TECHNOLOGY AND HEALTH CARE: ISSUES AND PERSPECTIVES – An approach paper*

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(This is a background paper written to serve as a basis for discussion at the medico-friends circle (mfc) annual meeting. It is neither exhaustive nor comprehensive but attempts to list out some points that would help participants to understand the basis for some of the concerns and issues related to the theme. Those with access to earlier issues of mfc bulletins would find additional information in bulletin numbers 57, 60, 62, 65, 88, 115, 121, 143-44 and 145.)

WHY DISCUSS TECHNOLOGY AND HEALTH CARE?
There are many reasons why the ‘technological’ dimensions of medical/health care in India need to be critically examined and assessed. Some of these are:

Health For All by 2000 A.D.: India’s commitment to this lofty goal demands a critical appraisal of all aspects of the existing health care service and an evaluation of alternative approaches and options. With the increasing awareness that the western high technology institutional model of health care is inappropriate, this appraisal becomes very important.

Technology Missions: In recent years the concept of ‘Technology Missions’ has grown and some options have been made and are being actively promoted. At least two of the present missions are directly related to health care – immunizations and drinking water.

Urban – Rural Disparity in Medical Technology: In keeping with our inequitable social structure and planning priorities, there has been a greater advancement of the technological status of medical/health centres in the urban area in both the governmental/non-governmental sectors and a stagnation in the Rural Primary Health Centres.

Proliferation of Diagnostic Centres: In recent years due to various aspects of a liberalized industrial policy, there has been a massive growth of diagnostic technology centres in the urban areas, all over the country. Most of these centres promote sophisticated technologies like CAT scan, Ultrasound, Echo etc., and are all in the private sector. What are its implications?

Overuse of unnecessary investigations and surgery: as elsewhere in the world and particularly in countries where there is a well-developed private sector in medical care, there is a growing concern that unnecessary investigations and often unnecessary surgery are taking place to support profit margins of hospitals, laboratories and medical practitioners.

Doctors-Medical Technology Axis: The ICMR-ICSSR Health for All report warns that ‘eternal vigilance’ is required against the growing Doctor-Drug Producer axis. Little is documented about the growing links between practitioners and diagnostic centres. The kick-back available for ordering a CAT scan is a glaring example.

Misuse of Medical Technology: the growth of amniocentesis/sex determination centres highlighted by health activists in recent years is one among many such examples which need further investigation.
**Medical/Health Care Is Not Only Drugs:** in recent years, drugs and consequently Rational Drug policy and Rational Therapeutics have received much attention from health and development activists, consumer groups, professional associations and policy researchers. Groups like mfc and others have also looked at medical education and policies like TB control, Family Planning, Child survival and so on. But the technological dimension of medical/health care particularly diagnostic technology, surgery and related aspects have never been scrutinized critically. Considering that these form quite a major part of the cost of medical care, they need immediate assessment.

**TECHNOLOGY AND HEALTH CARE**
The theme can be explored in many ways.

**Technology and Health Status:** A major area of exploration can be the relationship between advances in health care technology and health of people- their longevity, morbidity, alleviation from pain etc. McKeown in his book “The Role of Medicine” distinguishes five groups of measures while assessing the impact of science and technology in health status.

I. Measures which are scientific but owe little to professional science – manuring of land by farmers and limitation of family size by parents.
II. Measures leading to environmental improvements derived from observations on the relationship of living conditions to health
III. Non-medical science and technology – chemical fertilizers, insecticides, herbicides in agriculture and engineering technology which contribute to control of the environment.
IV. Boi-medical research which extended non-personal measures like food and water hygiene.
V. Bio-medical research which resulted in immunization and treatment.

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**Appropriate technology: What it is and What it is not?:**

‘Appropriateness’ of a technology is for a particular need, a particular situation, a particular level. At the ICMR National Workshop on ‘Appropriate technology’ ‘was’ and ‘was not’. Between them they explore all the important dimensions as well as the misconceptions.

**Appropriate technology : : What it is**

To be appropriate for the circumstances in which it will be used, a technology must be

“Scientifically effective (it works)
Culturally acceptable (it fits into the hands and minds of the people and does not endanger a social fabric that may already be fragile)
Economically feasible (they can afford it within the resources available)
Have an evolutionary capacity (it can be extended and built upon and is likely to lead to other changes)
Should be environmentally harmless or atleast, minimally harmful”.

Katherine Elliott
Nicolas Jequier

**Appropriate technology : : What it is not**

“Appropriate technology is not against industrialization or against modern technology. It does not represent a return to traditional technology.
It is not restricted to production, hardware and industry but it also involves products in all sectors such as agriculture, health, communication and others.
It is not primitive or low technology and does not imply undermining basic research. In fact it emphasizes an even greater stress on basic research because in the absence of the beaten Western path in conventional technology, there is no alternative but falling back on fundamental research and new insights.
It is not a substitute for the socio-economic changes required for real development.
It is not pointless within the present frame work of society because it becomes the key to the transformation of society.”

A V K Reddy
He concludes that at least in the West items IV & V have had less contribution to change in health status while I to III have had more impact. This is not an easy hypothesis to discuss here but some issues could be considered. Has development of preventive/promotive measures been neglected? If so, why? Is health status improvement to be expected by technological interventions or by socio-economic-cultural changes/interventions? How has the growth of medical/health technology affected social values, medical ethics and so on?

In this paper it has been decided to focus on a few areas:

a) Common investigations at Primary Health Centres and general practice
b) More sophisticated investigations in hospitals and consultant practice
c) Therapeutic technologies like injections and many forms of surgery
d) Technologies for community health/community level interventions

**CLINICAL INVESTIGATIONS AND DANGEROUS DIAGNOSIS**

Recognizing limitations of Lab Tests: The pathological, micro biological and bio-chemical investigations of ill health as well as the study of internal anatomy of the diseased body have revolutionized not only the understanding of disease, but, today they are the sheer anchor of medical treatment, aiding diagnosis, assessing cure and predicting prognosis. However, there are some basic facts about the measurement of biological parameters and/or the visualization of internal anatomy that is commonly forgotten. All laboratory tests have their own limitations. They are sensitive and specific to different extents. In simpler terms, it means that there are false positives and false negatives, i.e., normal findings in ill health and abnormal findings in health. Since most biological parameters follow normal distribution and the ranges for assessment are narrow, there will always be a few healthy subjects with levels at the lower end or higher end of normality or just outside the range. All tests need to be done by specific, well defined procedures and routines. In the absence of quality control and when corners are cut due to haste, poor training, over work or disinterest by laboratory personnel the reliability of the tests decreases.

In addition, when the test is given significance out of context of patient history or is substituted for clinical judgement based on good physical examination then the reliability and ‘hazard’ potential increase. In measurements that use technology requiring electricity, changes in voltage can affect readings. With more complex technologies repair and regular maintenance become crucial. It is significant that many of these limitations are not known to the medical personnel as well and even less to the patient or consumer public. With the proliferation of diagnostic centres and the absence of any quality controlling authority, the situation of ‘dangerous’ or ‘wrong’ diagnosis can become ‘epidemic’ in proportion in countries like ours and it is time we recognize this. When investigations get ordered for profit motive and get routinised this problem will increase phenomenally.

**Dangerous Diagnosis:** Mendelsohn in his now famous book “Confessions of a Medical Heretic” records a series of very reliable surveys done on the situation of diagnosis in the U.S. Using the term Dangerous Diagnosis he quotes from studies of monitoring/regulating by the Centre for
Disease Control on less than ten percent of the best labs in the country. Some of his findings are revealing:

The situation in India would definitely be worse. It is time consumer groups and professional authorities recognized this danger.

SURGICAL TECHNOLOGY AND RITUAL MUTILATIONS

Assessing Surgery: The technology for surgery has made great advances in keeping with the development of more complicated and sometimes more intricate forms of surgery. However, it is true that surgical technique has also begun to be misused, overused and routinised for a variety of motives – to play safe, for greater profits or due to impatience of the patient or doctor with medical treatment or for other such questionable reasons.

What is not commonly known is that many surgical techniques now in common application have not been adequately tested for effectiveness or for providing better prognosis. As more controlled studies are being done and costs measured against relative benefits, many surgical techniques are coming under critical assessment and are proving to be unnecessary or of ‘unproven efficacy’ or ‘effectiveness’. Episiotomy, tonsillectomy, adenoidectomy, some forms of gastric surgery, radical mastectomy and so on are now under increasing suspicion.

In a country like ours, in the absence of good clinical records, record linkage and efficient professional quality control, this problem is very difficult to assess, but many surgeons are concerned about the problem.

**Dangerous Diagnosis**

**ECG:** “A survey revealed that the reports of expert ECG interpreters varied by twenty percent among individuals and by another twenty percent when the same individuals re-read the same tracing at another time.

In one test the ECG delivered a positive finding in only twenty five percent of cases of proven myocardial infarction an equivocal finding in half and a totally negative finding in the rest.

In one test, more than half of the readings taken of healthy people were grossly abnormal”.

**ECG:** “About twenty percent of people with clinically established convulsive disorders never have an abnormal EEG. Yet fifteen to twenty percent of perfectly normal people have abnormal EEGs!”

**X-RAYS:** “Conservative estimates peg the number of deaths each year directly attributable to medical and dental radiation at 4000.

A survey showed that as many as twenty four percent of radiologists differed with each other in interpreting the same chest film even in cases of extensive disease. Thirty one percent of them even disagreed with themselves when re-reading the same films.

**LABORATORY TESTS**

In 1975, the Centre for Disease Control (CDC) reported that its surveys of labs across the country demonstrated that ten to forty percent of their work in bacteriologic testing was unsatisfactory, thirty to fifty percent failed various simple clinical chemistry tests, twelve to eighteen percent flubbed blood grouping and typing, and twenty to thirty percent botched haemoglobin and serum electrolyte tests. Overall, erroneous results were obtained in more than a quarter of all tests.

In a nation wide survey, fifty percent of “high standard” labs licensed for Medicare work failed to pass.

For $12 billion worth of lab tests each year, thirty one percent of a group of labs tested by CDC could not identify sickle-cell anemia. From ten to twenty percent of the tested groups incorrectly identified specimens as indicating leukemia. And from five to twelve percent could be counted on to find something wrong with specimens which were healthy.

In one study 197 out of 200 people were “cured” of their abnormalities simply by repeating their lab tests.”
‘Ritual Multilations’: Mendelsohn in the book mentioned earlier lists out some interesting surveys done again on the American scene. He uses the terminology “Ritual Mutilations” to indicate how like branding, circumcision and other forms of ritual surgery linked to socio-cultural beliefs, we continue to accept, promote and inflict forms of surgery which should have been discarded based on informed and critical professional opinion.

RITUAL MUTILATIONS

“Conservative estimates by a congressional sub-committee day that about 2.4 million operations performed every year are unnecessary and that these operations cost $4 billion and 12000 lives or five percent of the quarter million deaths following or during surgery each year.

The Independent Health Research Group says the number of unnecessary operations is more than 3 million. Various studies have put the number of useless operations between eleven and thirty percent.

One study closely reviewed people who were recommended for surgery. Not only did they find that most of them needed no surgery but fully half of them needed no medical treatment at all.

In six New York Hospitals, forty three percent of the hysterectomies reviewed were found to be unjustified.

A seven year study by the Veterans Administration of more than 1000 people found that except for high risk patents with rare left main artery disease, the coronary bypass provided no benefit. Mortality rates for surgery patients were not significantly different from those medically treated. Among the low risk patients, the mortality rates after four years were slightly higher among those receiving the operation.

The rate of Caesarean deliveries in US Hospitals is around twenty five percent. In some hospitals, it is reaching fifty percent. Studies of comparable deliveries show that Caesarean deliveries occur three to four times more often in births attended by electronic foetal monitoring than in those monitored with a stethoscope.”

‘Why does this happen? To what extent could this be a problem in a country like ours?

TECHNOLOGY FOR COMMUNITY HEALTH: DIFFICULT CHOICES

Critical assessment of options in the choice of technology becomes particularly crucial when one is planning for community needs – be they local, regional or national. Mass health care and national programmes require more careful planning and the choices, because of cost, accessibility and availability of services, logistics, etc., are rather difficult. This paper will, however, not explore this dimension in detail. Choices like sputum AFB vs. X-ray or MMR; ORT vs. IV fluids and antidiarrhoeals; which vaccines to include in immunization programmes; oral polio vaccine vs. injectable polio vaccine; cholera vaccine vs. safe water programmes; iodised salt or iodised oil injections; choice of contraceptives etc. all exemplify the technical,
epidemiological, social, economic and managerial factors and is based on more ad-hoc or empirical decisions and these need to be constantly scrutinized and critically debated.

**SOCIAL ISSUES AND HEALTH CARE TECHNOLOGY**

From Micro to Macro Analysis: While reviewing literature one constantly comes across social, economic, cultural, political, ecological, historical and ethical factors which determine the growth and development as well as the transfer, adoption and promotion of technologies. This is applicable to all technological development not only to those in health care.

It needs to be recognized and emphasized that macro-factors in society have often a greater impact on technological choice than micro factors – be they professional, technical or managerial.

In our deliberations, therefore, we need to constantly look at a macro analysis as well as a micro analysis; a social analysis as well as a techno-clinical or techno-epidemiological analysis.

**A Social Critique:** Professor Banerji in his recent book – HEALTH AND FAMILY PLANNING SERVICES IN INDIA – outlines some of the factors critical to a social choice of technology, emphasizing particularly the effect of market forces and industrial development on the growth of medical/health technology as well as the concomitant glorification of ‘technological fixes’ to solve societal problems.

**Exploring Social Links in Technology Choice and Application:** Apart from the factors mentioned in the earlier critique there are many other important ones as well:

a. **Privatization:** The transfer of provision of health care from the public sector to the private sector has major effects on accessibility and availability of health services, and on costs as well. The latter is more likely to respond to the profit motive and market pressures. The socially disadvantaged would be less likely to be covered by adequate health care.

b. **Gender Discrimination:** The social ethos which favours gender discrimination may affect technological choice, eg., female contraceptives being researched more than male contraceptives. Also the promotion of female sterilization surgery when male sterilization (vasectomy) is easier, less costly, safer and logistically more relevant is a case in point.

c. **Dumping of Technology:** Third world countries have become a ‘dumping ground’ for obsolete and often hazardous technologies. This may be equally true for medical technology transfer in the country at present.

d. **Class differences:** In an inequitous social set up where the upper classes control decision making and choices, various coercive tactics, disincentives and other organizational procedures may be thrust into planning affecting the lower income and socially disadvantaged groups. Programmes of compulsory sterilization during emergency symbolized this best though a subtle element of coercion continues even today.
“One of the features of the development of the Western system of medicine is the phenomenal growth and development of medical technology. This technology is often projected as a liberator of human beings from many dreaded diseases. Treatment of a disease is considered to need some sort of ‘technological fix’. In the flush of major medical breakthroughs it was earlier believed that what one needed, for alleviation of suffering caused by diseases, was a clever, well equipped medical technologist, who would ‘fix’ most of the diseases.

As is the case with other products in rapidly industrializing societies, market pressures have been a powerful motive force in the spectacular advance in medical science and technology. They have played a critical role in projecting problems of sickness, not simply as technological problems, as problems requiring a ‘technological fix’, but also as problems that are amenable to the particular brand of technology marketed by them. Thus, apart from having elements, that are undoubtedly rational and scientific and instrumental in alleviating suffering, the Western system of medicine also has many elements which are patently extraneous, imposed on it by market forces. Unnecessary hospitalization, excessive or even totally unwarranted use of drugs, tonics, vitamins and baby foods, excessive use of diagnostic tests and performance of unnecessary surgical operations are some examples of the undesirable consequences of this. Probably even more than being an instrument for alleviation of suffering of the sick, the entire system of medicine in Western countries has taken the form of an industry in which human suffering becomes an object of profit and market forces ‘create’ demands for the products of the industry among the potential consumers.”

This is not an extensive list and participants may like to identify more factors and add to the same.

**POLICY STATEMENTS: INADEQUATE ASSESSMENT**

National Health Policy 1983: The National Health Policy statement of 1983 refers to the issue of technology in Health Care in somewhat ambiguous terms. In the section on PROGRESS ACHIEVED, it notes that ‘significant indigenous capacity has been established for the production of drugs and pharmaceuticals, vaccines, sera and hospital equipment’.

In the section on THE EXISTING PICTURE, it concludes that ‘the establishment of curative centres based on the Western models are inappropriate and irrelevant to the real needs of our people and the socio-economic conditions in the country’.

In the section on NEED FOR PROVIDING PRIMARY HEALTH CARE, it plans to ‘provide specialist services as near to the beneficiaries as possible, within a well planned network’ and suggests that ‘expenditure should be reduced… by economical investment in the purchase of machineries and equipment, ensuring against avoidable duplication of such acquisitions. It is also necessary to device effective mechanisms for the repair, maintenance and proper upkeep of all bio-medical equipments to secure their maximum utilization’.
In the section on MEDICAL INDUSTRY, it notes interestingly that the practitioners of the modern medical system rely heavily on diagnostic aids involving extensive use of costly, sophisticated bio-medical equipment. Effective mechanism should be established to identify essential equipments required for extensive use and to promote and enlarge indigenous manufacturers, for such devices being readily available at reasonable prices for use at the health care centres.

On the whole the pronouncements are vague and do not reflect a comprehensive analysis of the issues of technological choice, use, misuse or policy.

In the section on PROBLEMS REQUIRING URGENT ATTENTION, it does mention nutrition, prevention of food adulteration, water supply and sanitation, environmental protection, immunization, maternal and child health, school health and occupational health as priority issues but in all these, the issues of technological choice and development are vague and lost in generalities.

**ICMR/ISSR Health for All Report:** This document, which is meant to be an important policy guideline for national health planning, has also not tackled this issue adequately. While drugs and pharmaceuticals are given much importance, other aspects of medical/health technology are not adequately researched.

The concept of Appropriate Technologies is, however, mentioned and a somewhat ambiguous plea is made for a balance between ‘over sophistication’ and ‘under-sophistication’.

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<td>In the existing health system, there is an emphasis on over sophistication which necessarily influences research. In the alternative model we have proposed, the emphasis is shifted to the utilization of paramedical personnel and the development of alternative, simple easy-to-use technologies. The research programmes and policies should be suitably modified to meet this need. This does not imply a swing to the other extreme of under sophistication. What is needed is a proper balance between the two approaches to meet real social needs.</td>
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Health for All – An Alternative Strategy
ICMR.ICSSR Study Group

It is apparent that while science and technology policy statements are the order of the day in the country, Health Care/Medical Care policy statements still suffer from an inadequate analysis and require greater clarity and commitment to the difficult choices that need to be made.

**CONCLUSION**

The topic ‘technology in Health Care’ is a complex matrix of issues and problems, which cannot all be covered in one meeting. The MFC meeting could, however, become the focal point for a
beginning of a process of technological assessment. Issues and perspectives could be clarified and an approach to assessment can begin to be explored.

In the present social ethos, ‘technology’ is subject to glorification, high pressure sell, and inequitous investment. Its impact on Medical/Health Care is bound to affect the nature of Health Care development in India. It is time for a ‘critical’ and ‘informed’ assessment of choices. Could we make a beginning?