DISEASE CONTROL PRIORITIES PROJECT

June 2008

Promoting Essential Surgery in Low-Income Countries

A Hidden, Cost-Effective Treasure

Health conditions that require surgery have not typically been a top priority in developing countries: They are considered to be at the end of the spectrum of curative care and unaffordable in low-income settings. Yet, surgically treatable conditions, such as injuries, complications of childbirth, hernias, and cataracts, take a serious human and economic toll. Many of these conditions can lead to death or serious disabilities and account for a substantial share of the burden of disease in developing countries.

Basic surgical services do not need to be provided in expensive, high-technology hospitals and can be highly cost-effective—even on par with widely accepted preventive health care such as immunization for measles and tetanus. The Disease Control Priorities Project (DCPP) has found some of the most cost-effective surgical interventions to be in district hospitals in Sub-Saharan Africa and South Asia.

Many Critical Conditions Require Surgery

No matter how successful prevention strategies are, conditions requiring surgery will always account for a significant share of a population's disease burden. This is particularly true in developing countries, because the incidence of injuries and obstetric complications (those related to pregnancy and childbirth) is high, and because there is a backlog of untreated health conditions that require surgery.

A surgical condition is one that requires a suture, incision, excision, or other invasive procedure with some type of anesthesia. But it does not have to be done by qualified surgeons. In developing countries with relatively few doctors, trained technicians can perform several types of operations satisfactorily.

Four types of surgery are most critical for saving lives and reducing disabilities in developing countries:

- Emergency care to injury victims—to avoid preventable deaths and reduce disabilities that pose a burden on families and communities;
- Addressing complications of pregnancy and childbirth such as obstructed labor;
- Managing a variety of abdominal conditions, such as appendicitis, ulcers, intestinal obstruction, and other conditions that are life-threatening; and
- Elective care for relatively simple surgical conditions such as cataracts, hernias, clubfoot, and middle ear infections.

The Burden of Surgically Treatable Health Conditions

Health conditions that require surgery impose a substantial health burden on the world, gauged in disability-adjusted life years (DALYs). A DALY is a composite measure that combines the number of years lived with a disability and the number of years lost to premature death. Of those conditions that are surgically treatable, injuries take up the greatest share, followed by malignant tumors (see table on page 2). Worldwide, the failure to treat common surgical conditions accounts for about 11 percent of the DALYs lost.

Injuries are estimated to account for just over 4 percent of all DALYs lost worldwide, and 38 percent of surgical DALYs lost. Surgical DALYs are those lost due to conditions that require surgery. Malignant tumors account for about 2 percent of all DALYs lost, and congenital abnormalities about 1 percent. About one-third of complications of pregnancy and childbirth—including severe bleeding and obstructed labor and its consequences—represent nearly 1 percent of all DALYs lost.

The absolute burden of injuries is highest in Southeast Asia, followed by the Western Pacific and African regions. In terms of DALYs lost per 1,000 population, they are almost twice as high for Africa (15 per 1,000) as for Europe (8 per 1,000). Similarly, rates for complications of pregnancy and childbirth are far higher in Africa than elsewhere.

BURDEN OF COMMON SURGICAL CONDITIONS

CONDITION	SURGICAL DALYS AS A PERCENTAGE OF TOTAL DALYS	PERCENTAGE OF SURGICAL DALYS
Injuries	4.3%	38%
Malignant tumors	2.1%	19%
Congenital abnormalities[a]	1.0%	9%
Obstetric complications[b]	0.7%	6%
Cataracts and glaucom[a]	0.5%	5%
Perinatal conditions[c]	0.5%	4%
Other[d]	2.1%	19%
Total	11.2%	100%

[a] Includes cleft lip and palate, anorectal malformations, clubfoot, hernias, and other anomalies.

[b] Certain complications of childbirth, including hemorrhage, obstructed labor, and obstetric fistulas (a tear between the vagina and bladder or rectum that must be repaired by surgery).

[c] Includes stillbirths, birth asphyxia, birth traumas, and other conditions occurring in the first seven days of life.

[d] Includes abdominal conditions such as appendicitis, intestinal obstruction, ulcers, and hernias, as well as infected wounds, abscesses, and other conditions.

Note: Surgical DALYs are estimates of DALYs lost due to conditions requiring surgery.

Sources: World Health Organization. 2002. *World Health Report 2002: Reducing Risks, Promoting Healthy Life*; and H. T. Debas et al. 2006. "Surgery," in *Disease Control Priorities in Developing Countries*, 2nd ed., ed. D.T. Jamison et al. Table 67.2.

Common Barriers to Surgical Care

Access to surgical services is often hampered by poor communications, a lack of transportation, and the high cost that patients must bear for the services. Other important constraints to surgical care include an insufficient number of district hospitals and poor infrastructure in existing hospitals—some lack even such basic needs as water, electricity, and essential drugs and supplies. Trained health professionals, and particularly surgeons, are also in short supply in low-income countries. There is an estimated shortage of 1 million health care workers in Sub-Saharan Africa alone.

The underlying cause of these weaknesses is insufficient public funding for health care, especially for district hospitals. A seriously underfunded health system cannot function unless patients pay a large share of the costs out of their own pockets, which drives families further into poverty.

Organizing and Supporting Surgical Care

Providing surgical services in developing countries requires adequate organizational structure and capacity in community-based clinics, district hospitals, and tertiary-level hospitals.

- Community-based clinics, at the primary health care level, usually provide the most basic surgical care, such as simple suturing and incisions, care of simple burns, and deliveries by a skilled birth attendant.
- District hospitals at the secondary level can be as small as 10 to 20 beds or as large as 200 to 300 beds and vary widely in sophistication. Typically a 100-bed district hospital would provide emergency care for abdominal conditions, obstetric complications, and general surgery for uncomplicated conditions such as hernias.
- Tertiary hospitals would manage more complex surgical services, including a full intensive care unit, a major burns service, orthopedics, and many other surgical specialties. These hospitals would be the top of the pyramid of surgical services.

Coordination and referral systems among these three levels are essential to ensure that priority patients are seen—and transported if necessary—in a timely fashion.

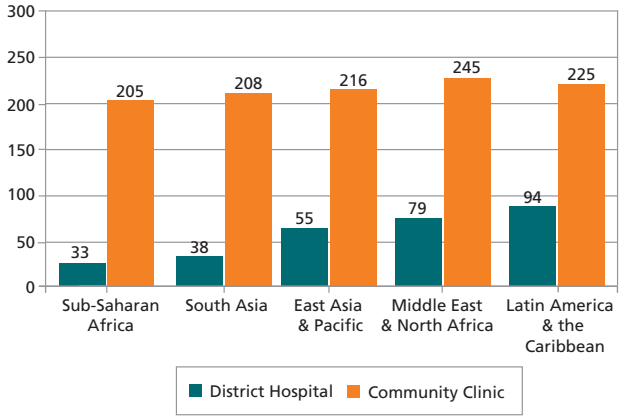
To support surgical care at all levels of the health system, and particularly for the poorest populations, alternative financing mechanisms need to be considered. For example, surgery should be included in sector-wide funding strategies for health. Regarding the shortage of health care personnel, one short-term solution is to train staff without medical degrees to provide some surgical services at the district level, although supervision and monitoring of quality are essential.

Cost-Effectiveness of Surgical Services

Policymakers often must choose between allocating resources for constructing several community clinics or a single district hospital, both of which provide a mix of

surgical and nonsurgical services. The figure below presents a middle range of cost-effectiveness estimates for surgery conducted in both types of facilities in selected regions, expressed in terms of cost per DALY averted. The estimates are based on the annual costs attributable to surgical patients in district and community hospitals and the burden of disease (DALYs) associated with the conditions treated.

COST PER DALY AVERTED BY SURGICAL SERVICES IN DISTRICT HOSPITALS AND COMMUNITY CLINICS



Source: H. T. Debas et al. 2006. "Surgery," in *Disease Control Priorities in Developing Countries*, 2nd ed., ed. D.T. Jamison et al. Figure 67.1.

Costs per DALY averted by surgical services in district hospitals are considerably lower than those in community clinics, and fall into three groups:

- Surgical services in district hospitals in Sub-Saharan Africa and South Asia are the most cost-effective, with the best estimates per DALY averted ranging between US$33 and US$38. Cost-effectiveness is greatest in these regions because the cost of infrastructure and personnel is low and because the disease burden is high.
- Services in the Middle East and North Africa, and Latin America and the Caribbean are the most costly (but still within an affordable range), with the cost per DALY averted between US$79 and US$94.
- Services in East Asia and the Pacific fall in the middle, with cost per DALY averted at about US$55.

These findings show that providing surgical care in a district hospital in Sub-Saharan Africa and South Asia is an exceptionally good buy—both are regions with high disease burdens. Coupled with evidence that district hospitals tend to be relatively underfunded, a strong case exists for increasing support for these services.

Reducing Blindness the Cost-Effective Way

Relatively simple procedures exist to correct health conditions that cause unnecessary disabilities to large numbers of people. For example, blindness from cataracts is a major public health problem, particularly as populations grow older. Estimates indicate that by 2020, more than 40 million people worldwide will be blind or almost blind because of cataracts.

The benefits of cataract surgery have been well documented in developing countries, including in India, where more than 4 million surgeries were conducted in the 1990s through a range of healthcare providers. Mobile camps were used to provide inexpensive and efficient cataract surgery in rural districts. The cost was US$97 per patient treated in mobile camps, US$176 for those treated in state medical college hospitals, and US$54 in nongovernmental hospitals. The surgical procedure proved to be good value for money, because multiple years of blindness were averted for each patient and because blindness is extremely disabling. The average cost of cataract surgery in India as a whole was estimated to be less than US$25 per DALY averted.

Saving Women's Lives Cost-Effectively

Beginning 40 years ago in Tanzania, 23 years ago in Mozambique, and more recently in Malawi, assistant medical officers (AMOs)—health officers without a medical degree—have received surgical training to provide a significant share of surgical services in small hospitals in the cities. All of the AMOs have between two and three years of special training to equip them for the job and to give them surgical experience under supervision.

An evaluation was conducted from 2004 to 2006 specifically to examine how many women's lives had been saved by AMOs who had provided emergency obstetrical surgery. In two regions of Tanzania, the evaluation found that 75 percent of operations were done by AMOs, with case fatality rates only slightly higher than the UN target of 1 percent for countries like Tanzania (1.1 percent and 2.2 percent in the two regions). On the other hand, two-thirds of women in need of emergency obstetric care did not receive it, because they were unable to travel long distances to reach a hospital. The study concluded that there is an urgent need to expand the number of facilities that provide this type of care, and that AMOs can provide these services safely and effectively.

Conclusion

Previous concerns that surgery is too costly for developing countries often prevented discussion of the potentially critical role it can play in preventing death and disability. Public health specialists now recognize that some surgical treatments not only prevent death and disability, but can be provided cost-effectively with low technology. In addition, a significant number of surgical procedures, including cesarean sections and other abdominal operations, can be performed by surgical technicians in countries where few doctors are available.

For More Information

Haile T. Debas, Richard Gosselin, Colin McCord, and Amardeep Thind. 2006. "Surgery." In *Disease Control Priorities in Developing Countries*, 2nd ed., ed. D. T. Jamison, J. G. Breman, A. R. Measham, G. Alleyne, M. Claeson, D. B. Evans, P. Jha, A. Mills, and P. Musgrove, 1245-59. New York: Oxford University Press.

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