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High technology: the case of obstetrics

Obstetric high technology is being increasingly exported to developing countries, where, more often than not, it is eagerly received. However, the replacement of indigenous technology may lead to new health risks for mothers and babies. High technology also tends to produce a hierarchical distribution of decision-making power and the transformation of social relationships.

In much of the Third World, efforts are being made to improve maternal and child health by adopting biomedical practices that are common in the developed countries. However, these practices confront indigenous obstetric systems that are particularly well adapted to local conditions, having an empirical basis and consisting of practitioners whose beliefs about the nature of birth are shared by the women, and frequently the men, in the communities they serve. Within these systems there is widespread agreement about what difficulties may occur in pregnancy and labour, what methods can be used to solve problems, and who the decision-makers should be. Western or Western-trained health care personnel do not necessarily hold the same views on these matters.

Differences in belief systems and in the allocation of decision-making power between the imported and indigenous

systems may lead to resistance against the Western type of health care, even where it would give better results. In Yucatan, Mexico, for example, I found that Maya Indian women would go to a hospital only as a last resort, sometimes when it was too late. A major reason for their resistance was that certain aspects of hospital care, including separation from midwife and family, violated traditional norms relating to the management of childbirth (1). Normal pregnancies can certainly be handled by the traditional sector, but it has to be said that there are always some conditions beyond the competence of traditional birth attendants, and here only modern medicine can provide solutions.

Developing countries face difficulties stemming from the so-called structural superiority of Western medicine (2). Although most health care is provided by the traditional sector, Western medicine furnishes the accepted blueprint for planners and medical personnel. This leads to a devaluation of indigenous obstetrics. In many developing countries, biomedicine has acquired a symbolic value independent of its

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use value. It has come to represent progress and thus stands in opposition to traditional approaches to health and disease. Traditional practitioners are frequently condemned as backward and unscientific, and their methods for dealing with childbirth tend to be dismissed, irrespective of their efficacy. For example, in midwife training programmes in Yucatan, useful indigenous methods such as external cephalic version for malpresentation and the cauterizing of the umbilical stump with the flame of a candle were rejected. Such disregard for effective local practices may actually increase mortality and morbidity.

A commitment to Western-style obstetrics carries with it a requirement for trained personnel and advanced instrumentation. In Third World countries, technology-intensive perinatal management is severely hampered by shortages of drugs and adequately trained staff, among other things. High-technology hospitals consume vast resources and are decidedly wasteful (3). In Senegal and the United Republic of Tanzania, for example, such hospitals absorb more than half of the health care budget, though they serve only 5% of the population (4). To some extent this is a legacy of the colonial era, when the main concern was to service administrators and urban elites. Today the problem is exacerbated by the high prestige value of Western medicine and the tendency to emulate the health care delivery systems of developed countries.

The fundamental problem relating to maternal and child care lies in the conflict of ideas about childbirth. The traditional view is that it is a normal event to be handled by the family and the community. This contrasts with the medical approach, which is concerned overwhelmingly with pathology and therefore aims to achieve universal hospital delivery. The imposition of technology-dependent Western obstetric

practices may cause iatrogenic disorders and create other difficulties if technological, pharmacological, and staffing needs cannot be met. An integration of the modern and the traditional is essential so as to preserve the best features of each for the benefit of mothers and children.

It has been suggested that people in the Third World prefer Western medicine to all other options (5), but most investigators recognize its limitations in developing countries (6). The integration of modern and traditional systems has repeatedly been advocated but the latter have been much more eager to absorb elements of the former, such as the use of antibiotics, than the other way round. Western medicine claims competence in all areas of health and illness; traditional medicine may embrace not only these areas, but also misfortune in general, or may be more specialized, restricting itself, for example, to the setting of bones. There may be different therapeutic

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traditions for different illnesses and conditions, each undergoing change as development proceeds.

Although traditional birth attendants sometimes receive training in Western care, it is virtually unknown for them to instruct scientifically trained personnel in the traditional management of pregnancy and childbirth. The special attention given to traditional birth attendants is primarily motivated by a recognition of their crucial

role in family planning, made possible by the confidence that childbearing women have in them. As far as midwifery is concerned, the prevalent attitude is that traditional birth attendants must be tolerated while steps are taken to achieve universal hospital delivery, a goal that cannot be reached for several decades at least and one that may not be desirable at all. In the Third World at present 60–80% of babies are delivered by traditional birth attendants.

Imported high technology has unforeseen consequences that are not always beneficial. It may be able to deal with problems that indigenous systems are unable to handle, e.g., highly abnormal deliveries, but it also produces changes in the distribution of information and decision-making power. Agricultural and economic development projects have often reduced women's status and range of options (7). The introduction of high-technology obstetrics may give similar results.

Levels of technology

The complexity of the artefacts or aids used to facilitate childbirth varies considerably

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between traditional and technologically advanced obstetric systems. Development planners should ask themselves about the consequences of replacing simple with complex technology.

The simplest technology is found in traditional societies uninfluenced by Western medicine. In many developing countries it survives even after the introduction of modern obstetrics, which usually covers only a small segment of the population. Thus most Maya Indian women in Yucatan give birth at home, helped by a lay midwife, family members and friends. The artefacts required are few, simple, and mostly available in the household: a hammock or chair on which to give birth, a rope suspended from the rafters for the mother to pull on during labour, a sharp instrument to cut the cord, and other multipurpose tools.

An intermediate level of technology exists, for example, in the Netherlands and the United States, where home births may be attended by a midwife, family members and friends. The midwife here has a set of somewhat specialized though still simple tools, such as a wooden stethoscope for listening to the fetal heart. Finally, high technology is seen in hospitals in the United States and other countries where medical specialists are available and complex equipment is relied upon to a great extent.

Low-technology birth

The physical support used in childbirth may be a mat on the floor, a hammock, a chair, a bed, an arrangement of bolsters and pillows or a hospital delivery table. As the degree of sophistication increases, the mother's familiarity with the artefact diminishes, thus affecting her experience of birth as well as the course of labour.

Traditionally, women in developing countries go through labour and give birth in upright or semi-upright positions, such as sitting, squatting, half-reclining, kneeling, or standing, and often adopt several of them in sequence. Oxygenation is better, the

contractions are more efficient, there is less pain, and there is an increase in the diameter of the pelvic outlet, especially in full squatting positions (8). If a woman gives birth sitting on a bed of mosses and ferns or kneeling on a mat she can listen to her body and respond as necessary. On a delivery table she cannot follow her body's messages and, indeed, cannot even move, since she is held in a rigid symmetrical position, her feet in stirrups and her pelvis unable to rotate. In low-technology obstetric systems, where there are no such specialized artefacts, women in labour often assume asymmetric positions (9), which, together with an upright posture and physical mobility, help the process. Women who are free to move experience shorter and less painful labour. Complications such as changes in the fetal heart rate or certain difficulties during labour can frequently be remedied by changes in position. The delivery table discourages such physiologically beneficial adjustments.

Social interaction

Artefacts also affect the nature and flow of information about labour. An electronic fetal monitor, for example, requires specialists to operate it and interpret its output. However, even a simple innovation, such as a hospital delivery table, introduces changes in communication that affect social interaction.

In low-technology situations, where the object on which the woman rests is familiar to her, it becomes available as a resource for the joint management of difficulties in labour. The woman's helpers, usually experienced women of the family and the community midwife, may give advice about positions and provide physical and emotional support. Her bodily performance and physical state is evident to all of these people.

Maya childbirth in Yucatan involves the helpers taking turns at holding the woman's body in their lap. The woman slings her arms around her helper's neck and pulls on it when a contraction develops, the strength of her pull reflecting the force of the contraction. The helper breathes and pushes in unison with the woman. She thus

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acquires direct bodily knowledge of the rhythm of labour. While this is going on, the midwife sits on a stool in front of the woman with a cloth-covered hand over the perineum. She feels the bulge made by the advancing head and reports progress to the mother. There are no specialized tools for gathering data. All those present have similar access to whatever information is available. The midwife may have more experience but her information is no different in kind from that accessible to everybody else. The helpers' behaviour is characterized by a fairly high degree of physical involvement, thanks to the delivery chair, hammock, mat or bean bags on which the woman rests.

This sharing of information and experience contrasts with the process of giving birth on a hospital delivery table to which the woman is strapped rendering her passive and preventing interaction with those in attendance. Here the woman may have a support person with her, usually the father of the child in the USA. In developing

countries there may be nobody, unless a friendly nurse takes this role upon herself. But even if there are support persons, their activity and interaction with the woman giving birth are severely restricted. The woman lying on the table cannot be held in anybody's arms. The lower part of her body,

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separated from the top by sterile drapes, is accessible only to the medical staff. The woman is not allowed to touch herself, she cannot see what is going on, and if she has had regional anaesthesia she cannot feel the working part of her body. The delivery table limits activity to the medical team by demarcating the lower part of the woman's body as the domain of the specialist.

Distribution of information

The tools required for birth in low-technology systems, including a sharp instrument to cut the cord, a basin for washing the baby, and clean soft cloths to wrap it in, are generally supplied by the mother herself. Even if they are provided by the midwife there is nothing incomprehensible about them. All the people concerned have access to the necessary information, and among them there is a rich store of experience. As a consequence, decisions about what to do when trouble arises are taken jointly by all participants in the event.

With high technology the information relevant to the management of birth is controlled by those who operate the specialized instruments and machinery, namely the medical staff. These items cannot be touched by non-specialists and often cannot even be seen by the mother-to-be. Instrument trays, for example, are usually covered with sterile cloths. The information provided by specialized instruments is not readily accessible to the lay person and supersedes that from other sources. The crucial information no longer comes from the state of the woman's body as assessed by herself and her helpers, but from a set of technical procedures, test results and machine outputs interpreted by specialists.

Even intermediate technology, exemplified by a simple stethoscope for listening to the fetal heart, can be appreciated by non-specialist birth attendants, but no amount of explanation can make clear to a woman attached to a fetal monitor why some wavy lines on graph paper should require her to undergo a caesarean section. Yet in hospital the machine produces the information on which decisions about the management of labour are based. On entering hospital, women are quickly educated about their new situation. They begin to believe that the machine knows better about what their bodies are doing than they do themselves. The machine becomes the focus of attention and interaction.

In the United States, attempts are often made to provide explanations, especially where informed consent is required, but in many Third World hospitals nobody bothers about such niceties. In any case, the information for making decisions about the management of labour is deeply embedded in the technology and controlled by its operators.

Use value and symbolic value

The rapid diffusion and acceptance of technology often has more to do with its symbolic value than with its use value. Sometimes high technology is adopted because it is equated with progressive medicine and, especially in developing countries, with being modern rather than backward. For example, a fetal monitor is a very expensive piece of equipment which tends to be used with increasing frequency in developed countries, even in normal labour. Developing countries, where Western-trained planners are inclined to subscribe to the pathological model of birth, are importing more and more of this equipment. One might imagine that its rapid adoption stems from proof of its efficacy, i.e., a high use value. However, the evidence indicates that electronic fetal monitoring does not lead to improved outcomes in normal births, even in Western settings (10). Its ready adoption in the West and its increasing acceptance in Third World countries may have more to do with its symbolic value and its reinforcement of technology-based control than with benefits for mothers and their babies.

Even the advocacy of Western implements and procedures at much lower levels of technology is only rarely based on demonstrated efficacy. For example, in Yucatan, the cord is commonly severed with a freshly cut bamboo sliver or other sharp object, and then the stump is cauterized by slowly and carefully burning it with the flame of a candle. The reason given by Maya Indians for doing this is that it prevents convulsions, i.e., neonatal tetanus, in their babies. However, in training courses indigenous midwives are told to cut the cord with scissors and to apply alcohol and thiomersal to the stump. Unfortunately, the sterilization of scissors in a hut without boiling water is well-nigh impossible and

alcohol is clearly much less effective than the traditional method for killing noxious organisms. In Third World conditions the introduction of apparently advanced scientific instruments and procedures may prove detrimental to newborn infants.

In order to understand the problems posed by the adoption of new technology, it is important to go beyond use values. Symbolic functions should also be considered, together with their efficacy as indicators and enforcers of the social distribution of information and the power to act in childbirth.

Complex solutions to simple problems

To deal with the problems of childbirth, obstetric systems develop solutions that reflect their levels of technology. In a low-technology system, people might deal with a breech presentation by doing an external cephalic version, unaided by any tools; in intermediate-level obstetrics, practitioners might do the same in conjunction with fetal heart auscultation; while doctors in a high-technology system might rotate the fetus with the help of drugs

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and monitoring equipment, and prepare the mother for caesarean section. If different levels of technology are available in the same place, solutions to problems arising on one level are almost always sought at the next higher level and hardly ever at the next

Round Table

lower level. For example, if a woman's contractions slow down because she has been transferred to the delivery table she is not allowed to resume the previously effective position, but is given drugs that speed up labour or is subjected to caesarean section. Obstetric referral networks are always designed for a flow of clients from low to high technology.

Diffusion of artefacts

Low and high technology have different kinds of mobility beyond their own environment. High technology is more easily transportable than low technology because it is less firmly anchored in daily life. In high technology, transferring the artefact transfers the procedure. Low technology, on the other hand, is embedded in a social matrix and is less easily transferred; it has to diffuse through social channels. It would not make much sense to ship ropes from Africa so that women elsewhere could hold on to them during labour. Knowledge of the use and benefits of such artefacts spreads via persons

High technology hospitals consume vast resources and are decidedly wasteful.

who have direct experience of low-technology procedures, which, unlike those of high technology, are only loosely connected to their artefacts. If there is no rope to sling over the rafters, a shawl can easily take its place. But if the delivery table disappears from a hospital, great disruption will occur. Low-technology artefacts are

simple, replaceable, interchangeable and easily procurable. Little prestige or commercial value attaches to them. Consequently, there is no incentive for anyone to advocate their use.

Technology and politics

The health needs of women and children are not necessarily served by introducing high technology, which requires resources and skills that are often lacking in developing countries. Furthermore, by the time a particular technology reaches the Third World it has often been superseded in its country of origin, so that the transfer amounts to dumping. It is ironic that, at a time when "natural childbirth", upright delivery positions, the use of midwives, having babies at home and the avoidance of high technology are all becoming popular and receiving increasing scientific support in the United States and western Europe, the Third World is bent on adopting high-technology obstetrics. However, in many developing countries, the indigenous obstetric systems are still intact and could provide the basis for safer, more humane, less hierarchical and more participatory primary health care.

Modern obstetrics has a male-dominated hierarchical power structure. Its introduction is supported by the ideology of modernization and progress. Unfortunately, it often serves the economic and social interests of elites rather than those of the great majority of women in need of basic care.

Because of insufficient coverage with Western-type health services, the concept of primary health care has been welcomed in developing countries. In many places it has also been adopted by planners who have ignored the necessity for social and political

reforms and have instead concentrated on the extension of medical coverage to rural areas. Technical and technological measures, such as the training of village health care workers and traditional birth attendants, immunization programmes and the introduction of oral rehydration therapy are less likely to threaten the prevailing power structure than fundamental reform.

Appropriate technology, while central to the theory and practice of primary health care, has never been clearly defined. By and large it seems to imply economic feasibility and, to some extent, social acceptability. What has been lacking is a radical questioning of the effects of technologies on the social systems into which they are introduced. □

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Discussion

Marie B. Assaad

—Realism needed in the Third World

In the Third World, medical practitioners are largely trained according to the Western model and consequently press for high technologies. On the other hand, millions of

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people live in appalling conditions—for instance, a high proportion of rural dwellers suffer from health problems related to unsafe water and inadequate sanitation. The most vulnerable people are women and children. It is now widely recognized that their health status is a basic indicator of equity and of the ability of society to follow a sustainable path of development.

As long as the resources for combating the poverty-related diseases that affect much of humanity remain scarce, spending on high

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