9] The progress of a post-operative wound or bed sore can be evaluated by a nurse through a digital photograph uploaded at home. Intelligent telephones can monitor vital functions from a distance. A nurse through a video surveillance unit can watch an elderly person,[60] instruct about taking pills, and even ensure that the refrigerator and pantry is adequately stocked. Borchers and Kee have opined that inexpensive domiciliary telenursing provides a method for early intervention.[7] Several publi-cations have emphasized the facets of technology in home health care.[40,47,53] In Italy, special-ized services for general practitioners, home telenursing for chronic patients, tele-diagnosis for palpitations, and call center services for hospitals are provided by many agencies, as in the Boario Home Care project.[55] Qualitative evaluation of an analogue videophone linked with a physiological monitoring device, in a home setting in Liverpool, was reported by Hibbert et al.[26] Clinical situations most amenable to telenursing included chronic airway obstruction and joint disorders. In a study in Belfast, two observers estimated that 14% of home nursing visits could be done via telemedicine, even with relatively low-quality compressed video.[62]

A call center triage is another important component in telenursing. On receiving a call, a trained nurse is expected to efficiently prioritize enquiries and get a physician's help when required. Studies are in progress, to understand how telenursing can be integrated into general practice.[58] Twenty-four-hour access to free telephone advice and symptom triage is available to residents in Australia and New Zealand. Nurse-led telephone help-lines across the UK have resulted in a necessity for the development of new nursing skills. Telephone nurses in Sweden assess care needs and provide advice, support, and information, recommending and coordinating health-care resources. New biomedical competence, an aging population, and constrained resources have made priority setting a primary concern. In an interesting study, Leclerc et al. cautioned that telephone health-line providers should be aware that many callers interpreted advice in a manner different from that intended.[45] Quality control interventions to reduce miscommunication and ensure better understanding will con-tribute to more effective service. Telephone-assisted problem solving by nurses, nurse-mediated SMS health alerts for vaccines, medication reminders, health checkups, health monitoring, diet, etc. are also part of the services offered in a call center.

Telenurses should be multi-faceted and competent in pharmacology, psychology, and communication. Telenurses also need training in handling overt or covert power messages based on male superiority. Training in technology to improve efficiency and recognition of the worth of *hands-on* nursing have been emphasized.[57] Telenurses at call centers often use decision aid software programs to offer triage recommendations and self-care advice to the general public.[27] At present sensitive decision-aid systems need to be developed exclu-sively for the global south.

With the exponential increase in telecommunications in emerging economies,[37] estab-lishing telenursing call centers per se would not pose major difficulties. However, in the current cultural milieu, acceptability of this service could be an issue. Who would pay for such a service? Who would be legally responsible if errors are committed? Absence of uniform health standards further compounds the issue. The presence of 36 official lan-guages, varying literacy levels, and diversity in social, economic, technological, and tele-communication development contributes to the complexities involved in introducing telenursing call centers in India. Telephone nursing has raised ethical questions. Conflicting values, norms, and interests are often encountered. In a multi-cultural society, ethical issues offer a challenge.[28,32]

5.5 Telenursing in Medical Specialties

Review of literature indicates that telenursing today is slowly being adapted to suit various medical specialties. With diabetes becoming endemic in most countries of the world, help-ing the diabetic patient to manage his/her condition is critical. In a study from Japan, sig-nificant improvements in levels of blood glucose and glycosylated hemoglobin (HbA(1c)) and in the patient's blood pressure were documented, when a telenursing system was used.[42] A child and adolescent psychological telemedicine outreach service (CAPTOS) started as early as 1997 has now shown to enhance the nursing care of young people with a complex mixture of psychological and physical health problems.[52]

Nursing care forms the *sine qua non* of hospice care, being a type and philosophy of care which focuses on the palliation of a terminally ill patient's symptoms. Telenursing is increasingly being used in hospice care. NurseLine, a telenursing system in hospice pallia-tive care, achieved improved symptom management, decreased visits to emergency rooms, and provided enhanced support for families, caring for loved ones at home. Maximizing technology to create systems that improve access to care and are sustainable was one of the lessons learned.[51] In one study, it was documented that 64.5% of home hospice nursing visits could be substituted with a video phone. This reduction in personal visits signifi-cantly reduces the costs.[11]

Cardiology is an area where telenursing is deployed. Reports on effectiveness of struc-tured, post-discharge, telephone intervention for patients recovering from bypass surgery and their partners revealed that timely reassurance and health promotion were possible.[24] One-lead electrocardiogram monitoring and nurse triage in chronic heart failure have been used in home telenursing.[54] Post-hospitalization telenursing care has shown to reduce

readmission in cases of congestive heart failure.[39] Nurse-mediated PDA-supported -decision support tools for cardiac tele-triage have recently commenced.

Oncology: In an outpatient management study of patients with cancer with new osto-mies, patients believed that nurses had increased understanding of their problems. Patients were more comfortable communicating with nurses. Though telemedicine was preferred to waiting for face-to-face visits, the latter was still felt to be important.[6,46] Oncology nurses are best suited to transfer their expertise to patients and their health-care providers through telehealth technologies.[56]

5.6 Telenursing: A Different Approach for Emerging Economies

One of the key components of the Indian National Rural Health Mission is to provide a trained female community health activist in every one of the 600,000 villages in the country. Designated *ASHA* or *accredited social health activist*, she is selected from the village itself and is accountable to it. The ASHA is trained to work as an interface between the commu-nity and the public health system.[29] In pilot studies, the ASHA has been provided with a wireless PDA to establish contact with health-care personnel in the chain of command. This form of "telenursing" using innovative hi-tech communications for the field worker at the grass root level helps address the specific local challenges. Orissa, a less developed state in southeastern India, has effectively demonstrated that technology could be used in the col-lection of health data at the ground level. Under the Integrated Child Development Scheme, one *Anganwadi* worker is allotted to a population of 1,000. The duty of an Anganwadi worker is to ensure that regular health checkups, child development, adequate nutrition, immunization, health education, and non-formal pre-school education are made available. The data are entered in a PDA. With a click of the mouse, one can access the details of an Anganwadi worker and the children under her care, even if she is in the remotest corner of the state. However, not all hamlets in Orissa have an Anganwadi. This exercise in connec-tivity and the dissemination of information is becoming wireless. Mobile handheld units are being used in this project as data harvesting points for NRHM at the grassroots level.[19,35]

5.7 Issues and Challenges in Implementing Telenursing in an Emerging Economy

- Creating awareness and jobs and reducing brain drain.
- Acceptance of "telenursing" by nurses, society, patients, family physicians, specialists, administrators, and the government.
- Designing cost-effective appropriate need-based hardware, software, and connectivity for telenursing.
- Standardizing, certifying, authenticating, and registering telenursing units so that mini-mum safe standards are uniformly adopted.

- Introducing telenursing in the nursing curriculum and training the trainers.
- Recognition of telenursing by the National Nursing Council.
- Adequate reimbursement to make the scheme attractive and viable.
- Getting grants, subsidies, and waivers to introduce this in suburban and rural areas.

5.8 Conclusions

The challenge today is not confined to overcoming technological barriers, insurmountable though they may appear.[17] The take-off problem facing telenursing is legion. It is our dream and hope that within the next few years there will be telenursing units in many parts of India. Eventually a nurse should only be a mouse-click away!![14] Improbable Yes!! Impossible No!! For this to happen, a critical mass must be reached. What is required is not implementing better technology and getting funds but changing the mindset of the people involved. Awareness should permeate throughout society. Real growth will take place only when soci-ety realizes that distance is meaningless today and that telenursing can bridge the gap between the "*haves*" and the "*have-nots*," at least in so far as access to health care is concerned.

5.9 Summary

- Telenursing is the use of telemedicine technology to deliver nursing care and conduct nursing practice.
- A telenurse needs to be a multifaceted personality with excellent communication skills and quick thinking ability with technical knowledge.
- Telenursing today is slowly being adapted to suit various medical specialties. It is used in pediatrics, mental health, diabetology, cardiology, oncology, and hospice care.
- The tele-density of India is growing exponentially. Today, there are many telemedicine units located in suburban and rural India, seeking telemedicine consultation from special-ists, and also about half a million teleconsultations have already taken place in India.
- One of the key components of the Indian National Rural Health Mission is to provide a trained female community health activist in villages, who is designated as ASHA and is trained to work as an interface between the community and the public health system.

References

1. Allen A, Doolittle GC, Boysen CD, et al. An analysis of the suitability of home health visits for telemedicine. *J Telemed Telecare*. 1995;5:90-96.
2. Annual Report 2007–2008. Ministry of Health & Family Welfare, Government of India. http:// mohfw.nic.in/.

3. Arnaert A, Delesie L. Telenursing for the elderly. The case for care via video-telephony. *J Telemed Telecare*. 2001;7:311-316.
4. Bai VT, Murali V, Kim R, et al. Teleophthalmology-based rural eye care in India. *Telemed J E Health*. 2007;13:313-321.
5. Biedrzycki BA. Telenursing: nursing care without geographic boundaries? *ONS News*. 2005;20:9-10.
6. Bohnenkamp SK, McDonald P, Lopez AM, et al. Traditional versus telenursing outpatient management of patients with cancer with new ostomies. *Oncol Nurs Forum*. 2004;31:1005-1010.
7. Borchers L, Kee CC. An experience in telenursing. *Clin Nurse Spec*. 1999;13:115-118.
8. Brent NJ. Emerging legal issues for nurse managers. *Semin Nurse Manag*. 2000;8:220-225.
9. Chan WM, Woo J, Hui E, et al. The role of telenursing in the provision of geriatric outreach services to residential homes in Hong Kong. *J Telemed Telecare*. 2001;7:38-46.
10. Clark RA, Yallop J, Wickett D, et al. Nursing sans specialize: a three year case study of multi-state registration to support nursing practice using information technology. *Aust J Adv Nurs*. 2006;24:39-45.
11. Doolittle GC, Whitten P, McCartney M, et al. An empirical chart analysis of the suitability of telemedicine for hospice visits. *Telemed J E Health*. 2005;11:90-97.
12. Ganapathy K. Telemedicine and neurosciences in developing countries. *Surg Neurol*. 2002;58:388-394.
13. Ganapathy K. Telemedicine in the Indian context. An overview. In: *Establishing Telemedicine in Developing Countries: From Inception to Implementation. Studies in Health Technology and Informatic*, vol. 104. Amsterdam: IOS Press; 2004:178-181.
14. Ganapathy K. Role of telemedicine in neurosciences. In: *Establishing Telemedicine in Developing Countries: From Inception to Implementation. Studies in Health Technology Informatics*. Amsterdam: IOS Press; 2004.
15. Ganapathy K. Telemedicine in India. Asia Pacific Biotech News 10:15. 2006. http://www.asiabiotech.com/readmore/vol10/1019/telemed.html.
16. Ganapathy K. Telehealth: yesterday, today and tomorrow. *Computer Soc India Commun*. 2007;30(11):5-11.
17. Ganapathy K, Ravindra A. *Telemedicine in Neurosciences in Current Principles and Practice of Telemedicine and e-Health*. Amsterdam: IOS Press; 2008:149-169.
18. Ganapathy K, Ravindra A. Healthcare for rural India: is telemedicine the solution? *J E Health Technol Appl*. 2007;5:203-207.
19. Ganapathy K, Ravindra A. mHealth: a potential tool for health care delivery in India. 2008. Available at: http://www.ehealth-connection.org/files/conf-materials/mHealth_A%20potential% 20tool%20in%20India_0.pdf.
20. Grady JL, Schlachta-Fairchild L. International telenursing survey. *Comput Inform Nurs*. 2007;25:266-272.
21. Guilfoyle C, Perry L, Lord B, et al. Developing a protocol for the use of telenursing in community health in Australia. *J Telemed Telecare*. 2002;8:33-36.
22. Hagan L, Morin D, Lépine R. Evaluation of telenursing outcomes: satisfaction, self-care prac-tices, and cost savings. *Public Health Nurs*. 2000;17:305-313.
23. Hardin S, Langford D. Telehealth's impact on nursing and the development of the interstate compact. *J Prof Nurs*. 2001;17:243-247.
24. Hartford K. Telenursing and patients' recovery from bypass surgery. *J Adv Nurs*. 2005;50: 459-468.
25. Henderson K. TelEmergency: distance emergency care in rural emergency departments using nurse practitioners. *J Emerg Nurs*. 2006;32:388-393.
26. Hibbert D, Mair FS, Angus RM, et al. Lessons from the implementation of a home telecare service. *J Telemed Telecare*. 2003;9:55-56.

27. Holmström I. Decision aid software programs in telenursing: not used as intended? Experiences of Swedish telenurses. *Nurs Health Sci*. 2007;9:23-28.
28. Holmström I, Höglund AT. The faceless encounter: ethical dilemmas in telephone nursing. *J Clin Nurs*. 2007;16:1865-1871.
29. http://mohfw.nic.in/NRHM/asha.htm.
30. http://www.domain-b.com/industry/telecom/20090221_indias_phone_connections.html.
31. http://www.hindu.com/2008/01/22/stories/2008012250520200.htm.
32. http://www.ihe-online.com/index.php?id=2695.
33. http://www.indiannursingcouncil.org/pdf/statistics-2006.pdf.
34. http://www.isft.net/cms/index.php?telenursing.
35. http://www.rediff.com/money/2007/apr/30school.htm.
36. http://www.rediff.com///news/2006/jul/05spec.htm.
37. http://www.trai.gov.in/WriteReadData/trai/upload/StudyPapers/12/studypaper16dec08.pdf.
38. Atlas: Nurses in Mental Health 2007 (2007) © World Health Organization
39. Jerant AF, Azari R, Martinez C, et al. A randomized trial of telenursing to reduce hospitaliza-tion for heart failure: patient-centered outcomes and nursing indicators. *Home Health Care Serv Q*. 2003;22:1-20.
40. Johnston B, Heeler J, Dueser K, et al. Outcomes of the Kaiser Permante tele-home health research project. *Arch Fam Med*. 2000;9:40-45. http://telemedtoday.com/articlearchive/articles/Tele-homeHealthII.htm.
41. Kaminsky E, Rosenqvist U, Holmström I. Telenurses' understanding of work: detective or educator? *J Adv Nurs*. 2009;65(2):382-390.
42. Kawaguchi T, Azuma M, Ohta K. Development of a telenursing system for patients with chronic conditions. *J Telemed Telecare*. 2004;10:239-244.
43. Kim HS, Kim NC, Ahn SH. Impact of a nurse short message service intervention for patients with diabetes. *J Nurs Care Qual*. 2006;21:266-271.
44. Larsen BS, Clemensen J, Ejskjaer N. A feasibility study of UMTS mobile phones for support-ing nurses doing home visits to patients with diabetic foot ulcers. *J Telemed Telecare*. 2006;12:358-362.
45. Leclerc BS, Dunnigan L, Côté H, et al. Callers' ability to understand advice received from a telephone health-line service: comparison of self-reported and registered data. *Health Serv Res*. 2003;38:697-710.
46. Lillibridge J, Hanna B. Using telehealth to deliver nursing case management services to HIV/AIDS clients. *Online J Issues Nurs*. 2009;14(1):36-40.
47. Lorentz MM. Telenursing and home healthcare. The many facets technology. *Home Healthc Nurse*. 2008;26:237-243.
48. McDermott R. Telenursing can reduce costs and improve access for rural patients. *Oncol Nurs Forum*. 2005;32:16.
49. Paul PG, Raman R, Rani PK, et al. Patient satisfaction levels during teleophthalmology consultation in rural South India. *Telemed J E Health*. 2006;12:571-578.
50. Peck A. Changing the face of standard nursing practice through telehealth and telenursing. *Nurs Adm Q*. 2005;29:339-343.
51. Roberts D, Tayler C, MacCormack D, et al. Telenursing in hospice palliative care. *Can Nurse*. 2007;103:24-27.
52. Rosina R, Starling J, Nunn K, et al. Telenursing: clinical nurse consultancy for rural paediatric nurses. *J Telemed Telecare*. 2002;8:48-49.
53. Russo H. Window of opportunity for home care nurses: telehealth technologies. *Online J Issues Nurs*. 2001;6:4. http://www.nursingworld.org/ojin/topic16/tpc16_4.htm
54. Scalvini S, Martinelli G, Baratti D, et al. Telecardiology: one-lead electrocardiogram monitor-ing and nurse triage in chronic heart failure. *J Telemed Telecare*. 2005;11:18-20.

55. Scalvini S, Volterrani M, Giordano A, et al. Boario home care project: an Italian telemedicine experience. *Monaldi Arch Chest Dis*. 2003;60:254-257.
56. Schlachta-Fairchild L. Telehealth: a new venue for health care delivery. *Semin Oncol Nurs*. 2001;17:34-40.
57. Snooks HA, Williams AM, Griffiths LJ, et al. Real nursing? The development of telenursing. *J Adv Nurs*. 2008;61:631-640.
58. St George I, Cullen M, Gardiner L, et al. Universal telenursing triage in Australia and New Zealand – a new primary health service. *Aust Fam Physician*. 2008;37:476-479.
59. Tschirch P, Walker G, Calvacca LT. Nursing in tele-mental health. *J Psychosoc Nurs Ment Health Serv*. 2006;44:20-27.
60. Vincent C, Reinharz D, Deaudelin I, et al. Public telesurveillance service for frail elderly liv-ing at home, outcomes and cost evolution: a quasi experimental design with two follow-ups.
Health Qual Life Outcomes. 2006;4:41.
61. Vitacca M, Assoni G, Pizzocaro P, et al. A pilot study of nurse-led, home monitoring for patients with chronic respiratory failure and with mechanical ventilation assistance. *J Telemed Telecare*. 2006;12(7):337-342.
62. Wootton R, Loane M, Mair F, et al. The potential for telemedicine in home nursing. *J Telemed Telecare*. 1998;4:214-218.
63. Yun EK, Park HA. Factors affecting the implementation of telenursing in Korea. *Stud Health Technol Inform*. 2006;122:657-659.
64. Yun EK, Park HA. Strategy development for the implementation of telenursing in Korea. *Comput Inform Nurs*. 2007;25:301-306.