Chest Research Foundation in collaboration with Cipla Ltd. and the Council of Scientific and Industrial Research - Institute of Genomics and Integrative Biology (CSIR-IGIB) conducted one of the biggest studies in India that examined the reasons for which patients visit a primary care physician in India.

How would this information be useful for people in India? If we know which are the most common ailments encountered in clinical practice, then we can build appropriate healthcare infrastructure to suit these needs. Also, medical curriculum can be fine tuned so that all undergraduate doctors in India are well trained to treat the most common diseases encountered in practice. Moreover, if we have limited funds for research, our knowledge about the most common ailments affecting people in India will help us in prioritizing where research money needs to be spent.

It is with these objectives in mind that CRF undertook this massive, nationwide study to find the answers. A total of 12,000 general practitioners, general physicians and pediatricians in a proportion of 70:20:10 were randomly selected from all over India. They included doctors from private clinics, private hospitals and government clinics. An additional 1250 doctors who heard about this study from their fellow colleagues requested to participate. On one day, every doctor kept a record of every single patient he or she saw in their clinic. A total of 91,000 SMSes were sent to the study doctors reminding them at least 4 times before the study date. 7400 doctors responded with good quality, clean data from all states and union territories in India. The data was so huge that CRF had to hire 10 computers and 10 data entry operators who worked for 4 months only to transfer the information from the doctors data sheet to the computer software. Data of 204,912 patients was received who presented to the doctors with 550,000 reasons for visit (disease symptoms and diagnosis, if made). A doctor in India saw an average of 27 patients every day, which when extrapolated to the number of the practicing registered doctors suggests that over 35 million patients visit a doctor every day in India. These do not include those who fall sick but take over the counter medications from pharmacy stores, or those to visit faith healers, those who self medicate or those who visit specialists. According to WHO reports, around 904 nominations were received from 8 South East Asian countries namely, India, Sri Lanka, Nepal, Bangladesh, Pakistan, Bhutan, Myanmar and Maldives. These nominations were across 12 categories which included Cardiology Team of the Year, Medical Team of the Year, Pulmonology Team of the Year, Diabetes Team of the Year, Surgical Team of the year, Innovation in Healthcare, Quality Improvement, Excellence in Medical Education, Research Paper of the Year, Postgraduate Thesis of the Year, Healthcare Advocacy and Healthcare Journalist of the Year. After two gruelling rounds, 36 finalists were selected to present their work in front of a panel of 12 high-profile and well acclaimed jury members.

The award ceremony was held on the 30th of October 2015 at the Grand Ballroom at The Leela in Mumbai. The ballroom was packed with healthcare practitioners from across South East Asia to honour the unsung heroes who have had a major impact on healthcare in this region.

Chest Research Foundation was awarded the “Pulmonology Team of the Year” for improving healthcare delivery in pulmonary medicine through medical education and quality research. Dr. Sundeep Salvi, director of the Chest Research Foundation, said later in his remarks “This is one step in getting recognized for the effort put in by the entire team. We will continue in our mission of liberating the sufferings of the patients of Obstructive Airway Diseases, with the renewed zeal and vigour, through knowledge generation, targeted knowledge dissemination and advocacy.”
18% of all global deaths and 20% of loss of global disability adjusted life years (DALYs) occur in India, making it a country with one of the highest disease burdens in the world.

Moreover, only 8% of patients who visited the doctor were elderly, which is exactly the proportion of elderly people in India, which suggests that elderly patients do not visit a doctor in India, and the reasons for which could be anything, including costs of care.

More than half the patients in India visited a doctor for a respiratory problem and this burden was uniform across all states and union territories in India, and across all age ranges. Half of these patients presented with fever, indicating that they likely had an infectious etiology (either upper airways or lower airways infection). The second commonest organ involved was gastrointestinal (25%) followed by circulatory (12.5%), skin (9%) and endocrine (6.6%). More males visited the doctor in India and this gender difference was particularly more common in the pediatric age group. Moreover, only 8% of patients who

The doctors made a specific diagnosis in about 40% of the patients they saw, but reported patient-related symptoms in all of them. The three most common diagnosis made were hypertension (14.52%), followed by Obstructive Airways Diseases - asthma and COPD (14.51%) and upper respiratory tract infections (12.9%). Interestingly, 21% of the hypertensives and 21% of the diabetics were younger than 40 years of age, and were from urban cities with a population of more than 1 million. The 550,000 reasons for visit from the 204,912 patients were fed into a supercomputer to look at age-related prevalence rates in symptom/disease prevalence. The alluvial graph shown here is a unique way of showing this data and resembles the different layers of soil with the heaviest layer settling at the bottom and the lighter layers rising upwards. As can be seen in the graph below, respiratory ailments were the heaviest layer across all age ranges, with even more burden in the pediatric age range. Digestive was the second most common burden in the pediatric age group, but became less and less important as the age advanced. Circulatory which was number four in the pediatric age group became second commonest somewhere between the ages of 50-60 years and very closely aligned with endocrine disorders. Interestingly, anemia which was the 4th most common diagnosis made by physicians in India was 3-times more common in women of child bearing age and closely followed ailments related to the female genital organs. This alluvial graph is snapshot of what people suffer across different age ranges in India and is the first time that such data has been generated in India.

A study of this magnitude would not have been possible without the tremendous support from Cipla Ltd, who sent their field force across the nooks and corners of India, inviting the randomly selected doctors by CRF to participate in this study. The team from CSIR-IGIB helped in the conduct of the exhaustive statistical analyses using their supercomputer. This is an excellent example of how a meaningful study of this magnitude can be conducted by partnership between an academic institute, a pharmaceutical company and a government institute. The results of the POSEIDON study should not only help organize health-care delivery in accordance with societal needs, but also set the path for future studies in other developing countries. To read the full study, refer Salvi S, Apte K, Madas S et al Lancet Global Health 2015; 3: e776-e784.
An estimated 18% of all global deaths and 20% of loss of global daily-adjusted life years (DALYs) occur in India, making it a country with one of the highest disease burdens in the world. While there are a number of government programs for infectious disease surveillance and treatment, such as tuberculosis, non-communicable diseases have recently overtaken communicable diseases as leading causes of mortality and morbidity in India. Optimal deployment of our limited resources requires strategic and informed health policies, but a general lack of objective health data makes this difficult. The consequent inequitable or inaccessible healthcare is a major cause of increasing disease burden, catastrophic medical expenses, and inability to escape poverty. Thus, a vast and diverse country like India that claims a national vision for health promotion (Swasth Bharat), must not only focus on health care infrastructure creation, but also prioritize public health research that can guide health policies and education. Health data collection at a national scale must form a corner stone of such efforts. However, the challenges will not be limited to data collection alone. The complexity and size of such data will demand a fresh analytical point of view that requires an awareness of developments in other data-intensive fields like systems biology and artificial learning. The emergence of such “big data” approaches in medicine is likely to be a central theme in the coming time and is foreseen to be the next frontier in medicine.

To understand these new trends in public health research and their necessity, it may be instructive to briefly consider a case study. Obesity is a well-recognized public health problem. Substantial efforts are underway to identify genetic predispositions that permit identification of the susceptible individual, presumably as a step towards targeted intervention. However, while obesity is a chronic non-infectious health condition, classified as non-communicable, it may be communicable or ‘contagious’ in a sense that the risk of an individual is dependent on the status of people to whom he/she is socially connected. Recognition of such contagiousness of obesity first came from a social network analysis, where 12,067 people were assessed repeatedly from 1971 to 2003, within the Framingham Heart Study cohort. The social network information was derived from handwritten administrative tracking sheets identifying people close to the study participants, to facilitate follow-up. This was valuable, previously unused social-network information because it systematically and comprehensively identified relatives and friends. Combining this data with annual anthropometric information, through network-based statistical models, Christakis et al showed that a person’s chances of becoming obese increased by 57%, if he or she had a friend who became obese in a given interval. The effect was not seen for neighbors and was not stronger in siblings, excluding local or genetic confounders. This concept of obesity as a contagious disease spreading through social networks has the potential to reshape public health policy since it implies that there are key influencing nodes where interventions would have disproportionate effects. Thus, investing in greater understanding of social networks of communities may be more important than genetic studies in deciding the battle of the bulge. In the preceding case study, diligent prospective data collection over 32 years enabled the subsequent research question. Carefully defined cohorts like Framingham or the Nurses Health Study (NHS) have been the backbone of our understanding of risk factors for chronic diseases. However, there is no guarantee that their results are generalizable to the rest of the world. The lack of such cohorts in India or other developing countries has led to adoption of medical best practices based on western data. This is a lacuna that can be addressed in two very different ways. First, by creation of systematic prospective cohorts using time-tested methods. This requires substantial expenditure of resources and highly motivated research groups that can maintain focus over long periods of time.

The second approach utilizes available data flowing through the modern digitally connected world. Such data spans previously unimaginable scales and is of multiple types (socio-economic, health, behavioral). These two approaches are highly complementary and should be deployed together for greatest efficiencies. However this requires innovation, novel methods and most importantly – changing mindsets. The challenge of using big data in public health research, especially in India, will be that this requires a fresh perspective. As little as a decade ago, this field barely existed. Despite explosive growth in the last few years and international recognition of the promise of big data, this is yet to trickle down into the curriculum of medicine or public health. Further, this requires interdisciplinary quantitative skills, which are often poorly developed in biomedical researchers. The integrated MSc-PhD program in Health Informatics, initiated by the Public Health Foundation of India (PHFI) and the Academy of Scientific and Innovative Research (AcSIR), is the first Indian degree program to prioritize such interdisciplinary training for public health research. Hopefully, this will gain traction and in coming years we will see many examples of big data or information technology in Indian public health research. Some of the low hanging fruits in this space are discussed further.

Smart Cohorts and Health Maps

The availability of inexpensive cloud-connected smartphones/tablets with GPS capability permits geo-tagged data collection that updates cloud-based repositories in real time. Concurrent analytics and automated feedback can even guide data collection. An example is the CSIR SACH (Stimulating Accuracy in Community Health data) initiative, which intends to enable location-tagged health databases that can scan existing data and communicate any desired missing questionnaires to survey workers based on their location. This, coupled with portable smartphone or tablet-based acquisition of vitals, ECG, pulse oximetry, hemoglobin, environmental data etc., with real time updating of records, is expected to provide dense coverage of transparently collected health data for communities; with minimal duplication of efforts. Increasing digital penetration to all socio-economic classes will permit virtual follow-up visits and self-updates from the target populations. Such use of big data for longitudinal follow up has already been implemented in the Nurses Health Study where NHS3 is completely web-based. Web-based questionnaires, administered every 6 months, allow collection of more specific or detailed information for some participants, without increasing the questionnaire size for other participants. This customizability allows the assessment of critical exposures at specific times, for example during pregnancy or even conception. NHS3 is currently piloting bio-specimen collection and use of smartphone-generated health data.

Surveillance of communicable diseases

The technologies discussed in the preceding section, as well as mining of noisy data such as twitter feeds, google searches, facebook updates, has been used for surveillance of infectious disease outbreaks. Software designed to track flu epidemics in USA by looking at frequency of web searches for “flu” and related keywords, was recently adapted...
On a quiet morning of July 2007, Mr. Ajay Phatak got a request from Dr. Nayanjeet Assistant Professor, Community Medicine, Pramukh Swami Medical College, to help expedite the death certificates of two patients who were admitted to Shree Krishna Hospital. This was an unusual call as Medical Records Department generally do not give priority to such work even if there are serious legal complications. Being curious with the cause of death mentioned in the death certificate, Ajay contacted Nayanjeet for further clarification. Being a post graduate student in community medicine with a Masters in Public Health he was sensitive enough to understand the issue and also have the vision to investigate such issues methodically and systematically. This sentinel case opened up a Pandora’s Box. Small agate stone polishing units operate from individual houses in Shakarpur area of Kambhat, a coastal city of Gujarat, India.

As the industry operates from individual houses, not only the workers but also the family members are exposed to silica dust. The exposure to respirable fine dust over long periods can result in a dreaded disease viz. ‘Silicosis’ that causes fibrosis and in due course of time; destruction of lungs. To add insult to the injury, most of the times, these patients are misdiagnosed to have tuberculosis and receive multiple courses of Anti-Koch’s therapy for non-resolving pulmonary shadows of silicosis, till they embrace a painful death. Jolted with these horrific facts, both decided to address this public health problem and contacted Dr. Rajiv Paliwal, Professor Department of Pulmonary Medicine, Pramukh Swami Medical College for help and guidance. As per the advice of Dr Paliwal, the Department of Radiology was also involved. The entire team of specialists decided to stand with the suffering humanity.

To understand the problem in greater details, the team of specialists from Pramukh Swami Medical College, Karamsad visited Shakarpur and after few rounds of discussion the institute took the responsibility of generating evidence, providing care and advocating against this menace in the scientific world. Within six months, a ‘Silicosis Clinic’ was started at Shakarpur with chest physicians visiting the clinic biweekly.

All the X-Rays with complete case history were sent to Shri Krishna Hospital which is a tertiary care hospital attached to the Pramukh Swami Medical College and the specialists from Radiology department reported the x-ray films as per the International Labour Office (ILO) classification.

**Outcome and impact of the silicosis project:**

The team from Pramukh Swami Medical College led by Dr Paliwal, published a first paper viz. “Silicosis among Agate workers at Shakarpur: An analysis of clinic based data” in Lung India describing the extent of the problem with sound scientific rigour. It was appreciated in the scientific community and considering the importance of the topic coupled with its scientific merit, the paper received Best Original Article Award by Indian Chest Society. The article is also cited widely by other researchers testifying the merit of the study. In view of the published study, a delegation of Govt. of Gujarat visited Pramukh Swami Medical College, to examine the authenticity of those findings. The delegation verified all the case sheets, x rays and was satisfied with the systematic documentation that was made. Using the data from the silicosis clinic we published another paper viz. “Co-morbidities among silicotics at Shakarpur: A follow up study” in Lung India describing the extent of the problem. This paper too received Outstanding Original Article Award by Indian Chest Society in November 2012. This is a unique example of multi-level partnership addressing an important epidemiological issue and the Department of Health; Government of Gujarat issued a GR (Government Resolution) in 2012 announcing compensations for all the victims who lost their lives due to dreadful silicosis. (Please find attached the copy of Government Resolution.)

Research literally means diligent and systematic inquiry or investigation into a subject in order to discover or revise facts, theories, applications, etc. Unfortunately research has become an uncomfortable, scary and frankly bizarre term for faculty of medicine in India. Knowledge utilization combines translational research with evidence based medicine. After the health transition following the rapid economic growth, India needs to develop its own indigenous methods to tackle the health problems expected to prevail in the near future. Improving understanding of research and capability to do research in a large country such as India should improve the research scenario in India. If such an initiative is effective it can bring about redefining of various management strategies in public health including service delivery. Inculcating research (Spirit of inquiry) is a need of the hour. In a resource poor setting, a more innovative model is required to address the issue with optimal utilization of the resources. Research is necessary not only to achieve personal satisfaction but also to provide evidence based contextual solutions to complex web of health problems faced by a country. The research culture is almost absent in the medical fraternity of India except few honourable exceptions. A paradigm shift from ‘me too’ research to pertinent and methodical research is essential.
A doctor’s clinic is a goldmine - The doctor is the miner and patient's health data is the gold. Patients come to the doctor with their ailments, their pain and suffering. A doctor through his diligent enquiry, clinical examination and acumen and supporting investigations comes to a conclusion about what the patient is suffering from and prescribes in his wisdom with the sound knowledge that he has acquired over his years of practice. The doctor also gets to see the effect of the intervention and the progress of the disease. The clinic can also be a rich source of information for understanding the social, cultural, economic back grounds of the patients and other factors related to the suffering and the patient's expectations, the scenario of the healthcare delivery etc.

However this gold mine is not converted yet. Doctors, due to their busy schedule and huge patient load do not maintain documentation diligently and do not even know that this huge database of patients can help understand novel ideas and be a valuable source for research. Most of the health related data are obtained from public hospitals and public health care service units and it is this data that is used to guide the health care policy makers. However this is not a true reflection of the health status as in India about 80% of the population turns to private clinics for their healthcare needs. Doctors in private practice need to understand that it is they who see the real picture and by assimilating and analysing their data, they can contribute majorly in by raising data that will actually reflect the health status of our country and guide the policy makers of the healthcare delivery systems. Hence they need to take the leap of digitisation. How they do this is a true reflection of the health status as in India about 80% of the population.

How to start?

Most doctors in private practice who want to do research are like the first time diver, standing on the diving board, wanting to dive but too apprehensive to take the plunge. The first step is to ask a good research question. It could be anything, Dr. Bidhaan (name changed), my friend always wondered what the prescription trend for diabetes in the area he practiced was. One fine day, he decided to find out himself. He did not have any assistant or any special infrastructure. All that he did was to click a picture of all the previous prescriptions written by previous doctors. Every evening, it was but a half an hour's job to put in the information from the pictures into an excel sheet.

What was the age of the patient, what was the blood sugar level what prescription was given by the physician any associated conditions. When he gathered data of about a hundred patients, he analyzed it and found interesting observations, like when was an Oral Hypoglycemic Agent prescribed, when was insulin prescribed, what were the commonly associated comorbidities, how frequently were blood tests done etc. He presented his experience in our local doctor's meet. It was a great learning experience for all of us.

We discussed with each other about our own prescriptions, their appropriateness and whether there was any scope to improve it further. For Dr. Bidhaan, it was an exhilarating experience.

The next step:

The journey towards clinic based research is interesting. Another doctor keen on doing research right from his college days, built up a reasonably good practice and then organized himself. In his small little clinic, he started keeping a registry of all patients who came to him. Each patient was given a registration number and a dedicated file. Carbon copies of all prescriptions was kept and filed at the end of the day. He could by then afford two assistants. After two years, he published an ODP based statistics of different diseases presenting in referral practice. Encouraged by this, he gradually went on to invest into full time research and has contributed some significant data now, such as Co-morbid associated with COPD, the fact that 72% of GOLD stage IV COPD cases had Osteoporosis, porter HRCT changes of Non Idiopathic Pulmonary Fibrosis, Diffuse Pulmonary Lung Disease patients in India. With such a significant contribution he now has no problem in getting some sponsorship or research grants from academic bodies as well as pharmaceutical companies who help him study various aspects of the diseases which are likely to create an impact on clinical practice. The Ethical Committee of a reputed hospital nearby reviews his research proposals and since most are observational, non interventional studies, he has no problems in getting the approvals.

The ascent:

He has published in several journals and has also presented his findings in National and International conferences. As a doctor he has tremendous satisfaction not only of being able to heal his patients, but also for contributing to knowledge generation by helping dig up the gold from the data mine he has. He is enriched as much as he is enriching the health statistics of our country and that is indeed more gratifying.

to track Dengue outbreaks in Pakistan. Further, geo-tagged smartphone photos were used to identify and destroy breeding sites of mosquitos. I expect that in coming years we will see hybrid approaches where data mined from a variety of sources will be used for early warnings, while more specific systems may be used to facilitate interventions.

Electronic Health Record research

The availability of health record data in standardized electronic formats is expected to provide a major boost to public health research in India. While the use of EHR is still in its infancy in India, when compared to the developed world, it is expected that these will rapidly gain traction. A number of interesting discoveries relevant to public health have been made by algorithmically sifting through large EHR datasets. These especially pertain to previously undetected drug interactions and side effects. Since most of the healthcare delivery in India is still conducted on paper, an unmet need is creation of rapidly deployable health infrastructure with a cloud-connected EHR that integrates the process of healthcare delivery and healthcare data collection. One such solution, called the eHealth Centre, has been tested and validated. About 40 such centers are operational throughout India and have also been deployed in Bhutan and Philippines. Big data based public health research holds the promise of enabling novel understanding of health and disease as well as increased efficiency of public health systems. Combining multiple types of data – environmental, demographic, epidemiological, health facilities, healthcare utilization - layered on actual Geographic Information System maps will permit understanding of complex relationships between the multiple variables that determine health and health care utilization. Finer resolution data encompassing personal health indices, symptoms, diagnoses, drugs and outcomes will enable precision medicine for individuals. Communities should be thought of as living public health laboratories where natural experiments are being conducted. Capturing, visualizing and exploring the data generated by these living labs are the challenges we must now embrace.

>>Continued from p.7 NEED FOR PUBLIC HEALTH RESEARCH
Research is defined as the systematic investigation process, into the study of materials and sources in order to establish facts and reach new conclusions. It follows the scientific method that has the following steps: identify a research problem, gather information (review the literature), form a hypothesis, test the hypothesis by performing an experiment, collect data in a reproducible manner, analyze the data, interpret the data, draw conclusions, publish the findings, and finally retest the hypothesis (frequently done by other researchers). When the entire foundation of modern medical science rests on research pursued using the scientific methods, it is surprising how little formal training on research methodology has been incorporated into medical education in our country.

Imparting the knowledge of research methods is important and should be done early during medical training. This knowledge is essential to acquire the skill of conducting novel research. For example, the understanding of critical appraisal of a randomized controlled trial or a meta-analysis helps to decide whether a new drug or technique is really effective. It also helps to explicate the applicability of the findings of published studies to one’s own clinical practice. Encouraging participation of residents in scientific enquiry early in the career also helps in moulding young minds to develop logical thinking which has a positive influence on their understanding of diagnostic and management algorithms. The residents also get a feel of what medical research is all about. Through this way of early exposure to research, the faculty can identify who among the bunch has real aptitude for research. This also helps the residents to make a choice between a practice-oriented or research-oriented career. Finally, the residents develop a reasoning and questioning attitude that builds a foundation for critical thinking which is helpful throughout their careers.

Presently, medical residency programmes in India have an essential requirement of a thesis/dissertation that needs to be submitted at the end of 2.5 years to be eligible for appearing for the exit examination. We need to ask the question whether this exercise is serving the purpose it is intended to serve. A multitude of problems and deficiencies plague the system of the MD/DM thesis. First, the faculty who guide the thesis themselves are often unfamiliar with research methodology. A faculty member is allotted candidates not by choice but only by seniority and roster system. Thus, if a resident wants to work in a particular area of interest with the respective faculty who has interest in that area, he is generally not given that option. Second, thesis projects are often not well thought out. Many a time, they are done just for the sake of doing it or they are just an advancement of the research being pursued by the thesis guide with little attention to whether the project is going to impart the necessary research skills to the resident. Third, the residents are not provided dedicated time to pursue their research projects. Rather, they are expected to squeeze it into their already busy schedule and long working hours. Such a practice can hardly stimulate free thinking and enhance creativity.

Certain systematic changes are required to improve the training in research methodology during residency. First, training in research methods should be identified as an essential part of any residency program and both formal training and evaluation of the same are required. The faculty should themselves receive formal instruction in critical appraisal of research papers and then incorporate the same into the curriculum. Sessions on basic research methods, critical appraisal of research studies, and basic statistics should be held in the very first semester of residency, so that the knowledge gained during these sessions can be applied throughout the period of the residency. It is also crucial that the faculty of the respective departments themselves are completely involved in such sessions rather than just sending their residents to the biostatistics section for didactic lectures. Second, residents should be stimulated to come up with ideas for their respective research projects soon after joining the course. They should be allowed to select their own guides (within certain restrictions) according to their research ideas. Then, they should be given dedicated research time to plan their study and conduct a good literature review. They should receive instructions in medical database searches by specialist librarians with the involvement of their guides.

Finally, dedicated time should be allotted not only for subject enrollment for their projects but also for focussed sessions to clear their doubts, troubleshoot problems and come up with further ideas to improve their project work. The time may be given as a few dedicated months or intermittent research weeks. Moreover, medical residency may also have an optional extra year for dedicated research that may be opted for during or after the three years of residency. Finally, each residency research project should not only be “in partial fulfilment of the degree” but it should also be aimed at a mandatory publication or presentation at an academic meeting. A part from systematic changes needed in research training during residency, a lot of initiative has to come from the side of the residents. Right from the beginning of residency they should aim to learn not only clinical skills but also research skills. With long work hours, it is essential that one is able to manage time well to spare some for research. One should find a mentor who may be the thesis guide or some faculty member other than the thesis guide, who may guide him/her in research methods. It is crucial to thoroughly search and read all the literature relevant to the research project. Developing a genuine interest in one’s research project is necessary to stay focussed and let it percolate into one’s everyday thoughts and discussions with colleagues. The resident should try to critically analyse latest research articles to inculcate the questioning attitude and logical thinking. Reading, understanding and applying basic statistical methods both during critical appraisals and one’s own research project leads to further enhancement of research skills. Finally, it is of utmost importance that the resident aims to present and/or publish his/her findings. If not presented in a national/international conference, one may target local chapters of medical forums. Similarly, if not published in a national/international indexed journal, one may publish the findings in local bulletins. Training in research needs to go hand-in-hand with clinical training during medical residency. Lack of facilities and funds should not be an excuse to not promote research. Any research project taken up in the right earnest, even if not adding to international literature can always act as a model to train the residents in research methodology and serve as an audit to guide and inform local clinical practice. It is high time that we make sincere efforts to incorporate high quality research training in medical residency programs in our country.
Challenges and Opportunities for Research in a Hospital Setting

Research in Respiratory Medicine in Indian hospital settings has its unique challenges and opportunities. Hospitals across India fall into one of the following categories; Educational institutions, Government hospitals, Corporate hospitals and Private non-profit hospitals. Each of them has a distinctive functional style, with goals and priorities clearly laid down. The common thing found in the majority of hospitals, is that they lean heavily towards patient care and clinical services. There is an ever increasing patient load and capping the number of patients seen is often not possible as this may result in undue patient waiting time to see the physician and get medical help. Focusing primarily on clinical work, research has often suffered and taken a back seat. There is very little emphasis on research with no dedicated secured time for such academic pursuits. Many doctors, in addition to the job in institutions, continue to see patients in their private clinics, which further pinches on the time for research.

There is a mandate for research in educational institutions like central government research institutions and medical colleges. In some institutions promotion is linked to academic pursuit or number of research papers published. Recently Medical Council of India has mandated that specific number of original research articles are needed for a faculty to climb the ladder to become an Associate Professor or Professor. While this is a welcome move, the flip side of it is the ‘publish or perish’ procedure for promotions. Undue pressure can tempt one to do research in unfair and unethical way. The researcher can fall victim to incomplete or improperly processed data, failure to follow ethical procedures, failure to obtain informed consent, duplicate submissions and plagiarism. With this new mandate on publications for promotions, there will be an increasing demand for co-authorship even with minimal contribution to the research. Presentation of research work in the national or international forum is becoming a difficult task. In some of the hospitals, personal leave have to be availed to participate in conferences. Arranging funding for travel and accommodation related to conferences is another challenge.

In non-educational institutions the research is primarily dependent on the interest of an individual. Often there is no dedicated time, space, personnel or funds for such a venture. The physicians have to look at alternative resources which are meagre. Agencies to fund medical research in India are less. Funding agencies have kept themselves blinded to the looming epidemic of respiratory diseases in India. Funding agencies take a long time to scrutinize research proposals and approve. Turning to pharmaceutical companies for funding comes with its own challenges in doing ethical research. With Government tightening the regulations for interventional studies, the multinational pharmaceutical funded studies are becoming more difficult.

In many hospitals in India, patient’s medical records are with the patients. They may not be readily available for any retrospective studies. Also there is a high probability of patients losing these important documents on follow up. Many patients follow up with many doctors or do doctor shopping which leads to loss of any follow up information. The case history is not written in detail, leading to inadequate information (for eg, pack years of smoking is not always documented) even for any retrospective data analysis.

There is a huge lacuna in our medical education, in systematic teaching of research methodology and statistical analysis for undergraduate and postgraduate students and the faculty. Most institutions often lack good dedicated statisticians, who are so crucial in designing the study methodology and data analysis. Comprehensive workshops on medical research and scientific writing should be conducted periodically.

A lot of research work done, as post graduate thesis or a conference presentation, often does not get published and valuable hard work and relevant scientific information is lost forever. The prime reason is lack of motivation to sit, write and convert it to a publishable format. The western journals are unduly biased towards research done in India for its quality. There are very few Indian respiratory journals, some of which are not available even on a monthly basis. They take a very long time for peer review and to provide a decision on the manuscript. This is another reason as to why a lot of research work done in India which is very relevant and important in the Indian context is not published.

Specialized tests such as spirometry, body plethysmography, lung diffusion capacity are required to evaluate respiratory disease. Most of these instruments are imported and they have predicted equations for the Western population which may not be applicable in Indian population. Even within India, different geographical locations may have different normal values. It is important that Indian predicted equations are installed in these instruments. It is a challenge to find an equation which most suites the specific population.

Accolades for CRF at European Respiratory Society Congress, 2015, Amsterdam, Netherlands
Dr. Rahul Kodgule – ERS Gold Sponsorship
Mr. Kuldeep Mandani - ERS Gold Sponsorship,
Ms. Baishakhi Ghosh – ERS Silver Sponsorship
Ms. Renu Sorte – CRF Sponsored
Dr. Virendra Singh is the leading Asthma Specialist of our country working as Director, Asthma Bhawan, Jaipur. His competence made him popular among patients who come to consult him from different parts of the country. He made some original discoveries and inventions. He has invented the Pink City Flow Meter and Pink City Lung Exerciser (PCLE) very useful instruments for patients of Asthma. For fundamental research and inventions he was awarded the prestigious NRDC award by the Government of India in 1989. He was the first person in the country to win this award below 35 years age. He was also awarded the most prestigious medical award of the country the Hariom Ashram B.C. Roy award in 1991. Pink City Lung Exerciser is an equipment to perform lung exercises. It is based on principles of pranayama. PCLE is essentially the harmonization of ancient yoga techniques and modern bio-mechanics. This consists of a mouthpiece attached to a disc containing apertures, which carry a one way valve. The valve facilitates setting to impose slow breathing, to enable asthmatics to exercise their lung in the 1:2 ratio of breathing in and out as equivalent to the rate during “Pranayama” in yoga exercises.

Here are few of his experiences he has shared with us:

1. What made you to do this research in your city, how did this idea come into your mind?

After completion of my post graduation in 1980, I developed interest in care of asthmatic patients. Therefore I was analyzing alternative treatment modalities and soon realized that many asthmatic patients attending yoga centers during those days were getting benefits for their disease. Yoga is an ancient Indian discipline useful for good health of body and mind. But these were just personal experiences and therefore did not have sufficient merit to influence medical advice. I searched the literature and found that majority of the yoga studies were subjective experiences only. A couple of studies used peak flow meter or spirometer as objective tools which provided some useful evidence but still it was short of any significant authentic evidence. Yogic practices involved series of asanas, postures and pranayama. I consulted literature to find out the most beneficial component of yoga. Pranayama the 4th step of ashtanga yag of Patanjali was claimed to be useful in respiratory patients in some reports. Especially the Anulom vilom pranayama was said to be beneficial in asthmatic patients. I attended a yoga ashram of Prakratic chikitsalaya at Bapu Nagar of Jaipur. Swamiji in the ashram said that pranayam was very useful for asthmatic patients but problem with the patients was that they were not able to keep a ratio of 1:2 for inspiration and expiration. The second challenge for those patients was gradual slowing of breathing frequency. Could we make some instrument to guide and help people to maintain a ratio of 1:2 for inspiration and expiration and stepwise slowing of breathing? An intense desire to answer this question leads to invention of the Pink city lung exerciser.

2. What is Pink City Lung Exerciser?

This is an equipment to practice pranayama. It has couple of holes of decreasing diameter which are provided with a partial one way valve. During inspiration full size hole is patent while during expiration half of hole gets closed by valve. By breathing through it one can maintain a ratio of 1:2 during inspiration and expiration easily. With practice when the size of hole is changed to next smaller, slowing of breathing can be achieved easily. The patent for invention was granted to the country, the Hariom Ashram Bapu Nagar said that pranayam was very useful for asthmatic patients but problem with the patients was that they were not able to keep a ratio of 1:2 for inspiration and expiration. The second challenge for those patients was gradual slowing of breathing frequency. Could we make some instrument to guide and help people to maintain a ratio of 1:2 for inspiration and expiration and stepwise slowing of breathing? An intense desire to answer this question leads to invention of the Pink city lung exerciser.

3. How did you start the study and what are the difficulties you faced while doing this study?

When the instrument was ready we planned to study it in asthmatic patients. The patients were asked to breath either through PCLE device or through a mouth piece device regularly. After one fortnight they changed the device in the cross over design of the study. The results showed that use of PCLE use lead to better control of asthma. In 1986 the study was published in one of the important international journal (1 Asthma 1987; 24:355)

Following this, the international community started taking yoga more seriously. They analysed the study and criticized its methodology. Their major objection was lack of a blinded placebo group. Though we used a control group but it was too obvious to identify placebo and treatment periods. More over Indians are well acquainted with yoga and therefore can readily identify the active and placebo group. At that point of time I got a bit frustrated. My colleagues in medical college used to laugh at me and passed sarcastic comments since initial stages. But I had one consolation, that my study was published in an international journal. I was in a fix, how to design a double-blind placebo control study.

My next opportunity came when I was selected for a common wealth fellowship and went to England. I was in Nottingham and my supervisor was Prof Anne Tattersfield who was a big name in the field of Asthma. She was the editor of Thorax during those days. I discussed my PCLE study with her. She said that if we can design an identical looking placebo we can plan a study. When Prof Tattersfield asked me to design an identical placebo it was quite a challenging task. Though I had a clear idea but executing was a challenge. In those days majority of Indians did not own a telephone and communication through letter was time consuming. In the Respiratory Department of Nottingham they had a fax machine, but in India rarely people had it. Meanwhile, couple of months passed and the duration of my fellowship was only for one year. I got frustrated and there were times when I thought of quitting the project. Then a miracle happened one night at 3 am in the morning, I received a phone call of my friend Dr S S Agrawal. He informed me that my other equipment Pink City Flow meter received the highest award of invention in the country, the NRDC award. It was a cash award of Rs 50,000.

This motivated me a lot and I made sustained efforts thereafter. Luckily my friend D Somani had telephone in his house and therefore, we could communicate more frequently and ultimately received identical looking placebo lung exerciser. The study was conducted in England where 18 British citizens participated in this study who had no knowledge of yoga during those days. The study went on well and results showed that PCLE was able to reduce airway reactivity by almost one doubling dose of histamine. The magnitude of reduction was quite impressive and theoretically it was comparable to the effect of low dose of inhaled steroids. It was the first double blind placebo-controlled study of yoga in the world literature. The study was published in the Lancet 1990; 355; 1381. It generated lot of interest not only

Continued on page 9
Humans cannot breathe underwater but there are several ways by which we can explore the underwater world. Recreational activities like snorkelling allows us to observe underwater life, without using any complex equipment and it does not need any special training. In snorkelling, an individual breathes through a small tube known as a snorkel (length not more than 30 cm) while swimming at the surface of the water. Since an individual breathes the atmospheric air through the snorkel he does not need to come out of water to breathe. A snorkel more than 30 cm in length is not considered to be safe because as we go deeper in water the pressure exerted by the water on the body (lungs) increases in a linear fashion. Therefore, if you are using a snorkel which is more than 30 cm in length the pressure on the lungs due to the water will be very high as compared to the pressure at the other end of the snorkel, which is out of the water (atmospheric pressure). As we go deeper, this pressure gradient increases. Human lungs can operate against a pressure differential of less than app rox. 0.05 atmospheres. The pressure underwater increases up around 1 atmosphere for every 10 meters (0.1 atm/m) deeper we go. This is the reason why humans cannot snorkel at a depth below 30-50 cms. If they do, the negative pressure required to breathe will be so high, that it will damage the sensitive visceral pleural membrane.

Elephants on the other hand are known to swim safely across rivers and lakes at much deeper depths (approx. 4m) compared to humans using their natural snorkels, their trunks. Elephants use their trunks as snorkel and are able to breathe while they are submerged underwater. They are able to withstand the utmost pressure differences above and below water without bursting the blood vessels lining the visceral pleural membrane of the lungs.

How do they do it?
Amazingly, elephants are the only mammals that do not have a pleural space. This pleural space is obliterated by a dense connective tissue. It is the absence of pleural space that allows the elephants to snorkel even upto 4m underwater. It is though that the modern day elephant evolved from an aquatic animal that used its trunk as a sort of snorkel while it spent extended periods of time beneath the surface of water. Even today, elephants are able to swim in this way, staying underwater for hours at a time, with only the tip of their trunk exposed.

4. How did you get the resources for this study?
I was member of Lions club banipark. Some of the members were industrialists. I appealed them. Three persons donated and we got Rs 4,500/ to design the device. It was sufficient to do initial trials to develop PCLE. After publication in the Lancet I received offer of a British company for outright purchase of marketing rights in 50,000/ pounds. But they wanted a global patent. I had only Indian patent. In those days India was not a member of WTO and therefore Indian patent was not valid globally. The offer could not be executed.

5. Why did you name it Pink City Lung Exerciser?
Keeping name of the invented device after me or after my family name was a great temptation. But I pondered and did an introspection and asked a question to myself “who contributed in the invention of the device?” The answer was almost 20 persons contributed in small or big way. I should give a name to the device which can represent all these people.
And common thing of those 20 persons was that they all lived in Jaipur, the Pink City. Therefore I named it Pink City Lung Exerciser.

6. How do you want to motivate the next generation by this study?
I think there are many Indians who are intelligent and innovative. Only problem is they ignore themselves and therefore do not execute the idea. My message to next generation is do not rely on others, just rely on your own ideas. Do not ignore yourself. Hardship of resources is a barrier but determined commitment can win over all hurdles. Never ignore yourself, move forward and execute your ideas. Today is the most auspicious day to take the first step towards execution of your idea.
The Respiratory Research Network of India (RRNI) was formed on 11th August 2012 inspired from the American Lung Association’s model of Airways Clinical Research Centres (ACRC), USA. RRNI is an initiative taken up by Chest Research Foundation, Pune. The Network brings together experts in the field of respiratory medicine and research to conduct large multi-centric studies to help shape research and health policies in India. The network currently has 40 Investigators registered from all across India. We are currently in the phase of expanding our Investigators database and welcome all doctors with respiratory practice and an inclination towards research to join this largest Respiratory Research Network in India.

The aim of this network is

- To promote respiratory research and encourage the healthcare professionals to conduct quality research in the field of respiratory medicine in India
- To support the policy makers in formulating or improvising the existing healthcare policies by generating the need based knowledge through the research work conducted by this network

**PUBLICATIONS**


For more information please visit: [www.rni.net](http://www.rni.net)

**Criteria to register as an Investigator**

- Pulmonologists/Physicians/General practitioners with respiratory medicine practice having genuine interest in academic research work
- Access to a considerably large patient population with respiratory diseases like Asthma, COPD, TB, Bronchiectasis and ILD (any 1 or all)
- Access to basic diagnostic facilities, e.g: spirometer, x-ray, lab investigations etc (referral for investigations are acceptable if you have an OPD setup)

Network Sites

Current Site: 40
Sites to be identified: 07

Register with RRNI!
## Completed Research Studies

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title</th>
<th>Authors</th>
<th>Aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prescription patterns for COPD patients by physicians across India:</td>
<td><strong>Principle Investigators</strong>: Dr. Parthasarathi Bhattacharyya, Dr. Serna Limaye</td>
<td>To understand the prescription patterns for COPD patients by physicians across India</td>
</tr>
<tr>
<td></td>
<td>A multi-centre observational study</td>
<td><strong>Co-investigators</strong>: Dr. P A Mahesh, Dr. Raja Dhar, Dr. Suryakant Tripathi,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr. Rajesh Swarnakar, Dr. D J Christopher, Dr. Mahivr Modi, Dr. C. E. Prasad</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Global Initiative for MRSA Pneumonia- GLIMP</td>
<td>Dr. Raja Dhar, Dr. P A. Mahesh, Dr. Suryakant Tripathi, Dr. Parvaiz Koul, Dr. Hirrenappa Udun</td>
<td>To identify risk factors associated with pneumonia caused by MRSA in hospitalized patients coming from the community</td>
</tr>
</tbody>
</table>

## Ongoing Research Studies

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title</th>
<th>Authors</th>
<th>Aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>APRISE</strong> - Antibiotic Prescribing practices and prevalence of antibiotic Resistance in various Intensive care units across multiple centres in India.</td>
<td><strong>Principle Investigator</strong>: Dr. Rajesh Swarnakar <strong>Co-investigators</strong>: Dr. C.E. Prasad, Dr. P.A. Mahesh, Dr. Sanjay Kochar, Dr. Murali Mohan, Dr. Sushant Meshram, Dr. Zuber Ahmed, Dr. Babaji Ghewade, Dr. Virendra Singh, Dr. Girja Nair, Dr. Hirrenappa Udun, Dr. Suryakant Tripathi, Dr. Rajesh Khyalappa, Dr. Amol Hartalkar, Dr. Jitendra Ingole</td>
<td>To study the antimicrobial prescribing practices and the extent of the problem of antimicrobial resistance in various intensive care units across multiple centres in India</td>
</tr>
<tr>
<td>2</td>
<td><strong>EMBARC INDIA</strong> (The European Multicentre Bronchiectasis Audit and Research Collaboration In INDIA): This study is being conducted in collaboration with the European Bronchiectasis Registry</td>
<td><strong>Indian Principle Investigator</strong>: Dr. Raja Dhar <strong>Co-investigators</strong>: Dr. Hirrenappa Udun, Dr. Babaji Ghewade, Dr. Sushant Meshram, Dr. Nitin Abhyankar, Dr. Parthasarathi Bhattacharyya, Dr. C.E. Prasad, Dr. Virendra Singh, Dr. Praveen Valsalan K, Dr. Murali Mohan, Dr. K. P. Venugopal, Dr. Tushar Sahasrabuddhe, Dr. Girja Nair, Dr. Suryakant Tripathi, Dr. Archanan Rao, Dr. Surajnan Mukherjee, Dr. P.A. Mahesh, Dr. R. Vijai Kumar, Dr. Rajesh Swarnakar, Dr. Aditya Jindal, Dr. Sanjay Kochar, Dr. Amol Hartalkar, Dr. Gayathri Jeshy, Dr. Sushmita Roychoudhari, Dr. Parvaiz Kouli, Dr. Anuman Mukhopadhyay, Dr. Sunil Vyas, Dr. Zuber Ahmed</td>
<td>To create an Indian registry of bronchiectasis in order to improve quality of patient care through research and knowledge generation</td>
</tr>
<tr>
<td>3</td>
<td><strong>UNLOCK</strong> - India’s contribution to the Uncovering and Noting Long-term Outcomes in COPD to enhance Knowledge.</td>
<td><strong>Principle Investigator</strong>: Dr. Komalkirti K. Apte <strong>Co-investigators</strong>: Dr. Bill Brashier, Dr. Sundeep Salvi, Dr. Parthasarathi Bhattacharyya, Dr. P.A. Mahesh, Dr. Rajiv Paiwal, Dr. Balamugesh, Dr. Rajesh Swarnakar, Dr. C.E.Prasad, Dr. Parvaiz Koul, Dr. Arvind Bhome</td>
<td>To develop a database of Asthma and COPD patients from across India</td>
</tr>
<tr>
<td>4</td>
<td>Asthma and COPD Differentiation in Respiratory Symptoms Analysis- ACIRA</td>
<td><strong>Principle Investigator</strong>: Dr. Sundeep Salvi <strong>Co-investigators</strong>: Dr. Sushant Meshram, Dr. Vishwanath Pujari, Dr. Shrikant Bhalara, Dr. Nikita Jalan, Dr. Sneha Limaye, Dr. Rahul Kothgule, Dr. Komalkirti Apte, Mrs. Renuka Kiran Gaiikwad</td>
<td>To develop short and simple questionnaires which will help physicians differentiate between COPD and Asthma with ease and confidence in the absence of objective tools</td>
</tr>
</tbody>
</table>

## Upcoming Research Studies

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title</th>
<th>Aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Burden of Chronic obstruction Pulmonary Disease Exacerbations in various Intensive care units across multiple centres in India.</td>
<td>To study the burden of COPD Exacerbations in various intensive care units across multiple centres in India.</td>
</tr>
</tbody>
</table>
| 2    | Study on Airflow Limitation in Treated Tuberculosis Patients (SALT-TB) | 1. To study the association between treated pulmonary tuberculosis and chronic airflow obstruction  
2. The pattern of spirometric abnormalities in patients with past history of tuberculosis  
3. To study chronic airflow limitation in these patients behave like asthma or COPD  
4. To study the trend of change in spirometric values over next one year |
ICONIC 2016
2nd International Conference on Insights & Management of COPD

5th - 7th February, 2016 • Hotel The Westin, Pune

The 3-day spread of ICONIC 2016 involves a knowledge feast delivered by the stalwarts in the field of Pulmonology. Eminent international speakers and world renowned Indian faculty would grace the conference.

PRE-CONFERENCE WORKSHOP
5th Feb 2016

- Arrest of the Notorious COPD Devil – Smoking Cessation 09 am to 1 pm
- Advanced pulmonary function tests 09 am to 1 pm
- Non-invasive Ventilation Extensive Hands - on 02 pm to 05:30 pm

COPD Quiz
COPD Quiz on 6th Feb 2016 evening for PG Students. Attractive cash prizes for the winners.

COPD Quiz
- 1st Prize ₹ 20,000/-
- 2nd Prize ₹ 15,000/-
- 3rd Prize ₹ 10,000/-

The first round is a written MCQ assessment on 6th Feb 2016.

Best Abstract Award
- 1st Prize ₹ 20,000/-
- 2nd Prize ₹ 15,000/-
- 3rd Prize ₹ 10,000/-

Abstract submission Open Last Date of abstract submission: 15th Jan 2016

Call For Abstracts

ICONIC 2016 will be accepting the submission of scientific & case report abstracts on COPD. Abstracts can report on basic, translational & clinical science research, epidemiological, social, bio-behaviours and psychological investigation or educational and quality improvement projects.

SUBMISSION DEADLINE: 20th Dec 2015 (5:00 pm ISD)

Credit Points : MMC (Maharashtra Medical Council) & EBAP (European Board for Accreditation in Pneumology)

For your feedback / queries write to respimirror@crfindia.com

Do you want to conduct a training programme in your city? Please write to Ms. Simi Raghavan at simi@crfindia.com

NOTE: For private circulation only. Edition by: Ms. Simi Raghavan Published by: Chest Research Foundation, Pune Printed by: Bookmark I Print Division, Pune