Manpower Governance in Health Services in India

by Developing Information Technology Infrastructure in Health

Indrajit Bhattacharya[1], Anandhi Ramachandran[2], R. K. Suri[3] and **S. L. Gupta[4]**
[1]International Institute of Health Management, Dwarka, New Delhi, India.
[3]Monad University, UP, India
[4]Birla Institute of Technology, UP, India
[1]indrajitbhat@gmail.com, [2]anandhirama@gmail.com, [3]radeshsuri@gmail.com and [4]drslgupta@gmail.com

ABSTRACT

Management of Knowledge workers in healthcare is one of the key challenges being tackled for delivering quality healthcare services . Faced with a global shortage of skilled health workers, even developed countries are struggling to build and maintain an optimum Knowledge workforce in healthcare. India too has been experiencing acute shortage particularly so in rural areas. This paper attempts to describe about the study undertaken to analyze the prime reasons for attrition of Knowledge Workforce in Healthcare in Northern parts of India that have a wide gradient of rural and urban belt , taking into account both public and private healthcare organizations. Further the paper focuses on three categories of health workers: Doctors, Nurses & Paramedics and Administrators. The present work analyzes the pattern of attrition based on socio demographic differentials among the healthcare professionals. The objective of the study has been to analyze the strategies adopted by the healthcare organizations to retain the employees and suggest measures in lowering attrition. Simplification of processes using Healthcare Information Technology *(HIT) tools is a suggested as a significant strategy to reduce stress at work , time spent on administrative work and focus on core competence by knowledge workers in healthcare thereby reducing rate of attrition.*

KEYWORDS

Attrition, Knowledge workforce, e-health, retention strategies

1. ABBREVIATIONS

Healthcare Information Technology (HIT), Electronic Medical Record (EMR), Health Information System (HIS) , Electronic Data Capture (EDC), Continuing Medical Education (CME), Hospital Management Information Systems (HMIS) Unique Health Identification Number (UHID)

2. DESCRIPTION

This manuscript describes the work done by the Healthcare Attrition Tracking Survey (HATS) conducted to evaluate the rate of attrition among Doctors, Nurses and Paramedics and healthcare administrators. About 2000 healthcare professionals were approached for the survey. Out of this, after elimination based on certain eligibility criteria, questionnaire was filled by 807 respondents. 40 hospitals including both private and public sectors in the rural and urban areas were included for this survey. Additionally, Focused Group Discussions (FGD) were also carried out to find out factors contributing to attrition. Next, plausible retention strategies were analyzed for knowledge workforce in healthcare. Data was analysed by means of Factor Analysis on Rotated Factor Matrix using Principal Components Analysis (PCA) in SPSS 16.0 package to determine the relationships between factors influencing attrition. Six factors of attrition namely Compensation and perks, Work Life Balance, Sense of Accomplishment, Work load leading to exhaustion,Need for automation and technology improvement, Break Monotony of Work have been identified with a data reliability of 0.809%. Simplification of processes using Healthcare Information Technology (HIT) tools is a suggested as a significant strategy to reduce stress at work, time spent on administrative work and focus on core competence by knowledge workers in healthcare thereby reducing rate of attrition.

3. INTRODUCTION

Health care industry relies a lot on advanced medical technology, but it is also a labor-intensive industry. Health care providers play a vital role in the health care system. As the Indian healthcare industry experiences phenomenal growth, hospitals are moving forward towards excellence rather than survival and gearing up to fulfill the gaps in three key areas of people, process and technology. In this paper, the terms "health care providers", "health care professionals", "health care knowledge workers " and "human resources for health" are used interchangeably, although "human resources for health" may comprise people other than those who have been trained in health-related field, such as health policy analysts, health planners, medical statisticians or ambulance drivers.

Previous studies in the area of attrition have been carried out amongst physicians, nurses and pharmacists [1],[2]. The migration of health professionals from developing countries to the developed world has been debated for more than three decades to be one of the main reasons of attrition and has been the main focus of such studies[3]-[6]. The movement of doctors began as a post-colonial phenomenon common to India, Sri Lanka and Pakistan and later extended to Bangladesh and

Nepal. Nursing professionals began their journey mostly to the Middle East, but have currently shifted attention to the United Kingdom of Great Britain, United States of America and Australia. It was argued that opportunities for professional training, higher salaries and perks and better living conditions act as "pull" factors, surplus production of health personnel, resultant unemployment, less attractive salary, stagnation or underemployment coupled with lack of infrastructure act as "push" factors for the youth to migrate.

A study of 'Law of attrition in Canada' has been conducted at Centre for Global e-health Innovation, University Health Network and the outcomes have been published in the Journal of Medicine and Internet Resources [7]. In an ongoing effort to develop and further the theories, models, and best practices around e-health research, this paper argues for the need for a "science of attrition", that is, a need to develop models for discontinuation of e-health applications and the related phenomenon of participants dropping out of e-health trials. A "run-in and withdrawal" trial design is suggested as a methodological innovation for Internet-based trials with a high number of initial dropouts/ non-users and a stable group of hardcore users.

Despite being the 2nd most populous country with 70% population in rural areas8 and with Indian Medical Council churning out nearly 31000 health care professionals (excluding ayurvedic, homeopathic doctors, health policy analysts, ambulance drivers and the like), India is expected to have a shortage of nearly 5,00,000 doctors and 10,00,000 nurses by 2012. The Indian healthcare sector is suffering from acute shortage of healthcare professionals and facilities delivering quality healthcare services to the citizens9. According to survey carried out in 2008-09, India has only around 85,000 doctors, who practice modern medicine and 1.5 million nurses to serve its more than one billion. It has 0.8 beds/ 1000 population, and 0.6 doctors / 1000 population (lowest in the world). This means 6 doctors per 10,000 patients with a doctor/nurse ratio of 0.83 compared to China having 20. This large disparity has led to high attrition of knowledge workers in healthcare and increase in cost of manpower resources in India.

Many strategies have proposed for reducing attrition among healthcare professionals [3]-[6], [10],[11]. Another important study was conducted in UK for establishing health informatics as a recognized and respected profession in UK National Health Services [12]. Healthcare professionals trained in health informatics are able to work in alternative healthcare facilities like Ambulatory care centres, Rehabilitation centres, Public Health Facilities, Home Health Agencies, Insurance Companies etc. This overwhelming opportunity increases the job satisfaction and adds to the job enrichment and motivation of the employees thereby reducing attrition. The literature is filled with examples of importance of HIT in healthcare [13]-[19]. There are evidence based cases of improved patient care, reduced waste and inefficiency in services, reduction in adverse drug effects and medical errors20. However physician job

satisfaction also has important implications for quality healthcare delivery. Healthcare professionals those who are satisfied with their job are inspired to provide quality patient care [21], [22]. A recent study [23] examined the relationship between use of HIT and physician career satisfaction. Physicians were classified from very low to very high users of HIT. Using more information technology was the strongest positive determinant of physicians' being very satisfied with their careers, which lends support to the importance of resources for physicians in patient care. This study was also the first to explore whether the relationship between HIT and career satisfaction differs between primary care physicians and specialists. The results indicate that primary care physicians (PCPs) and specialists respond to HIT in their practices in different ways, which is consistent with the amount of resources available to each type of provider as well as the differences in the typical doctor-patient interactions for these physician types.

While there are reports and literature that indicate there is greater danger of brain drain in the area of healthcare in India due to migration and attrition among doctors, nurses, pharmacists, there are no detailed studies that explores this thought and offers an effective retention strategy for reducing the attrition [8],[38],[39]. The study by Elder et.al [23] represents an important start, but clearly, many questions loom about the causes of attrition in healthcare in today's scenario of globalization. For instance, is the prime reason for attrition is only greater salary expectations? Is this attrition dependent on ethnicity? Is there a wide difference in the rate of attrition among urban and rural healthcare professionals? If there is job enrichment will this reduce? And, finally, can HIT act as a driver in controlling attrition in India? The purpose of this study is to begin answer these questions. Specifically, this study is based on the pilot survey work done in the area of northern India.

4. METHODOLOGY
4.1. DATA SOURCE
Data for this study came from the second round of the Healthcare Attrition Tracking Survey (HATS). HATS is a part of the multi-level study of the ongoing research program conducted to address these issues regarding attrition among healthcare professionals and to determine if implementation of Health Information Technology in hospitals and healthcare centers can work as an effective retention strategy in India. HATS was conducted among skilled healthcare professionals such as doctors, paramedics, administrative and managerial staff in public as well as private hospitals covering rural and urban regions of Northern India.

4.2. STUDY DESIGN
The first round of HATS was gathered based on a non-formal discussion with nearly 40 healthcare professionals who had participated in the International Conference on Medical Informatics held by Indian Association for Medical

informatics (IAMI) in Hyderabad, India (Nov. 2009). This was followed by a pre-test study conducted on 30 respondents in a leading 100 bedded Private Hospital in New Delhi, India. The second round of data collection led to the present paper using a complex sampling design of 40 Hospitals randomly selected to yield a non-biased representative sample of healthcare workforce both in rural and urban areas. Out of about over 2000 respondents surveyed, 807 finally respondents filled the questionnaire. The questionnaire tool was developed by the authors, reviewed by the experts in the field and then utilized for the HATS. The major challenge faced was to take permission from the HR authorities to conduct the survey due to issues of transparency of the system and its HR policies.

Table I

The data provided in this paper is based on the HATS conducted among the 40 hospitals (20 rural: 20 urban) among the states of Delhi, Haryana, Uttar Pradesh, Madhya Pradesh and Jammu & Kashmir. The rural hospitals in Jammu & Kashmir and lower part of Madhya Pradesh could not be covered in this first round of HATS. Doctors, paramedics, administrative and managerial staff were interviewed. Prior to providing a questionnaire to be filled each participant was screened to determine survey eligibility (Fig. 1.) based on the following criteria:

Criteria 1 (origin): Health care professionals who are not of Indian origin or Non–Resident Indians but undergoing special training in India were not included as the prime focus to study attrition among respondents trained solely in India.

Criteria 2 (Completion of Training): Respondents who have not yet completed their training or not yet licensed or temporarily licensed were excluded. Proxy respondents were not permitted.

Criteria 3 (Job Satisfaction): HATS was constructed from the following question: "Taking into consideration your future career plans in medicine, would you say that you are currently: satisfied, very much satisfied, somewhat satisfied, dissatisfied, very much dissatisfied, neither satisfied nor dissatisfied. Participants who responded "don't know" or "refuse to answer" were excluded from the HATS survey. This allowed examination of potential differences in the attitudes towards migrating to newer job between those who did not plan to change or planned to change job in near future.

Those who were included were asked to indicate their response on a five-point Likert scale from 1 (strongly agree) to 5 (strongly disagree) to the 30 statements relating to their job satisfaction other than their demographic details like:

- My organization helps employees to achieve a balance between their work and family responsibilities
- I am satisfied with the freedom I have to do what I want on my job
- I have sympathetic and considerate seniors.
- There is openness in relationships in the organizational hierarchy.
- I am satisfied with the security my job provides me.
- I would leave my job if offered a better one with regards to any aspect troubling here.
- I feel stressed out from my Job.

"In your job, are computers or other forms of information technology used? If yes, then it is used for...

- To obtain information about treatment alternatives or recommended guidelines?"
- To obtain information on potential patient drug interactions with other drugs, allergies, and /or patient conditions?"
- To obtain information on formularies?"
- For clinical data and image exchanges with hospitals and laboratories?"
- To access patient notes, medication lists, or problem lists?"
- To write prescriptions?"
- To communicate about clinical issues with patients by e-mail?"

If no, then

- Would you like to use computers in future?
- Do you think it would make your job easier?
- You would be able to provide better patient care?

The above measures allowed the investigators to examine which type of HIT was utilized by the respondents and to relate if adoption of HIT would be deemed as job enrichment thereby increasing their satisfaction.
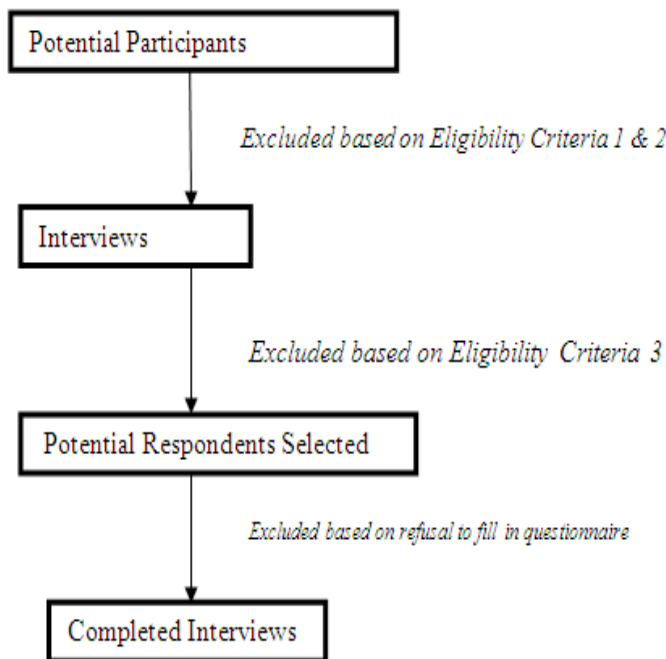
FIG. 1. Flowchart of Respondent Screening Process.

During the pre-test survey it was observed that the Consultants showed a bit of enthusiasm for HATS while the junior staffs were reluctant to fill questionnaire. Also few respondents especially the experienced healthcare professionals did not like to mention their salaries while the new physicians & nurses were keen to fill the survey form. As initially some of the respondents were reluctant to fill the form due to reasons like transparency, being odd man out in expressing their view, not being taken seriously, data privacy etc. weekly interviews were conducted and managerial staff confidence sought before the actual HATS survey

4.3.DATA ANALYSIS

Only 40% of the respondents were both eligible and ready to fill the questionnaire out of the 2000 professionals approached. Completed questionnaires were collected by the investigators, coded and entered into a standardized collection spreadsheet in Windows Excel 2007$^{©}$. A random 5% sample of responses was checked for coding errors. Wherever the data was left uncompleted and unclear the respondents were approached individually to recollect the data. The Reliability Test on Data was 0.809%. Data were analyzed by means of Factor Analysis on Rotated Factor Matrix using Principal Components Analysis (PCA) in SPSS 16.0 package to determine the relationships between factors influencing attrition. Descriptive statistics included percentage rates for categorical variables, means and standard deviations. The categorical variables considered were demographic ie., gender, marital status, age, education, work nature, work experience and income. The Factor Analysis on Rotated Factor Matrix has led to 6 Factors of Attrition as under:

Factor 1: Compensation and Perks

Factor 2 : Work Life Balance
Factor 3 : Sense of Accomplishment
Factor 4 : Work load leading to exhaustion
Factor 5: Need for automation and technology improvement
Factor 6 : Monotony of Work.

5. RESULTS

An overall response rate of 40% was achieved in this study with a total of 1000 questionnaires distributed and 807 responses. The following illustrates the descriptive statistics of the various parameters considered for the HATS.

Table II

The sample was predominantly male and the proportion ranged 57.6 ± 0.5%. The respondents were mostly middle-aged (52.1%) in the range 26 to 35 years and mostly married (62.4%) living with family. Nearly 20% of the married respondents especially male were living alone with their family in their respective home towns. Almost two-thirds of the participants were doctors, paramedics, nurses, administrators who had less than a year of practice in the current organization and also middle-aged. 54.7% of the participants were graduates while the postgraduates were 34.5%. Undergraduates were few (11.6%). Approximately nearly equal number of doctors and nurses, paramedics participated while the administrators were less. There was not much difference in the number of participants based on their income.

Table III

Comparison of the six factors of attrition (Table III) between male and female respondents did not yield significant contribution to the forces of attrition. The same effect could be seen when the marital status of the respondents was considered (Table IV). Married but divorced respondents were not considered as a separate entity. They were considered as a part of unmarried status. Time spent by a healthcare professional at an organization does contribute to the attrition (Table V). Two factors namely how the organization contributes to the work – personal life and extent of the work load seem to be the major contributors.

Table IV

Table V

Age of the respondent (Table VI) and education background (Table VII) did not seem to matter much when the factors of attrition were considered except for work load. Nature of the work of the respondents (Table VIII) considered seems to throw significant contributions to attrition. Nearly 4 out of the 6 factors were affected. All the four factors namely, Compensation and Perks, Work -Life balance, Sense of accomplishment and Need for Automation and Technology all were significant at 0.01 level.

Irrespective of the salary package (IX), five out of the six factors of attrition identified were significantly found to contribute to attrition. Compensation and Perks need for implementing automation and technology all contributing to

job satisfaction in terms of sense of accomplishment seem to be major affecting factors.

Table VI
Table VII
Table VIII
TABLE IX
Table X

More than 70% of the healthcare professionals had previous computer awareness but only 50 to 69% were using computers at work. The respondents were also tracked regarding their usage of HIT in order to determine their awareness and willingness to adopt HIT to increase the job efficiency.
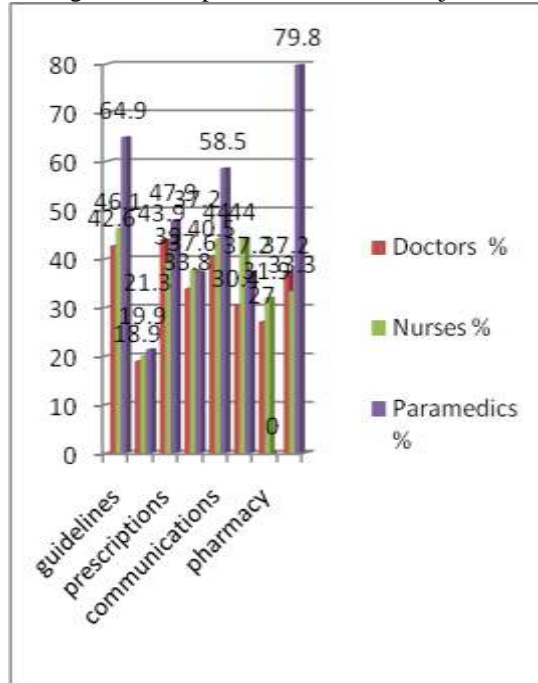

Fig.2: Use of Health Information Technology (HIT) by the Respondents

The percentage of healthcare professionals using the computers was more among the males, compared to their female counter parts.
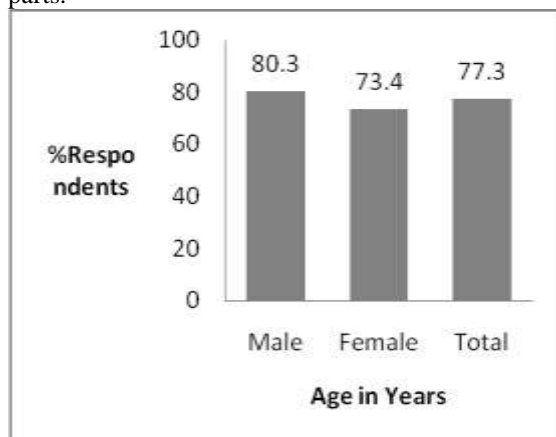
Fig.3: Use of Health Information Technology (HIT) by the Respondents (As per gender)

The healthcare professionals those who done their post graduation were more aware of computers and used them for their professional work than the graduates and undergraduates. Also it was determined that the younger generation were more adept at using IT compare to the older health care professionals.

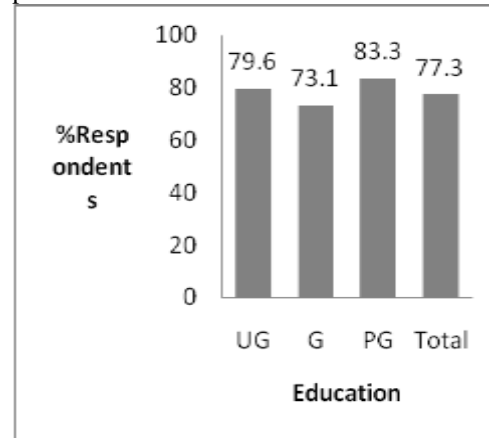**Fig.4:** Use of Health Information Technology (HIT) by the Respondents (As per education)
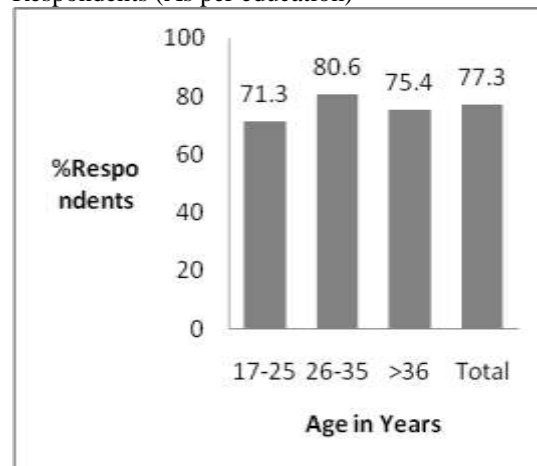

Fig.5: Use of Health Information Technology (HIT) by the Respondents (As per Age)

Out of all the respondents surveyed more than 80% were interested in undergoing IT training. 60 % indicated the need to implement HIT for their work.
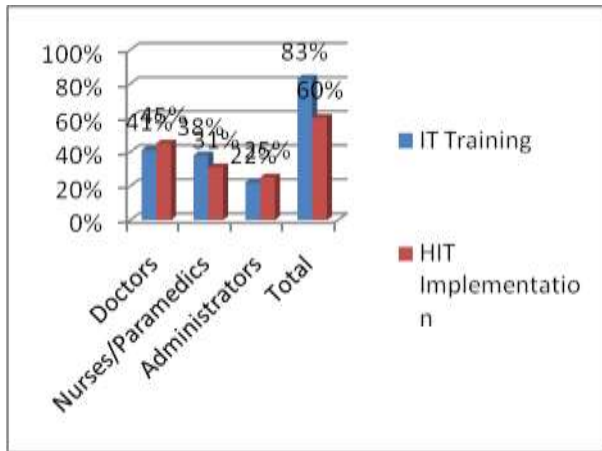
Fig.6: Percentage of respondents interested in IT training and HIT implementation

6. DISCUSSION

Results show a significant difference in attitudes towards factors affecting attrition. These attitudes together with nature of work and income are associated with an increased propensity for migration to another job. These findings support earlier such findings, that a broader set of both push and pull factors should be taken into consideration while considering attrition in healthcare [5]. The factors that have been identified through statistical analyses provide a deeper understanding of the relationships between forces that influence attrition rate. The results also provide evidence to demonstrate that economic motivation as a factor for changing jobs is not an independent, stand-alone factor in itself, but rather a component of broader factors that takes into consideration the yearning to improvise both developments in both professional and personal front. This finding is a departure from previous studies that indicate the intention of healthcare professionals to frequently change jobs and migration to foreign countries are mainly dependent on remuneration. This may be partly because those studies did not take into account the deeper analysis of relationships between factors [24],[25].

Based on a broader framework of understanding derived from the results of this study, a number of inferences can be drawn relating to strategies to encourage retention.

Factor 1 (Compensation and perks) refers to the providing incentives and extra income to the doctors in terms of benefits. The contested policies of public and health sector reforms can be constructed as attempts to craft the beneficial environment that would induce the health care workers to continue in the existing organization. There are reports that provide such examples where the use of provider incentives and enablers has known to increase the performance under certain conditions [26]. There are difficulties involved, since paying incentives to reduce attrition might increase indicators of activity to be measured, crafting proper incentives and monitoring issues.

Factor 2 (Work life balance) is about helping employees better manage their work and personal (non-work) time. This refers to family friendly work arrangements and alternative work arrangement. This depends on the nature of the work, type of the workplace and issues in the workplace. Introducing strategies like flexible work options, specialized leave policies, paid maternal leave, paternal leave; home tele-commuting subsidized exercise for fitness centre etc. can increase the satisfaction level of the healthcare professionals. This factor does not differentiate the male and female respondents but seem to play an important role especially when the type of work of the respondents is considered. Doctors and administrators who spend greater time of the day in the hospital are affected by work life balance issues.

Factor 3 (Sense of accomplishment) is about job satisfaction felt by the healthcare workers. This does not depend upon the monetary issues and it deals with the sense of achievement and fulfilment felt by the employees. Employees feel sense of accomplishment when they feel oneness with the organization. This happens when the organization delivery systems share the same mission, vision, goals, objectives and strategies. A key to build such a culture is by involving the medical staff members to make collaborative decisions in clinical and operational issues [27]. Medical staff thus involved is philosophically and economically aligned with the organization, feel a sense of accomplishment and are likely to make decisions that benefit the organization, thereby benefiting the patients served by the organization.

Factor 4 (Work load leading to exhaustion) and *Factor 6* (Break monotony of Work) refers to the overworked health care professionals. While this was not much of the problem in urban hospitals interviewed, it was more prominent in the FGD that were conducted in the rural areas. Hospitals in underserved rural areas often have higher workloads, cover large geographic areas, have lower access to specialists, encounter problems in recruiting and retaining clinical staff, and treat a broad array of complex patients. This results in attrition. This specifies the need to improve working conditions and the professional interface with other health professionals and society in the rural areas. The supply of good support, education and training is a key approach to attracting and retaining allied health practitioners in rural locations. This enables health care professionals to confidently access, interpret, and apply organisational knowledge, patient care procedures, professional workforce competencies, best practice knowledge and other skills information in a manner that improves patient satisfaction, achieves positive clinical outcomes, and maximises cost savings for the organisation [28]. Planned interventions could employ non-financial incentives and human resource management tools, such as recognition by management, performance review and improving inter-professional working relationships, to uphold and strengthen the professional ethos of health professionals, a key determinant of motivation and retention[29].

Factor 5 (Need for Automation and Technology Improvement) implies the requirement of HIT implementation in the health care industry. The supply of good support, education and

training is a key approach to attracting and retaining allied health practitioners, especially in rural locations [30],[31]. HIT enables health care professionals to confidently access, interpret, and apply organisational knowledge, patient care procedures, professional workforce competencies, best practice knowledge and other skills information in a manner that improves patient satisfaction, achieves positive clinical outcomes, and maximises cost savings for the organisation [32],[33]. In this present study irrespective of gender, age & education the importance of implementing HIT was stressed by almost all respondents. The nature of work done by respondents seems to play a significant role in assigning the need for automation and technology as a major factor of attrition. This observation is compounded by the data collected regarding the information technology usage statistics (Table V). The doctors seemed to be the preferred users of computers, then healthcare administrators and then the nurses and paramedics. It was also identified that the postgraduates and the younger generation of healthcare professionals were more computer aware and used them for their work. While 80% insisted on computer training to increase their knowledge 60% were interested in HIT implementation in their work. They felt implementation of HIT would reduce their work, increase their job satisfaction. 40% were unsure of the use of HIT in reducing their work. Also during the FGD it was identified that the HIT usage was more prevalent in urban hospitals than rural hospitals. Also the difference in the salary does not seem to detract the fact that implementation of HIT was seen as a basic requirement of healthcare professionals.

7. OBSERVATION

Main reasons for Attrition were noted while conducting questionnaire interviews and focused group discussions. It was observed that the nurses and paramedics leave their jobs due to the job opportunities in abroad especially to UAE, Dubai, UK countries where the demand for Asian nurses associated with good hospitals is very high. The salaries of nurses in India are not very high therefore they get attracted to higher pay packages abroad. The MBBS qualified Doctors working in corporate hospitals leave their jobs for doing their post Graduation. Attrition of post graduate doctors is seen to be in lure of attractive salary packages, better technologically equipped healthcare facilities besides doing their higher studies. Medical professionals working in rural private health set ups found reasons for leaving their job in search of opportunities to work in Government sector where the perks and allowances are better with flexibility of working hours. Senior doctors, administrators though dissatisfied in their jobs due to their workplace environment and profiles were still hesitant to shift jobs taking into consideration difficulties like migration policies, children education, and security of job. Health care workers both in urban and rural hospitals felt the need of implementation of information technology to ease their work. But some were not sure about the actual benefits it would provide them for their work individually. This can be taken

care by conducting workshops, conferences and training in relevant areas of IT so that healthcare professionals are comfortable in using IT.
Based on the observation the following strategies are suggested for reducing attrition:

7.1. MANPOWER PLANNING

For any hospital and health care system the planning of manpower (human resources) is very vital. Without an equally effective manpower and the equipments it has to use, all other inputs of the hospital like finances, technology, and infrastructure are not able to sail alone any project successfully. Manpower planning translates the organization's objective and plans into a number of workers needed to meet those objectives [34]. Detailed planning of Human Resources and a plan of action for their selection, training and deployment is very important factors right through the project planning and implementation and should be undertaken at the inception of the Project.

7.2. NEED FOR TECHNOLOGY ADOPTION AND PROCESS IMPROVEMENT

Increasing retention rate by simplifying processes by adopting Healthcare IT practices thereby empowering the Healthcare knowledge workers to focus on their core specialization also leads to decreased medical errors and efficient patient deliver [35]-[38]. Healthcare IT is seen as a tool to reduce complexity of processes, healthcare costs and improve quality and safety. Healthcare is rapidly becoming an interconnected ecosystem, with IT as its circulatory system. Use of IT tools and applications in healthcare has led to many benefits:

- Consumers are able to get involved in managing their health, to understand the increasing patient liability, to get improved quality of care (and of life) through remote home health monitoring.
- Healthcare providers and enablers are able to provide revenue cycle management tools and reimburse for remote home health monitoring.

- In Clinical research, in identifying patients for clinical trials, utilizing EMRs to supplement Electronic Data Capture (EDC) systems.
- Mobile revolution leading to m-Health: Some of the key potential application of m-Health advantage is disease surveillance and tracking, remote data collection and remote consultation, prescription and patient monitoring services, education and awareness besides healthcare worker training.
- Using Telemedicine to offer effective treatment to rural populations.

While the above strategies can be uniformly followed among all healthcare professionals irrespective of their nature of work and location the following guidelines may be followed especially in India.

8. CONCLUSION

Since all the processes of recruitment and selection are critical and attrition rate of knowledge workers in Healthcare is significant, the healthcare industry should focus on employing right talent and develop the talent to increase retention in the organization for a longer period of time. Other points in consideration would be planning of specialties to be made available and the budgetary constraints and the workload projection on the basis of market mapping needs to be carried out at the location of the Healthcare facility.

A potential solution to bridge acute shortage of healthcare workers and reduce attrition rate is through providing accessibility to online healthcare, which has emerged as very important tool for offering healthcare services that can be accessed by patients across boundaries. Online healthcare connects patients and doctors via internet services. Online health portals can reduce workload and streamline processes for consultations, booking appointments, maintaining patient health records, getting second opinions, among various other services offered.

Implementation of Technology and adoption of Healthcare Information Technology applications and best practices would result in simplifying processes. The benefits would be in terms of Unique Health Identification Number (UHID) for each patients, Electronic Medical Record (EMR), Reduction in Physician Errors, Time Savings in processes such as information retrieval, Adoption of International Standards and best practices, Instant Availability of Administrative Data, increased Financial Savings and Clinical Trials & Research. This in turn would bring in transparency in the system and healthier working conditions. Improved efficiency and profitability would lead to better employee compensation and working condition thereby leading to retention of knowledge workers in healthcare.

ACKNOWLEDGEMENT

REFERENCES

[1]. T. Pang, M.A. Lansang, and A. Haines, "Brain Drain and Health Professionals", *British Medical Journal*, vol.324(2), pp.499, 2002.

[2]. V. Patel, "Recruiting doctors from poor countries: the great brain robbery? ", *BMJ*, vol. 327:, pp.926- 928,2003.

[3]. B. Stilwell, K. Diallo, P. Zurn, M. Vujicic, O. Adams, and M. Dal Poz, "Migration of health-care workers from developing countries: strategic approaches to its management", *Bulletin of World Health Organization*, vol. 82(8), pp.601, 2004.

[4]. K. Diallo, "Data on the migration of health-care workers: sources, uses, and challenges", *Bulletin of the World Health Organization*, vol.82, pp.595-600, 2004.

[5]. T.Wuliji , S. Carter , and I. Bates, "Migration as a form of workforce attrition: a nine-country study of pharmacists", Hu*man Resources for Health vol.* 7, pp. 1-32, 2009.

[6]. A. Hagopian , M. J. Thompson, M. Fordyce, K. E. Johnson, and L. G. Hart, "The migration of physicians from sub-Saharan Africa to the United States of America: measures of the African brain drain", *Human Resources for Health,* vol. 2, pp. 17, 2004.

[7]. G. Eysenbach, "The Law of Attrition", *Journal of Medicine and Internet Resources*, vol. 7(1), pp. e11, Mar 31, 2005.

[8]. *Deloitte- CII Report* , Medical Technology Industry in India, July 2010.

[9]. Online Revolution– Delivering healthcare at doorstep, *e-healthonline*. 2010.

[10]. Dealing with Attrition, *Express Healthcare* (May 2010), [online]. *Available at* www.expresshealthcare.in. May 2010.

[11]. J. A. Effken, and P. Abbot, " Health IT enabled care for Underserved Rural Populations – The Role of Nursing", *Journal of American Medical Informatics Association*, vol. 16(4) , pp.439. 2009.

[12]. L. S. Cowin, and C. H.Sims, "New graduate nurse self-concept and retention: A longitudinal survey", *International Journal of Nursing Studies*, vol. 43(1), pp. 59-70, 2006.

[13]. E. Alberdi E et al., "Use of computer-aided detection (CAD) tools in screening mammography: a multidisciplinary investigation", *The British Journal of Radiology*, vol. 78, pp. S31–S40, 2005.

[14]. H. Lærum, G. Ellingsen, and A. Faxvaag, "Doctors' use of electronic medical records systems in hospitals: cross sectional survey", *British Medical Journal*, vol. 323, pp. 1344-8, 2001.

[15]. R.W. Park, S. S. Shin, Y. I. Choi, J.O. Ahn , and S. C. Hwang, "Computerized Physician Order Entry and Electronic Medical Record Systems in Korean Teaching and General Hospitals: Results of a 2004 Survey", *Journal of American Informatics Association*, vol.12, pp. 642-647, 2005.

[16]. H. Lærum, G. Ellingsen, and A. Faxvaag, "Effects of Scanning and Eliminating Paper-based Medical Records on Hospital Physicians' Clinical Work Practice American Medical Informatics Association", vol. 10(6), pp.588-595, 2003.

[17]. H. H. Pham, D. Schrag, J. L. Hargraves, and P. B. Bach, "Delivery of Preventive Services to Older Adults by Primary Care Physicians", *Journal of the American Medical Association,* vol. 294(4) , pp. 473–81,2005.

[18]. C. E. Sammer, K. Lykens, and K. P. Singh, "Physician Characteristics and the Reported Effect of Evidence-Based Practice Guidelines", *Health Service Research,* vol.43(2), pp. 569–81,2008.

[19]. D. H. Peters, M. Kohli, M.Mascarena, and K. Rao, "Can computers improve patient care by primary health care

workers in India?", *International Journal for Quality in Health Care* , vol. 18(6), pp. 437–445, 2006.

[20]. R. S. Evans, S. L. Pestotnik, and D. C. Classen, "A Computer-Assisted Management Program for Antibiotics and Other Antiinfective Agents", *New England Journal of Medicine,* vol. 338(4), pp. 232–38, 1998.

[21]. J DeVoe,., G. E. Fryer Jr., J. L. Hargraves, R. L. Phillips, and L. A. Green, " Does Career Dissatisfaction Affect the Ability of Family Physicians to Deliver High-Quality Patient Care?", *Journal of Family Practice,* vol. 51(3), pp. 223–28, 2002.

[22]. C. Hongoro, B. McPake, "How to bridge the gap in human resources for health:, *Lancet,* vol. 364, pp. 1451-56, 2004.

[23]. K. T. Elder, J. C. Wiltshire, R. N. Rooks, R. BeLue, L. C. Gary, " Health Information Technology and Physician Career Satisfaction", *Perspectives in Health Information Management,* vol. 1-18, 2010 (Summer),

[24]. A. Astor, T. Akhtar, M. A. Matallana, V. Muthuswamy, et al, " Physician migration: Views from professionals in Colombia, Nigeria, India, Pakistan and the Philippines", *Social Science & Medicine,* vol. 61, pp. 2492-2500. 2005.

[31]. M. Cutchin, " Physician retention in rural communities: the perspective of experiential place integration", *Health & Place,* vol. 3(1), pp.25-41, 1997.

[32]. N. Margolis, E. Booker, "Taming the healthcare cost monster" *Computerworld,* Vol. 192; pp. 26(1): 14-5.

[33]. J. K. Young , "Quality care on a budget: Realizing benefits from clinical systems", *Computers in Healthcare*, vol. 13, pp. 34-5, 1992.

[34]. S. M. Kabene, C. Orchard, J. M. Howard, M .A .Soriano, and R. Leduc. "The importance of human resources management in health care: a global context ", *Human Resources for Health*, vol. 4(20), pp. 1-17.

[35]. M. Weiner, P. Biondich, "The Influence of Information Technology on Patient-Physician Relationships", *J Gen Intern Med*, vol. 21, pp. S35–39, 2006.

[25]. R. P. C. Brown, J. Connell, " The migration of doctors and nurses from South Pacific Island Nations", *Social Science & Medicine*, vol, 58, pp. 2193-2210, 2004

[26]. J. Rodrigues, "Hospital utilization and reimbursement method in Brazil", *Int J Health Plann Management*, vol 4, pp. 3–15,1989.

[27]. S. M Shortell, J. Schmittdel etal, "An Empirical Assessment of High- Performing Medical groups: Results from a National Study.", *Medical Care Research and Review*., vol. 62(4), pp. 407-434, 2005

[28]. K. C. Lun, "The Role of Information Technology in Healthcare Cost Containment", *Singapore Med. J*, vol. 36, pp. 32-34. 1995.

[29]. I. Mathauer, I. Imhoff , " Health worker motivation in Africa: the role of non-financial incentives and human resource management tools", *Human Resources for Health* , vol. 4, pp.24, 2006..

[30]. K. Pillemer, " A higher calling. Choose nursing assistants carefully, train them well, and your turnover rates will dwindle", *Contemporary Long-Term Care,* vol. 20(4), pp. 50-2, 1997.

[36]. D. W. Bates et al., " Reducing the Frequency of Errors in Medicine Using Information Technology", *Journal of American Medical Informatics Association., * vol 8, pp. 299-308, 2001.

[37]. B. Chaudhry et al. , "Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care", *Ann Intern Med.*, vol. 144, pp. 742-752, 2006.

[38]. E. Oren, E. R. Shaffer, and B.J. Guglielmo, "Impact of emerging technologies on medication errors and adverse drug events", *American Journal of Health-System Pharmacy*, vol. 60(14), pp. 1447-1458, 2003.

	Rural	**Urban**	**Subtotal**
Public	16	8	**24**
Private	4	12	**16**
Subtotal	20	20	**40**

Table I Demography of Number of Hospitals Covered

	N= 807		
Gender			
Male	57.6%	(461	)
Female	43.2%	(346	)
Marital Status			
Married	62.4**%**	(499	)
Unmarried	38.4**%**	(307	)

Practice

< 1 year	76.1**%**	(	609	)
> 1 year	24.7**%**	(	198	)

Age

17-25	18.7**%**	(	150	)
26-35	52.1**%**	(	417	)
36+	30**%**	(	240	)

Education

undergraduate	11.6**%**	(	93	)
graduate	54.7**%**	(	438	)
postgraduate	34.5**%**	(	276	)

Nature of Work

Doctors	38.9**%**	(	311	)
Nurses & paramedics	37.1**%**	(	297	)
Administrators	24.7**%**	(	198	)

Income

upto 10,000	20.5**%**	(	164	)
10,000-20,000	18.9**%**	(	151	)
20,000-30,000	26.6**%**	(	213	)
30,000-40,000	16.6**%**	(	133	)
>40,000	17.9**%**	(	143	)

Table 2: Demographic Characteristics of the Respondents

Factors of Attrition	**Male**		**Female**		**t - value**
	Mean	**SD**	**Mean**	**SD**	
Compensation and Perks	2.82	.82	2.9	0.78	0.86 NS
Work life balance	2.63	.69	2.68	.69	.64 NS
Sense of accomplishment	2.65	.50	2.74	.51	1.79 NS
Work load leading to exhaustion	2.91	.82	2.91	.74	.03 NS
Need for Automation and technology improvement	2.24	.76	2.26	.67	.26 NS
Break Monotony of Work	2.98	.72	2.86	.61	1.69 NS

NS: Not Significant

Table III: Comparison of Factors of Attrition between Male and Female Respondents

Factors of Attrition	**Married**		**Unmarried**		**t - value**
	Mean	**SD**	**Mean**	**SD**	
Compensation and Perks	2.87	.76	2.82	0.87	0.54 NS
Work life balance	2.69	.71	2.59	.65	1.4 NS
Sense of accomplishment	2.70	.49	2.67	.54	.40 NS
Work load leading to exhaustion	2.92	.80	2.89	.77	.40 NS
Need for Automation and technology improvement	2.18	.69	2.37	.76	2.48 NS
Break Monotony of Work	2.90	.67	2.96	.69	.82 NS

NS: Not Significant

Table IV: Comparison of Factors of Attrition between Married and Unmarried Respondents

Factors of Attrition	Upto One Year		More than One year spent		t - value
	Mean	SD	Mean	SD	
Compensation and Perks	2.84	.81	2.89	0.79	0.55 NS
Work life balance	2.61	.67	2.79	.71	2.27 *
Sense of accomplishment	2.69	.50	2.67	.54	.40 NS
Work load leading to exhaustion	2.63	.76	3.14	.85	3.29 **
Need for Automation and technology improvement	2.26	.71	2.21	.76	0.60 NS
Break Monotony of Work	2.94	.689	2.96	.65	.76 NS

*NS: Not Significant *Significant at 0.05 level **Significant at 0.01 level*

Table V: Comparison of Factors of Attrition between Duration of Time Spent By Respondents In The Organization

Factors of Attrition	A1		A2		A3		A1 V/s A2	A1 V/s A3	A2 V/s A3	F- Value
	Mean	SD	Mean	SD	Mean	SD				
Compensation and Perks	2.9	.78	2.79	.82	2.94	.78	-	-	-	1.47 NS
Work life balance	2.67	.61	2.61	.70	2.72	.72	-	-	-	1.00 NS
Sense of accomplishment	2.7	.47	2.68	.51	2.7	.53	-	-	-	0.08 NS
Work load leading to exhaustion	3.03	.63	2.79	.81	3.03	.83	*	-	*	4.65**
Need for Automation and technology improvement	2.37	.75	2.26	.72	2.17	.70	-	-	-	1.74
Break Monotony of Work	2.86	.49	2.98	.74	2.88	.67	-	-	-	1.14

*NS: Not Significant *Significant at 0.05 level ** Significant at 0.01 level*

Table VI: Comparison of Factors – Studies among Respondents of three age groups
(A1 = 17 – 25 yrs., A2 = 26 – 35 yrs., A3 = 36+)   - DUNCAN's Mean Test

Factors of Attrition	E1		E2		E3		E1 V/s E2	E1 V/s E3	E2 V/s E3	F- Value
	Mean	SD	Mean	SD	Mean	SD				
Compensation and Perks	3.04	.76	2.83	.82	2.82	.78	-	-	-	1.41 NS
Work life balance	2.66	.50	2.68	.72	2.62	.69	-	-	-	.30 NS
Sense of accomplishment	2.74	.53	2.69	.53	2.68	.48	-	-	-	.28 NS
Work load leading to exhaustion	3.21	.81	2.88	.72	2.85	.87	*	*	-	3.69**
Need for Automation and technology improvement	2.32	.76	2.27	.69	2.2	.77	-	-	-	.60
Break Monotony of Work	2.95	.52	2.91	.65	2.93	.76	-	-	-	.57

*NS: Not Significant *Significant at 0.05 level **Significant at 0.01 level*

Table VII: Comparison of Factors – Studies among Respondents of Education Qualification Groups
(E1 = Undergraduate , E2 Graduate , E 3 = Post Graduate) - DUNCAN's Mean Test

Factors of Attrition	W1		W2		W3		W1 V/s W2	W1 V/s W3	W2 V/s W3	F-Value
	Mean	SD	Mean	SD	Mean	SD				
Compensation and Perks	2.88	.84	3.03	.71	2.53	.80	-	*	*	11.52**
Work life balance	2.65	.78	2.80	.55	2.44	.70	-	*	*	7.77**
Sense of accomplishment	2.67	.49	2.77	.49	2.6	.55	-	-	*	3.39**
Work load leading to exhaustion	2.88	.81	2.94	.74	2.9	.84	-	-	-	.24
Need for Automation and technology improvement	2.17	.73	2.40	.72	2.17	.69	*	-	*	4.24**
Break Monotony of Work	2.94	.83	2.92	.51	2.92	.62	-	-	-	.03

*NS: Not Significant *Significant at 0.05 level **Significant at 0.01 level*

Table VIII: Comparison of Factors – Studies among Respondents of Nature of Work Groups
(W1 = Medical Professionals , W2 = Nursing and Paramedics , W 3 = Administration) - DUNCAN's MEAN TEST

Factors of Attrition	I1		I2		I3		I4		I5		compare	F - Value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Compensation and Perks	3.00	.69	2.87	.88	2.61	.85	2.99	.77	2.9	.73	I2 Vs I3 I3Vs I5 I3 Vs I4 I1 Vs I3	3.45**
Work life balance	2.73	.47	2.66	.68	2.57	.80	2.79	.75	2.57	.67	-	1.49
Sense of accomplishment	2.81	.51	2.68	.50	2.65	.56	2.83	.49	2.50	.38	I1 Vs I5 I3 Vs I4	4.93**
Work load leading to exhaustion	3.01	.69	2.95	.77	2.74	.72	2.95	.82	2.95	.97	I1 Vs I3	1.57**
Need for Automation and technology improvement	2.47	.78	2.39	.63	2.18	.75	2.24	.69	1.98	.65	I4 Vs I5 I2 Vs I5 I1 Vs I5 I1 Vs I3	5.29**
Break Monotony of Work	3.02	.43	3.02	.63	2.97	.75	2.73	.73	2.85	.76	I3 Vs I4 I2 Vs I4 I1 Vs I4	2.33**

*NS: Not Significant *Significant at 0.05 level ** Significant at 0.01 level*

Table IX Comparison of Factors – Studies among Respondents of Income Groups
(I1 = Upto Rs.10,000/- , I2 = Rs.11 – 20,000/- , I 3 = Rs21 – 30,000/-, I 4 = Rs.31 – 40,000/-, I 5 = More than Rs.40,000/-)-
DUNCAN's Mean Test

	Doctors		Nurses /Paramedics		Administrators	
	N=312	%	N=297	%	N=198	%
Computer Awareness & Use IT	255	81.7	228	76.8	141	71.2
Use Computers at Work	213	68.3	150	50.5	118	59.6
No Awareness or Never Use Computer	57	18.3	69	23.2	57	28.8

Table X: The Healthcare Professionals Were Surveyed To Know Their Knowledge, Attitude Of Computer And Information Technology.