Good Medicine and Health Informatics. We need calm technology that works.

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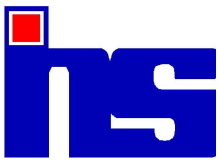

THE INSTITUTE OF HEALTH SYSTEMS

Good Medicine and Healthy Informatics. We need calm technology that works.[1]

Dr. Prasanta Mahapatra[2]

Chairman of the session Mr. Parekh, Prof. Saikumar, Mr. Gopalakrishna, Director, IPE, other organisers of the conference, delegates to this important conference, ladies and gentlemen. I would like to thank Prof. Saikumar, his colleagues and members of the organising committee, for providing me an opportunity to speak before you and present my personal viewpoints on a subject which is very dear to me. I seek your attention and request you to bear with me for the next half hour.

My primary interest lies in human health, social and economic development. I see medicine, informatics and for that matter every thing else that contributes to promotion of human health as instruments. Thus my views on the emerging medical and health informatic scenario arise from this perspective of promoting human health in general and health status of the average Indian in particular.

I will first take stock of some current trends in our society and try to take stock of what I mean by good medicine, healthy informatics and calm technology. I will then try to identify the **key** steps needed to harness medical and health informatics for an improvement in health of the Indian population, the **notes**, i.e. financial implications of this field and finally **address** to each one of you and through you, our fellow country men about steps we can take to improve efficacy of our health care system through use of informatics. I hope, by then, I would have some what justified the my role today.

I. Good Medicine:

Those of you who live in Hyderabad, I am sure, would have noticed the distinct change in health care delivery facilities in the twin cities over the last two decades. The number of health care institutions have increased many fold, mostly in the private sector, and the size of many institutions have increased, mostly in the public sector. But that's not my point. If you spare a moment to think about the names and title of these health care facilities, you would see that the usage of the word "super" and hospital has increased many fold. For example you have ABC super speciality hospital, ... dental hospital, ... super speciality dental hospital, super speciality skin hospital and clinic, and so on. Those of you from dentistry and dermatology, please bear with me. The scenario is the same in almost all areas of health care delivery. I had to chose some name to make the point, but do not mean to single out your specialities. Now returning to our main theme, if you ever had to go for some tests, say for example urine test, blood test, or X-ray, you would have noticed that the report usually is a computer printout. Dot matrix printouts are particularly popular, since they are the most cost-effective way of giving respectability to the report.

The government did not lag behind in this competition to bring in super speciality health care. Quite a few super speciality hospitals have been set up, starting with the well known Nizams Institute of Medical Sciences. Most of these hospitals set out to provide super care to public and develop themselves as centres of excellence. Here you should interpret superiority and excellence in terms of the capital investments mostly to buy high cost

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diagnostic and therapeutic equipment. Soon other public hospitals recognised that these high cost diagnostic equipment gave tremendous respectability and credibility to a hospital. So you will now find a set of demoralised tertiary hospitals in the public sector who have not been able to persuade the political - bureaucratic authorities for sanction of funds to buy the MRIS, CAT Scans and Cath labs. The other set of a few hospitals have tried to keep up their past glory by mobilising funds and acquiring some sort of CATS and MRIs.

Some time ago a well known private hospital chain started a helicopter service. The service was duly inaugurated by the Chief Minister. We were told that the helicopter service was to take super speciality care from out of the elitist confine of hospitals in the city to the country side. I happen to know the chief executive of this hospital chain. Some of my friends work in this hospital. I was indeed overawed! I wondered then, how this company going to bear the cost of the helicopter? Recently, I happened to meet chief executive of this hospital chain. Quite naturally, I was curious about the state of the helicopter service. After all many of us have seen those western films and news clips showing dramatic helicopter rescue operations. We would have pined to see India develop such facilities. So I asked this person "How's the helicopter service doing?". Then he explained, that the specialists including cardiologists are in fact paying visit at regular intervals to the clinic sites in the countryside. People to come to consult the team and the hospital does get some patients on account of this service. However, the teams are now travelling by car. The helicopter is not available any more, since the leasing company packed up its operation or some such thing. I learnt one lesson from this. It is possible for us to sustain specialists and super specialist visits to the countryside at regular intervals, provided they were inaugurated through some sort of helicopter or small aircraft or such other high-tech vehicle. Looks like we are operating under some exponential decay in interest function. Thus if the interest and enthusiasm generated at the beginning is high enough, through use of heroic and high tech medium, the service will still be sustained even if the decay in interest function is operating. But those of you familiar with the mathematical properties of an exponential decay function, would realise that sooner or later such services fade. If you disagree with me on the decay in interest hypothesis, will probably agree with my primary argument that all we needed to start and sustain a service of specialist visit to countryside is some arrangement for road transport, for example cars, and funds to sustain that.

I will stop my survey here. I hope, I have made the following simple point. We have a tendency to be impressed by heroic schemes, and technology intensive solutions. Some times I wonder, we seem to have simply transferred our tantric reliance on spirits to a more modern object, namely the technology intensive, mystifying diagnostic and therapeutic equipment.

You may be wondering, why am I so critical? What is the alternative? Its not enough to identify what's bad medicine. We need to positively understand what's good medicine. I agree and owe to you a more positive statement of what is good medicine. Let me try that now.

1. Practice of Medicine is an Art. The art is to harness scientific and technological developments in multiple areas to benefit human health. The art is to listen and understand patients. The art is to demonstrate empathy to fellow human beings, and share information to meet their concerns.
2. Good medicine is about choosing cost-effective therapeutic alternatives that does the job for less money.
3. Good medicine is based on evidence about efficacy of chosen interventions.

4. Good medicine is about appropriateness of technology. Appropriateness is to be viewed here from two perspectives. The chosen technology is appropriate to the circumstances of the case and not because the technology is around and is in fashion. If cultural variants of a technology are feasible, then the one that is in synchrony with our culture.
5. Super care should mean superiority in care and not be confined to attained superiority of the care giving institution. Excellence and superiority in care should be measured by concrete health promoting indicators that tell us how a hospital performs against a desirable characteristic. For example incidence of pathogenic isolates from areas designed to be aseptic. Existence of practice guidelines. Appropriateness evaluation protocols. Transparency and sharing of information with patients and attendants, etc.

These exhortations are general in nature. They would not mean much, if I could not find some examples to elucidate the idea. Hence I propose to give you one example. Lets take the case of acute myocardial infarction (AMI). I have chosen this example, because heart care, these days, is considered "super". I quite understand that. Quite naturally, since our heart lies in our heart. Another reason is that I have studied literature on this condition and have gathered some knowledge about medical management of AMI. Current medical technology, gives us the potential to save the life of about 42% of persons experiencing an acute attack. Half of this potential can be attributed to aspirin. Unfortunately many doctors and specialists do not prescribe aspirin even after such patients are admitted to a hospital and given a diagnostic label of AMI. Here the simple solution is to develop practice guidelines and disseminate the same through continuing education programs. No amount of additional equipment is going to work, since the equipment that is needed, namely doctors prescription, is already there. All we need to do is to sensitise this resource. Continuing with the same example of AMI cases, there is no evidence to suggest that aggressive dilatation of heart vessels gives any better result in comparison to conservative management. But some centres do entertain such heroic approaches involving extra cost but no extra benefit.

II. Healthy Informatics:

I now turn to informatics. This is about gathering, manipulation, classification, storage, and retrieval of recorded knowledge. All this is done with a purpose. The purpose is to better inform people. Now the question is better inform whom? The health care providers or the health care consumers? I hope most of you will agree with me that, our goal should be to better inform both sides of the enterprise, each according to their needs. The information provided should elucidate a situation and not mystify it. It should be available in time at the right place, so that it is of some use. Considering such needs and other relevant aspects, I have outlined the following few characteristics of healthy informatics:

1. Appropriateness to the perspective of the class of persons for whom it is intended,
2. Elucidate and there by simplify understanding of a problem and consideration of alternate solutions.
3. Temporal and locational appropriateness. In other words be available in time at the location where its user will most need it.
4. Improve the efficiency of health care delivery and thereby contribute to cost-effective medicine.
5. Improve professional competence of health care professionals, and there by contribute to improved quality of care.
6. Increase awareness of patients and health care consumers and there by improve compliance by all concerned.

Now lets look at some of the current trends in medical and health informatics and examine their relevance. Two topics appear to be trendy and fashionable. These are;

i. Telemedicine, and
ii. Artificial Intelligence.

A. Telemedicine:

Telemedicine is about use of telecommunication and information technology for medicine. We are told that telemedicine is going to solve our major problem of doctor unavailability in rural areas. The Government of India appears to have authorised a telemedicine project to be implemented by the CDAC and Sanjay Gandhi Institute at Lucknow. Once this technology is mastered by scientists in the country, we are told, villagers will be able to consult city based doctors in real time. City based specialist teams will be able to perform procedures on patients at remote locations with the help of a collaborating local practitioner. The distinguishing feature of telemedicine as opposed to the conventional Internet is the real time video conference. In future we are going to see some amount of robotics attached to the village end and manipulated from the city end. People have demonstrated feasibility of carrying out procedures by a team of medical professionals through real time video conference and availability of some local collaborator. The local collaborator should have some basic skills to be able to carry out the instructions of the specialist team, who are able to see things but can't extend their hand. With addition of robotics, the situation will improve. The specialist team will be able to do some amount of manipulation but not all.

Now lets stop for a moment and think about this calmly. Think about the location that can support real time video conference. You will need a fibre optic link for good quality video conference. A compromise will be three ISDN lines bonded together. I hope you are aware that the DOT at present charges a minimum rental of Rs60000 for each 64 Kb ISDN line. A fibre optic line is going to cost a lot more. It will be worth while to note that, in Andhra Pradesh, fibre optic lines have just been extended to the district headquarters towns. This has happened with constant persuasion by the Chief Minister, who as you all know commands respect and clout at the central government level, in the present political scenario. Lets grant it that with our emphasis on building IT infrastructure, we have laid the fibre optic lines. I would imagine that a town or village to have got a fibre optic connection would already have got electricity. Availability of good quality telecommunication infrastructure supported by fibre optic cables and electricity would have spurred some our entrepreneurs to set up software development facilities. Even general industrial activity would grow with availability of such infrastructure. Do you think doctors and specialists are going to wait and watch or can we expect development of hospitals and nursing homes concomitantly with development of basic infrastructure? In other words, if a village can afford the infrastructure of real time video conference, it might as well have some doctors and specialists operating within close reach. This is certainly going to be the case in densely populated country like India in contrast to sparsely populated country sides elsewhere in the world. I feel a more feasible alternative will be to encourage collaboration through document sharing, sharing of clinical data etc. using the much cheaper store and forward technology over Internet or some such infrastructure.

B. Artificial Intelligence in Medicine:

Expert systems imbued with artificial intelligence, and powered with knowledge bases, have been suggested as an alternative to lack of medical attention in the countryside.

Their potential to substitute medical and health care professionals is limited on account of many factors. Think from the perspective of a patient requiring medical care, and recall what we outlined earlier as features of good medicine. A patient expects empathy. Human touch and face to face interaction is an essential part of the doctor patient encounter. Technological options may allow some of these encounters to take place over a telecommunications network. But the primary relationship will have to be build by direct human interaction. An expert system will not be able to provide that. Now lets look at some facts about usage of expert systems in the west. I have compiled a summary from an article available in the Internet. This article is a survey of Artificial Intelligence Systems in Routine Clinical Use. Only one out of 39 expert systems is meant for the general population. This one is help a person give information about his / her current life style and then get some feedback about risk of cancer. Doctors, dentists, nurses and pharmacists and laboratory personnel are the primary users for 33 of these systems. That means about 85% of the artificial intelligence systems in routine clinical use today are being primarily used by health care professionals.

Summary of Artificial Intelligence Systems in Routine Clinical Use

AIS Category	Doctors	Dentists	Nurses	Pharmacists	Lab. personnel	General Population	Hospital Managers	Managed Care Providers
Acute Care Systems	5		1					
Decision Support Systems	3	4	1				1	
Educational Systems						1		
Lab Systems	8			1	3		1	
Medical Imaging	3							
Quality Assurance and Administration	3			1				3

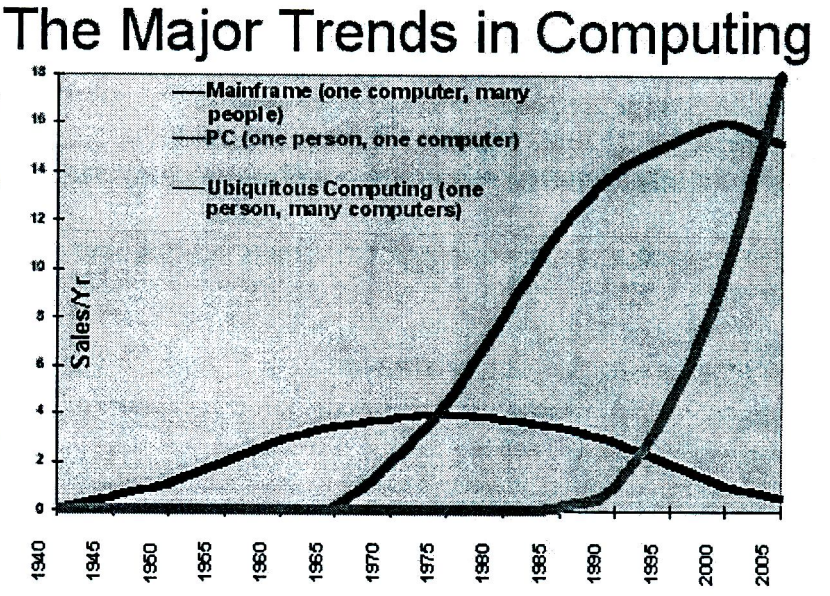
[1] Source: Compiled from Artificial Intelligence Systems in Routine Clinical Use at http://www.coiera.com/ailist/list-main.html accessed on 18 February, 2000.

So my conclusion is that expert systems and artificial intelligence has tremendous potential to improve the competence, quality and productivity of health care professionals. One more thing is clear as well. These systems are not going to be able to substitute the health care professionals and hence are not a solution to our problem of lack of medical and health personnel in rural areas.

III.Calm Technology:

Information technology (IT) has opened new vistas and enabled many fold improvements in the quality of services and efficiency of operations. This has naturally excited people. An unintended result of this mass excitement about the potentiality of information technology is a technocentric fixation. For example, you must have come across some of these technophiles who take pride in acquiring the latest in information technology, be it the latest microprocessor, the latest operating system or the latest version of an application. Considering that the rate of innovation in the IT field is very fast, these people tend to change their laptops, and software very frequently. Naturally they must be either rich, have access of company funds or are simply making copies of latest software! I call them adolescent IT users. Adolescents are an important source of economic development in any society. They push, they demand, and above all they remind all of us of our youth and reinvigorate us in many ways. But we need middle aged people to do the work, because that's the way the economy ultimately runs. Here, I mean states of mind and approach to life rather than chronological age.

The idea of calm technology has taken roots in the area of information technology. For example, Weiser and Brown (1996) have classified major trends in computing into three phases, namely the era of mainframes, the era of PC and the era of ubiquitous computing. Calm technology means that computing devices have been embedded in our environment, have receded to the background, and are working for us, rather than we working to work the computer. This naturally calls for a lot of hard work and massive build up of infrastructure mostly of an interdisciplinary nature, so that people with IT skills and knowledge of the health care service domain get down to developing solutions for day to day problems.



[1] Source: Mark Weiser and John Seely Brown; Designing Calm Technology; October 5, 1996 at http://www.ubiq.com/hypertext/weiser/UbiHome.html

IV.Concluding remarks:

Since, my job is to deliver a keynote address, I now propose to put forth before you some keys to development of medical and health informatics for improvement of our populations health status. I will then just mention about the economic and business potential, this area has for our entrepreneurs and business. Finally I will end with an address and an appeal to each one of you playing different roles in the health systems of our country.

A. Here are the Keys to harnessing informatics for health!

i. Building up of health informatics infrastructure which consists of;
   a. National and local extensions to existing health care application level standards,
   b. Health Informatics skills including;
      1) skills to administer health Intra nets and integrate health informatic solutions,
      2) skills to develop health informatic solutions,
      3) skills among health care professionals to use the computing interfaces.

ii. The supporting institutional system consisting of formal, and informal organisational mechanisms for development, implementation and quality assurance of health informatic standards, technology and applications respectively

iii. Applied and operational research to understand how we can use IT to improve the health care service experience of an average Indian and how the existing solutions are faring in terms of ultimate consumer satisfaction.

B. And the Notes!

i. Software for the health care industry is a multi billion dollar business in the economically developed countries. These software are used in hospitals, by health care providers, health care personnel and institutions allied to the health sectors. There is a lot of need to upgrade of many of the existing soft wares and writing up of new

ones. All of you are aware that our software export is growing and holds tremendous potential. To sustain our growth in software exports we will have to diversify specific domains. Health informatic solutions is one such area.

ii. Then there is the domestic potential. All of you are aware, and many of you have definitely explained, how badly our health care delivery institutions are run. These hospitals and health care institutions are going to need software to efficiently manage themselves.

iii. I may also inform you that the present stock of our hospitals and health care institutions is a small fraction of what we are going to need to provide health for all. That means that still more work and potential for health informatic solution providers right here in the domestic sector.

iv. Then there are the sister developing countries who share similar health care systems and similar medical professional culture. I am sure some of them are going to like our software.

C. Finally my address and appeal to each one of you:

1. Public health officials:
   i. Develop fact sheets and information documents on locally important diseases and conditions to inform and educate the average health care consumer.
   ii. Make these available through locally hosted web sites.
   iii. Build public databases and electronic registries of health care professionals, health care institutions and make them available to people through web sites.
   iv. Develop and make available locally relevant practice guidelines to health care professionals.
   v. Most important, remember to update them regularly. Unfortunately most of our government web sites tend to contain information as on the day of their inauguration!
2. Health Care Service Consumers:
   i. Access and use information from Internet and public registries to guide your health care seeking decision.
   ii. Demand better quality service and do not be carried away by the rituals to convey a false feeling of technological advancement.
   iii. When ever you are confronted with some service touted on the basis of its high tech content, stop and think, what it is actually going to do for you?
3. Doctors:
   i. Firstly learn typewriting. Many doctors have an aversion to learn typewriting. Please note that this the writing tool for the next few decades. I say decades, because I am hoping that voice recognition technology will enable us to speak instead of write.
   ii. Learn to use the personal computer for your day to day work mostly for office computing purposes, and to provide you with knowledge bases relevant to your area of work.
   iii. Learn to access the knowledge resources provided by the Internet.
4. Health care institutions:
   i. Buy and install more than one computer. Today's computing happens in the network, not on a single computer.
   ii. Do not confine the computer to a computer room. Instead make them available where people normally work.

iii. Build an Intranet, howsoever small it may be, and improve the quality of your services to you clientele.

D. To all my countrymen:

We are already having enough of adrenaline from the medical informatics, telemedicine hype. Lets now calm down, and start building IT solutions to improve the efficiency of our health care institutions.

Thank you very much and good luck!

References:

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