

Disease Control Priorities in Developing Countries

SECOND EDITION

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Joel G. Breman

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Dedication

This book is dedicated to Bill and Melinda Gates, whose vision, leadership, and financing over the past decade have catalyzed global support for transforming the lives of the world's poor through inexpensive but powerful health interventions.

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Foreword

The 1993 publication of the now classic book, *Disease Control Priorities in Developing Countries*, by Oxford University Press and of its companion document, the *World Development Report 1993: Investing in Health*, published by the World Bank that same year, constitute a landmark in the public health literature. For the first time, decision makers and public health practitioners had a comprehensive review of the cost-effectiveness of available interventions to address the most common health problems in the developing world. They were also provided with the useful metric known as disability-adjusted life years to calculate the burden of disease and the cost-effectiveness of interventions more accurately than in the past.

As was the case with the first edition, this second edition of *Disease Control Priorities in Developing Countries* will serve an array of audiences. One primary audience consists of people working in the health sector, ranging from those who are responsible for making evidence-based decisions to those who practice medicine and public health under often suboptimal field conditions. A second audience consists of people working in finance and planning ministries, who will benefit from the solid recommendations for improving the health of populations through sound resource reallocation and cost-effective practices.

PURPOSE

The purpose of this book is to provide information about what works—specifically, the cost-effectiveness of health interventions in a variety of settings. Such information should influence the redesign of programs and the reallocation of resources, thereby helping to achieve the ultimate goal of reducing morbidity and mortality.

FUNDAMENTAL POLICY CONSIDERATIONS

Although economic and budgetary constraints are clearly important considerations, money is not the only limitation. Additional factors fundamental to improving outcomes are the

particular circumstances in each country, as well as the individual institutional capacities to deliver goods and services and to implement policies and processes.

Context-specific strategies and responses are essential, because application of the Disease Control Priorities Project's findings will vary according to each country's circumstances: one size does not fit all. Understanding that most health interventions require a minimum level of institutional capacity to deliver goods and services is equally important, and such capacity may have to be built up before money or physical inputs can yield any benefits. Accordingly, goals and priorities should be established and tailored to each country's context.

TRANSITION IN HEALTH

Every developing region is facing a transition in its epidemiological profile from an environment with high fertility rates and high mortality from preventable causes to one in which a combination of lower fertility rates and changing lifestyles has led to aging populations and epidemics of tobacco addiction, obesity, cardiovascular disease, cancers, diabetes, and other chronic ailments. The 20th century will be remembered for, among other things, witnessing the largest universal increase in life expectancy in history. While life expectancy is highest in the richest countries, the upward trend is apparent in almost every society. Moreover, in the past 50 years, variations in this health indicator across and within countries have decreased. This convergence of improved life expectancy and reduced variations, which has occurred even in the presence of widening income gaps in many regions, can be explained solely by the impact of knowledge expansion and direct public health interventions.

The increase in life expectancy worldwide will, however, soon reach a plateau, and a retraction has occurred in many countries. HIV/AIDS and civil unrest in Africa, vaccine-preventable diseases and alcoholism in Eastern Europe, and obesity in the United States have reduced—or will soon do so—the years of life their populations can expect.

SCALING UP EFFECTIVE INTERVENTIONS

The late Jim Grant, former executive director of the United Nations Children's Fund, was one of the first leaders with a vision for setting specific health goals and priorities within a time frame and on a global scale. He recognized the need to raise awareness of the dramatic disparities in children's health and to mobilize political will accordingly. His missionary zeal for universal child immunization and for organizing the first summit of world leaders for children's health and rights in 1990 permitted the scaling up of interventions of proven efficacy. The Millennium Development Goals are a natural consequence of that vision and an extremely useful instrument for maintaining both focus and social pressure. Achieving these ambitious goals will require not only the universal implementation of effective interventions that are currently available, but also the development of new interventions.

NEED FOR ONGOING RESEARCH

Today, most vaccines, medical devices, diagnostic tools, and drugs have been subjected to careful investigation in the laboratory, at the bedside, and in the field. However, not enough investment has gone into research to increase well-being and development globally. We need more epidemiological and health systems research to improve the efficiency of available interventions, technological research to reduce their costs, and biomedical research to develop new tools for dealing with as yet unsolved and emerging health problems.

OPPORTUNITIES AND CHALLENGES OF GLOBALIZATION

One of the greatest opportunities and challenges for international public health is globalization. We live in an era when the explosion of trade, travel, and communications is spreading new cultural influences and lifestyles faster than ever before, and the division between domestic and international health problems is becoming increasingly obsolete. At the same time, globalization also permits the spread of risks, pathogens, and other threats. The ever-increasing movement of people everywhere increases the potential for epidemics. Travelers, refugees, and displaced people are more vulnerable to infectious diseases, and their movement contributes to spreading pathogens into new areas. Overall, however, the positive consequences outweigh the negative ones, and cautious optimism about this irreversible trend is justified. Certainly, one of the most valuable contributions of globalization is the rapid accrual and spread of knowledge about useful tools for controlling disease and ways to implement those tools on a large scale.

In recent years, the huge advances in information technology have greatly boosted the globalization of knowledge.

Ideally, this should become a tide that lifts all boats to yield global benefits. The challenge is to harness the information technology revolution to foster the growth of economies. One step in the right direction is the open access movement, which promotes and permits free and immediate access to research results and other components of knowledge transfer.

SPENDING MORE AND SPENDING BETTER

It is indeed a paradox to observe that even though the money spent on health worldwide has reached 10 percent of overall global income, that amount is both insufficient and poorly allocated. The World Health Organization's Commission on Macroeconomics and Health and several other global initiatives make a persuasive plea for a larger investment in health. At the same time, this book is dedicated to making the case for better spending—that is, deriving more health benefits from every dollar spent. The aim should be to reduce inequalities in health investment between and within countries: a 100-fold difference between the rich and the poor in money spent on health services still persists in many places. Despite a lack of clarity about what constitutes the optimum balance of health spending, a larger share should go to prevention. This book looks at several prevention options and clinical interventions that are not being fully implemented.

SELECTING INTERVENTIONS

This book persuasively makes the case that both clinical and public health interventions depend on the capacity of a given country's health system to deliver, noting that some interventions are more demanding than others in terms of infrastructure and human resources. Therefore, both the costs and the likelihood of success of the more complex interventions are a function of the health capacity in place. In addition, decisions about which interventions should be given priority will depend on assessments of the local burden of disease, local health infrastructure, and other social factors as well as on cost-effectiveness analyses. The following chapters identify the health system capacity needed for scaling up a given intervention. Even middle-income countries with relatively better health infrastructure often pursue sophisticated approaches to medical care that result in fewer health gains per amount of money invested. Every country, regardless of level of development, could benefit from the recommendations presented here.

DIAGONAL APPROACH

The medical literature has long debated which approach to delivering health interventions is more effective: vertical programs or horizontal programs. *Vertical programs* refer to

focused, proactive, disease-specific interventions on a massive scale, whereas *horizontal programs* refer to more integrated, demand-driven, resource-sharing health services. This is a false dilemma, because both need to coexist in what could be called a *diagonal approach*—that is, the proactive, supply-driven provision of a set of highly cost-effective interventions on a large scale that bridges health clinics and homes. This approach often starts vertically (polio vaccination, for instance) but moves toward an increasing number of interventions (for example, oral rehydration, other vaccines, residual spraying and bednets for malaria control, micronutrient supplementation, and supervised tuberculosis treatment), making full use of field health workers and existing infrastructure. This could well be the equivalent of a public health polypill.

MULTIDISCIPLINARY ORIENTATION

What makes this book unique, in addition to its comprehensive scope, is its truly multidisciplinary approach to disease control, which merges the best of the medical and economic sciences. Every recommendation has been carefully researched and documented. Evidence-based approaches must be the foundation for allocating scarce resources. The poor cannot afford

anything but the most efficient methods for organizing and implementing health care. This book is a fundamental component for fostering equitable outcomes in health and development. It will inspire all those who seek the highly complex but attainable goal of universal good health for all members of the global community.

FACILITATING PROGRESS

We all share global responsibility: governments and international agencies, public and private sectors, and society and individuals all have specific tasks. We must all strive toward more equitable distribution of the benefits of new knowledge to reduce health and development gaps between rich and poor, between countries, and within countries. The second edition of *Disease Control Priorities in Developing Countries* is a new step in precisely the right direction. If we succeed in conveying the main lessons and messages of this book, public health in developing countries will progress farther and faster.

Jaime Sepúlveda, *Director, National Institutes of Health of Mexico, Mexico City, Mexico*
Chair, Advisory Committee to the Editors

Preface

In the late 1980s, the World Bank initiated a review of priorities for the control of specific diseases and used this information as input for comparative cost-effectiveness estimates of interventions addressing most conditions important in developing countries. The purpose of the comparative cost-effectiveness work was to inform decision making within the health sectors of highly resource-constrained low- and middle-income countries. This process resulted in the 1993 publication of the first edition of *Disease Control Priorities in Developing Countries (DCPI)* (Jamison and others 1993). That volume's preface stated its purpose as follows:

Between 1950 and 1990, life expectancy in developing countries increased from forty to sixty-three years with a concomitant rise in the incidence of the noncommunicable diseases of adults and the elderly. Yet there remains a huge unfinished agenda for dealing with undernutrition and the communicable childhood diseases. These trends lead to increasingly diverse and complicated epidemiological profiles in developing countries. At the same time, new epidemic diseases like AIDS are emerging; and the health of the poor during economic crisis is a source of growing concern. These developments have intensified the need for better information on the effectiveness and cost of health interventions. To assist countries to define essential health service packages, this book provides information on disease control interventions for the commonest diseases and injuries in developing countries.

To this end, *DCPI* aimed to provide systematic guidance on the selection of interventions to achieve rapid health improvements in an environment of highly constrained public sector budgets through the use of cost-effectiveness analysis.

DCPI provided limited discussion of investments in health system development. Other major efforts undertaken at the World Bank at about the same time, including the *World Development Report 1993: Investing in Health*, used the findings of *DCPI* and dealt more explicitly with the financial and health systems aspects of implementation (Feachem and others 1992;

World Bank 1993). Closely related efforts in collaboration with the World Health Organization led to the first global and regional estimates of numbers of deaths by age, sex, and cause and of the burden (including the disability burden) from more than 100 specific diseases and conditions (Murray, Lopez, and Jamison 1994; World Bank 1993).

This second edition of *Disease Control Priorities in Developing Countries (DCP2)* seeks to update and improve guidance on the “what to do” questions in *DCPI* and to address the institutional, organizational, financial, and research capacities essential for health systems to deliver the right interventions. *DCP2* is the principal product of the Disease Control Priorities Project, an alliance of organizations designed to review, generate, and disseminate information on how to improve population health in developing countries. In addition to *DCP2*, the project produced numerous background papers, an extensive range of interactive consultations held around the world, and several additional major publications. The other major publications are as follows:

- *Global Burden of Disease and Risk Factors* (Lopez and others 2006), undertaken in collaboration with the World Health Organization
- *Millions Saved: Proven Successes in Global Health* (Levine and the What Works Working Group 2004), undertaken in collaboration with the Center for Global Development
- “The Intolerable Burden of Malaria: II. What’s New, What’s Needed” (Breman, Alilio, and Mills 2004), undertaken in collaboration with the Multilateral Initiative on Malaria
- *Priorities in Health* (Jamison and others 2006), a brief and nontechnical companion to this volume.

Each product of the Disease Control Priorities Project marries economic approaches with those of epidemiology, public health, and clinical medicine.

While general lessons emerge from the Disease Control Priorities Project, they result from careful consideration of individual cases. The diversity of health conditions necessitates specificity of analysis. Arrow clearly stated the need for

technical analyses to underpin health economics: “Another lesson of medical economics is the importance of recognizing the specific character of the disease under consideration. The policy challenges that arise in treating malaria are simply very different from those attached to other major infectious scourges (Arrow, Panosian, and Gelband 2004, xi–xii).” Chapters in this volume address this need for specificity, yet use cost-effectiveness analysis in a way that makes findings on the relative attractiveness of interventions comparable.

DCP2 goes beyond *DCP1* in a number of important ways as follows:

- While virtually all chapters of *DCP1* were structured around clusters of conditions, *DCP2* provides integrative chapters—for example, on school health systems, surgery, and integrated management of childhood illness—that draw together the implementation-related responses to a number of conditions. These and other chapters reflect *DCP2*'s inclusion of implementation and system issues.
- *DCP2* includes explicit discussions of research and product development opportunities.
- Although *DCP1* dealt with policy mechanisms to change behavior (or the environment), *DCP2* attempts to do so in a more systematic way. In particular, a number of chapters assess in depth the public sector instruments for influencing behavior change that were described briefly in *DCP1*: information, education, and communication; laws and regulations; taxes and subsidies; engineering design, such as speed bumps; and facility location and characteristics.
- Different interventions place different levels of demand on a country's health system capacity. *DCP2* builds on earlier work (Gericke and others 2005) in attempting, in some chapters, to identify which interventions require relatively less system capacity for scaling up and which require more.
- Although *DCP1* briefly discussed the nonhealth outcomes of interventions, *DCP2* does so in a more systematic way, including looking at the consequences of interventions (and intervention financing) for reducing financial risks at the household level. Other important nonhealth outcomes include, for example, the time-saving value of having piped water close to the home, the increased labor productivity of healthy workers, and the amenity value of clean air.
- An important element of *DCP1* was its assumption that to inform broad policy, major changes from the status quo need to be considered, not just marginal ones. For cost-effectiveness analysis, any major change needs to be informed by burden of disease assessments in a way not required for judging the attractiveness of marginal change, because the size of the burden affects total costs and the feasibility of extending the intervention to all who would benefit. This is particularly true when considering research and

development priorities, but also applies to control priorities. In this regard, *DCP2* continues in the spirit of *DCP1* in assessing cost-effectiveness analyses of major changes, but it does so more systematically for each of the six regional groupings of low- and middle-income countries used throughout this volume (see map 1, inside the front cover).

What was becoming clear in 1990 is clearer today: focusing health system attention on delivering efficacious and often relatively inexpensive health interventions can lead to dramatic reductions in mortality and disability at modest cost. A valuable dimension of globalization has been the diffusion of knowledge about what these interventions are and how to deliver them. The pace of this diffusion into a country determines the pace of health improvement in that country much more than its level of income. Our purpose is to help speed this diffusion of life-saving knowledge.

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Dr. Alleyne's scientific publications have dealt with his research in renal physiology and biochemistry and various aspects of clinical medicine. During his term as director of the Pan American Health Organization, he dealt with and published on issues such as equity in health, health and development, and international cooperation in health. He has also addressed several aspects of health in the Caribbean and the problems the area faces. He is a member of the Institute of Medicine and chancellor of the University of the West Indies.

Dr. Alleyne has received numerous awards in recognition of his work, including prestigious decorations and national honors from many countries of the Americas. In 1990, he was made Knight Bachelor by Her Majesty Queen Elizabeth II for

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Mariam Claeson, M.D., M.P.H., is the program coordinator for AIDS in the South Asia Region of the World Bank since January 2005. She was the lead public health specialist in the Health, Nutrition, and Population, Human Development Network, of the World Bank (1998–2004), managing the Health, Nutrition, and Population Millennium Development Goals work program to support accelerated progress in countries.

Dr. Claeson coauthored the call for action by the Bellagio study group on child survival in 2003, *Knowledge into Action for Child Survival*, and the World Bank's 2005 report on *The Millennium Development Goals for Health: Rising to the Challenges*. She was a member of the What Works Working group hosted by the Center for Global Development that resulted in the report *Millions Saved: Proven Successes in Global Health* (2005). Dr. Claeson coauthored the health chapter of the *Poverty Reduction Strategy* source book, promoting a life-cycle approach to maternal and child health and nutrition. As a coordinator of the public health thematic group (1998–2002), she led the development of the strategy note *Public Health and World Bank Operations* and promoted multisectoral approaches to child health within the World Bank and in Bank-supported country operations, analytical work, and lending.

Prior to joining the World Bank, Dr. Claeson worked with the World Health Organization from 1987 until 1995, in later years as program manager for the Global Program for the Control of Diarrheal Diseases. She has several years of field experience working in developing countries; in clinical practice at the rural district level in Bangladesh, Bhutan, and Tanzania; in national program management of immunization and diarrheal disease control programs in Ethiopia; and in health sector development projects in middle- and low-income countries.

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Prabhat Jha is Canada research chair of health and development at the University of Toronto. He is also the founding director of the Centre for Global Health Research, St. Michael's Hospital; associate professor in the Department of Public Health Sciences, University of Toronto; research scholar at the McLaughlin Centre for Molecular Medicine; and professeur extraordinaire at the Université de Lausanne, Switzerland.

Dr. Jha is lead author of *Curbing the Epidemic: Governments and the Economics of Tobacco Control* and coeditor of *Tobacco Control in Developing Countries*. Both are among the most influential books on tobacco control. He is the principal investigator of a prospective study of 1 million deaths in India, researching mortality from smoking, alcohol use, fertility patterns, indoor air pollution, and other risk factors among 2.3 million homes and 15 million people. This work is currently the world's largest prospective study of health. He also conducts studies of HIV transmission in various countries, focusing on documenting the risk factors for the spread of HIV and interventions to prevent the spread of the HIV/AIDS epidemic. His studies have received more than \$5 million in peer-reviewed grants.

Dr. Jha has published widely on tobacco, HIV/AIDS, and health of the global poor. His awards include a Gold medal from the Poland Health Promotion Foundation (2000), the Top 40 Canadians under Age 40 Award (2004), and the Ontario Premier's Research Excellence Award (2004). Dr. Jha was a research scholar at the University of Toronto and McMaster University in Canada. He holds an M.D. from the University of Manitoba and a D. Phil. in epidemiology and public health from Oxford University, where he studied as a Rhodes Scholar at Magdalen College.

Anne Mills, Ph.D., is professor of health economics and policy at the London School of Hygiene and Tropical Medicine. She has more than 20 years of experience in research pertaining to health economics in developing countries and has published widely in the fields of health economics and health planning,

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Dr. Mills has had extensive involvement in supporting the health economics research activities of the World Health Organization's Tropical Disease Research Programme. She founded, and is head of, the Health Economics and Financing Programme, which has become one of the world's leading groups in developing and applying theories and techniques of health economics to increase knowledge on how best to improve the equity and efficiency of developing countries' health systems. She has acted as adviser to a number of multilateral and bilateral agencies—notably, the United Kingdom Department for International Development and the World Health Organization. She guided the creation of the Alliance for Health Policy and Systems Research and chairs its board. Most recently, she has been a member of the Commission for Macroeconomics and Health and cochair of its working group on improving the health outcomes of the poor.

Philip Musgrove is deputy editor—global health for *Health Affairs*, which is published by Project HOPE in Bethesda, Maryland. He worked for the World Bank (1990–2002), including two years on secondment to the World Health Organization (1999–2001), retiring as a principal economist. He was previously an adviser in health economics at the Pan American Health Organization (1982–90) and a research associate at the Brookings Institution and at Resources for the Future (1964–81).

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The Fogarty International Center is the international component of the U.S. National Institutes of Health. It addresses global health challenges through innovative and collaborative research and training programs and supports and advances the mission of the U.S. National Institutes of Health through international partnerships.

The World Health Organization is the specialized agency for health of the United Nations. Its objective, as set out in its constitution, is the attainment by all peoples of the highest possible level of health, with *health* defined as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

The World Bank Group is one of the world's largest sources of development assistance. The Bank, which provides

US\$18 billion to US\$22 billion each year in loans to its client countries, provided US\$1.27 billion for health, nutrition, and population in 2004. The World Bank is working in more than 100 developing economies, bringing a mix of analytical work, policy dialogue, and lending to improve living standards—including health and education—and reduce poverty.

The Population Reference Bureau informs people around the world about health, population, and the environment and empowers them to use that information to advance the well-being of current and future generations. For 75 years, the bureau has analyzed complex data and research results to provide objective and timely information in a format easily understood by advocates, journalists, and decision makers; has conducted workshops around the world to give key audiences the tools they need to understand and communicate effectively about relevant issues; and has worked to ensure that policy makers in developing countries base policy decisions on sound evidence.

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The Editors

Abbreviations and Acronyms

ACE	angiotensin-converting enzyme	CBR	cost-benefit ratio
ACER	average cost-effectiveness ratio	CDC	U.S. Centers for Disease Control and Prevention
ACT	artemisinin combination therapy	CDD	control of diarrheal diseases
AD	Alzheimer's disease	CEA	cost-effectiveness analysis
ADB	Asian Development Bank	CEmOC	comprehensive emergency obstetric care
ADHD	attention deficit and hyperactivity disorder	CER	cost-effectiveness ratio
AED	antiepileptic drug	CFR	case-fatality rate
AHEAD	applied health education and development	CHA	community health aide
AIDS	acquired immunodeficiency syndrome	CHD	coronary heart disease
AIN-C	atención integral a la niñez comunitaria	CHF	congestive heart failure
ALRI	acute lower respiratory infection	CHNP	community-based health and nutrition program
AMI	acute myocardial infarction	CHNW	community health and nutrition worker
ANW	<i>anganwadi</i> worker	CHOICE	choosing interventions that are cost-effective
aP	acellular pertussis vaccine	CI	confidence interval
APOC	African Programme for Onchocerciasis Control	CKD	chronic kidney disease
ARF	acute rheumatic fever	CL	cutaneous leishmaniasis
ARI	acute respiratory infection	CL/P	cleft lip and palate
ART	atraumatic restorative treatment	CM	cerebral malaria
ASD	autism spectrum disorder	CMH	Commission on Macroeconomics and Health
ATLS	advanced trauma life support	CML	chronic myeloid leukemia
AUD	alcohol-use disorder	CO	carbon monoxide
AZT	Zidovudine	COBRA	combination therapy for rheumatoid arthritis
BCC	behavior-change communication	COHRED	Council on Health Research for Development
BCG	Bacillus Calmette-Guérin	COM	chronic otitis media
BEmOC	basic emergency obstetric care	COPCORD	Community-Oriented Program for Control of Rheumatic Disease
BINP	Bangladesh Integrated Nutrition Program	COPD	chronic obstructive pulmonary disease
BMI	body mass index	CoV	coronavirus
BMT	buprenorphine maintenance treatment	COX	cyclo-oxygenase
BOD	burden of disease	CRA	comparative risk analysis
BRAC	Bangladesh Rural Advancement Committee	CT	computed tomography
BRFSS	behavioral risk factor surveillance system	CVD	cardiovascular disease
BZA	benzimidazole anthelmintic	CVS	chorionic villus sampling
CABG	coronary artery bypass graft	CYP	couple-year of protection
CAD	coronary artery disease	DAH	development assistance for health
CAM	complementary and alternative medicine	DALY	disability-adjusted life year
CAPP	Country/Area Profile Programme	dBHL	decibel hearing level
CBA	cost-benefit analysis	DCPI	<i>Disease Control Priorities in Developing Countries</i> , first edition
CBE	clinical breast examination		
CBHI	community-based health insurance		

DCP2	<i>Disease Control Priorities in Developing Countries</i> , second edition	GFHR	Global Forum on Health Research
DCPP	Disease Control Priorities Project	GIS	geographic information system
DDT	dichlorodiphenyltrichloroethane	GM	genetic modification
DEET	N,N-diethyl-meta-toluamide	GMP	good manufacturing practice
DF	dengue fever	GNI	gross national income
DHF	dengue hemorrhagic fever	GNP	gross national product
DHS	demographic and health survey	GSE	glutathione S-transferase
DMARD	disease-modifying antirheumatic drug	GUSTO	global use of strategies to open occluded coronary arteries
DMFT	decayed, missing, and filled teeth	HAART	highly active antiretroviral therapy for the treatment of HIV/AIDS
DNA	deoxyribose nucleic acid	Hb	hemoglobin
DOT	directly observed therapy	HBV	hepatitis B virus
DOTS	directly observed therapy short course	HDL	high-density lipoprotein
DRC	Democratic Republic of Congo	HepB	hepatitis B
DSM-IVTR	<i>Diagnostic and Statistical Manual of Mental Disorders</i>	HHV	human herpes virus
DSS	dengue shock syndrome	Hib	<i>Haemophilus influenzae</i> type B
DTP	diphtheria-tetanus-pertussis	HIC	high-income country
EAP	economically active population	HIS	health information system
EBM	evidence-based medicine	HIV	human immunodeficiency virus
ED	emergency department	HMN	Health Metrics Network
EFA	education for all	HPLC	high-performance liquid chromatography
EFM	electronic fetal monitoring	HPS	health promoting school
EHCAP	Effective Health Care Alliance Programme	HPV	human papillomavirus
EIR	entomological inoculation rate	HR	human resource
ELISA	enzyme-linked immunosorbent assay	HRT	hormone replacement therapy
EMR	electronic medical record	HSV-1	herpes simplex virus type 1
EMS	emergency medical services	HSV-2	herpes simplex virus type 2
EPI	Expanded Program on Immunization	IAEA	International Atomic Energy Agency
ESRD	end-stage renal disease	IAP	indoor air pollution
EUROSTAT	European Statistical Office	IAVI	International AIDS Vaccine Initiative
FA	folic acid	ICD-10	<i>International Statistical Classification of Diseases and Related Health Problems</i> , 10th revision
FBD	food-borne disease	ICDS	integrated child development services
FCTC	Framework Convention on Tobacco Control	ICER	incremental cost-effectiveness ratio
FDA	U.S. Food and Drug Administration	ICPD	international conference on population and development
FDC	fixed-dose combinations	ICT	information and communication technologies
FEFO	first expiry, first out	IDA	International Development Association
FETP	Field Epidemiology Training Program	IDD	iodine deficiency disorders
FEV1	forced expiratory volume in one second	IDSR	integrated disease surveillance and response
FGM	female genital mutilation	IEC	information, education, and communication
FHP	family health program	IFF	International Finance Facility
FIC	fully immunized child	IHD	ischemic heart disease
FRESH	focusing resources on effective school health	ILO	International Labour Organisation
FTE	full-time equivalent	IMCI	integrated management of infant and childhood illness
G6PD	glucose-6-phosphate dehydrogenase	IMF	International Monetary Fund
G-7	Group of Seven	IMR	infant mortality rate
GATB	Global Alliance for TB Drug Development	INCB	International Narcotics Control Board
GAVI	Global Alliance for Vaccines and Immunization		
GDP	gross domestic product		
GET 2020	World Health Organization Alliance for the Global Elimination of Trachoma		

INDEPTH	International Network of Field Sites with Continuous Demographic Evaluation of Populations and Their Health in Developing Countries	MR	mental retardation
INFECTOM	information, feedback, contracting with providers to adhere to practice guidelines, and ongoing monitoring	MRI	magnetic resonance imaging
IPT	intermittent preventive treatment	MSF	Médecins Sans Frontières (Doctors Without Borders)
IPTi	intermittent preventive treatment in infancy	MTCT	mother-to-child transmission
IPV	inactivated polio vaccine	MVA	modified vaccinia virus Ankara
IRB	institutional review board	NAFTA	North American Free Trade Agreement
IRR	internal rate of return	NAP	nonaffective psychosis
IRS	indoor residual spraying	NCCAM	National Center for Complementary and Alternative Medicine
ISDR	international strategy for disaster reduction	NCE	new chemical entity
ISIC	international standard industrial classification of all economic activities	NDP	national drug policy
ITN	insecticide-treated net	NGO	nongovernmental organization
IUATLD	International Union against Tuberculosis and Lung Disease	NHA	national health account
IUD	intrauterine device	NHS	national health service
IUGR	intrauterine growth retardation	NIH	National Institutes of Health
JE	Japanese encephalitis	NIOSH	National Institute for Occupational Safety and Health
LAAM	levo-alpha-acetyl-methadol	NIPA	national income and product accounts
LBW	low birthweight	NMR	neonatal mortality rate
LDD	learning and developmental disability	NO ₂	nitrogen dioxide
LDL	low-density lipoprotein	NORA	national occupational research agenda
LE 20	life expectancy at age 20	NOx	nitrogen oxide and nitrogen dioxide
LF	lymphatic filariasis	NRA	national regulatory authority
LIC	low-income country	NRT	nicotine replacement therapies
LMICs	low- and middle-income countries	NSAID	nonsteroidal anti-inflammatory drug
LPG	liquid petroleum gas	NSO	national statistics office
LRI	lower respiratory tract infection	NTD	neural tube defect
LSD	lysergic acid diethylamide	OA	osteoarthritis
MBB	marginal budgeting for bottlenecks	OCP	Onchocerciasis Control Program
MCE	multi-country evaluation of IMCI effectiveness, cost, and impact	ODA	official development assistance
MCH	maternal child and health	OECD	Organisation for Economic Co-operation and Development
MDA	mass drug administration	OEPA	Onchocerciasis Elimination Program for the Americas
MDG	Millennium Development Goal	OP	osteoporosis
MDMA	methylenedioxymethamphetamine	OPV	oral polio vaccine
MDR-TB	multidrug-resistant tuberculosis	ORS	oral rehydration solution
MDT	multidrug therapy	ORT	oral rehydration therapy
MEASURE	monitoring and evaluation to assess and use results	PAHO	Pan American Health Organization
MIC	middle-income country	PAL	practical approach to lung health
MMR	measles-mumps-rubella	PARIS21	Partnership in Statistics for Development in the 21st Century
MMT	methadone maintenance treatment	PCBs	polychlorinated biphenyls
MMV	Medicines for Malaria Venture	PCD	Partnership for Child Development
MNCH	maternal, neonatal, and child health	PCP	<i>Pneumocystis carinii</i> pneumonia
MOH	ministry of health	PCR	polymerase chain reaction
		PCV	protein-conjugated polysaccharide vaccine
		PD	Parkinson's disease
		PDOH	Philippine Department of Health
		PDSA	plan-do-study-act

PFGE	pulsed-field-gel-electrophoresis	TB	tuberculosis
PHC	primary health care	TCA	tricyclic antidepressant
PHSWOW	public health school without walls	TDR	Special Programme for Research and Training in Tropical Diseases
PLACE	Priorities for Local AIDS Control Effort	TEHIP	Tanzania Essential Health Interventions Program
PM	particulate matter	THC	tetrahydrocannabinol
PMTCT	prevention of mother-to-child transmission	TINP	Tamil Nadu Integrated Nutrition Program
PopEd	population and family life education	TLTI	treatment for latent tuberculosis infection
ppm	parts per million	TLV	threshold limit value
PPPs	public-private partnerships	TM	traditional medicine
PRSC	poverty reduction support credit	TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
PRSP	Poverty Reduction Strategy Paper	UN	United Nations
PSV	polysaccharide vaccine	UNAIDS	Joint United Nations Programme on HIV/AIDS
PTA	parent-teacher association	UNEP	United Nations Environment Programme
PTCA	percutaneous transluminal coronary angioplasty	UNESCO	United Nations Education, Scientific, and Cultural Organization
PTSD	posttraumatic stress disorder	UNFPA	United Nations Population Fund
PZQ	Praziquantel	UNICEF	United Nations Children's Fund
QALY	quality-adjusted life year	UNIDO	United Nations Industrial Development Organization
RA	rheumatoid arthritis	URI	upper respiratory tract infection
R&D	research and development	USAID	U.S. Agency for International Development
RCT	randomized clinical trial	VAD	vitamin A deficiency
RDI	recommended dietary intake	VC	vital capacity
RESU	regional epidemiology and surveillance unit	VCT	voluntary counseling and testing
RHD	rheumatic heart disease	VERC	village education resource center
RNA	ribonucleic acid	VF	ventilation factor
ROP	retinopathy of prematurity	VIA	visual inspection after application of an acetic acid solution
RRT	renal replacement therapy	VL	visceral leishmaniasis
RSV	respiratory syncytial virus	VOI	value-of-information (techniques)
RTI	road traffic injury	VSL	value of a statistical life
rt-PA	recombinant tissue plasminogen activator	WFP	World Food Programme
SAFE	surgery, antibiotics to control the infection, facial cleanliness, and environmental improvements	WHA	World Health Assembly
SAR	search and rescue	WHO	World Health Organization
SARS	severe acute respiratory syndrome	WHO/TDR	WHO Special Programme for Research and Training in Tropical Diseases
SBP	systolic blood pressure	WHOCC	WHO Collaborating Center
SCC	short-course chemotherapy	WISE	work improvement in small enterprises
SD	standard deviation	WTO	World Trade Organization
SiC	significant caries (index)	YF	yellow fever
SMA	severe malarial anemia	YLD	year of life lived with disability
SO ₂	sulfur dioxide	YLL	year of life lost
SP	sulfadoxine-pyrimethamine	YLS	year of life saved
SSO	social security organization		
SSRI	selective serotonin reuptake inhibitor		
STATCAP	statistical capacity building		
STH	soil-transmitted helminth		
STI	sexually transmitted infection		
SWAp	sectorwide approach		

All dollar amounts are U.S. dollars unless otherwise indicated.

Chapter 66

Referral Hospitals



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The appropriate allocation of resources to referral hospitals within a national health system has long been a controversial issue in health system planning in developing countries. Consensus appears to be widespread that referral hospitals consume an excessive share of health budgets and that their contribution to improving health and welfare is low relative to the expenditure on these facilities, but the literature does not indicate what percentage of budgets should ideally be allocated to referral hospitals. Presumably, except in the poorest countries, some referral facility is needed, but how much is required, and how should the proportion allocated to referral facilities vary with increasing levels of health expenditure and health system sophistication?

One approach would be to review how much countries at different levels of gross domestic product (GDP) currently spend on referral hospitals. However, as explained later, the definition of *referral hospital* varies widely; therefore, analyses of national health accounts and studies of expenditure are rarely comparable. Thus, although the chapter summarizes the literature on expenditure on referral hospitals, this evidence cannot provide guidelines for policy makers.

A second approach might be to undertake a detailed analysis of the role of referral hospitals in treating disease to derive their contribution to total disability-adjusted life years (DALYs). A simple analysis of the cost-effectiveness of specific interventions offered by referral hospitals might allow the selection of those interventions that are justified given their marginal cost per DALY gained. Those interventions, multiplied by expected demand, would then be aggregated to give a total optimal allocation for referral hospital services. This approach is precisely the one used for evaluating and prioritizing disease-specific interventions throughout this volume. However, when this kind

of “pure” cost-effectiveness analysis is used to determine an appropriate or optimal resource allocation for referral hospital services, several problems arise. To begin with, hospitals have complex economies of scope and scale. At the point when hospitals offer a range of cost-effective interventions, the marginal cost-effectiveness of additional interventions may be much greater than would be the case if these other interventions were evaluated in isolation. Yet a standard disease-specific analysis of interventions would rarely be able to calculate the marginal costs of referral hospital-based interventions. Similarly, important and complex interdependencies exist between services and specialties within referral hospitals that may be almost impossible to capture adequately using a cost-effectiveness analysis.

A further limitation to a cost per DALY approach arises because referral hospitals produce multiple outputs, many of which contribute so indirectly to DALYs that they cannot be compared directly to individual health interventions, but which are critical to the functioning of the health system. For example, referral hospitals are arguably essential to the training of doctors, particularly specialists. If a country can justify training its own doctors, then it must have a referral hospital. Yet the value of this output in terms of DALYs probably cannot be calculated. Indeed, many of the functions of a referral hospital occur outside the hospital itself and involve enabling and facilitating the effective functioning of lower-level health services. Although the referral hospital’s contribution may constitute only a small fraction of the total cost of an intervention provided at a lower level of care (which may perhaps be viewed as a fixed cost of the health system), the referral hospital’s role may nevertheless be essential, thereby justifying a considerable premium on its valuation above and beyond the cost per DALY of the care directly provided within the hospital’s own walls.

Finally, strong arguments can be made that cost-effectiveness analysis fails to capture important dimensions of the individual utility—and thus the social welfare—that accrues from the provision of health services, especially those relating to high-cost and low-frequency conditions.

We are, therefore, highly skeptical about the feasibility of proposing a formulaic and purely quantitative response to the question of how to achieve an appropriate allocation of resources to the referral hospital level. Although perhaps unsatisfying for some readers, this chapter attempts instead to provide an overview of the critical features of and challenges relating to referral hospital care in developing countries and a guide to the many issues that decision makers face in setting policy for this level of care. We suggest that planners need to adopt a far more qualitative and intuitive approach to deciding on the appropriate allocation of resources for referral hospitals than for other health care interventions. Such an approach is informed by a more extensive listing of the roles of referral hospitals and their direct and indirect benefits and costs to society. We acknowledge that analysis of the value of referral hospitals is bedeviled by the fact that, when judged empirically, they do not work as they are supposed to. The chapter, therefore, considers the key problems faced in the real environment in which referral hospitals operate in poor countries before reviewing what needs to be done to improve their functioning, drawing in particular on the authors' knowledge of South Africa and the Caribbean.

DEFINITION AND CHARACTERISTICS

Any hospital, including a district hospital, will receive referrals from lower levels of care. Indeed, *referral* can be defined as any process in which health care providers at lower levels of the health system, who lack the skills, the facilities, or both to manage a given clinical condition, seek the assistance of providers

who are better equipped or specially trained to guide them in managing or to take over responsibility for a particular episode of a clinical condition in a patient (Al-Mazrou, Al-Shehri, and Rao 1990). Furthermore, higher-level hospitals in developing countries do not treat only referred patients; tertiary hospitals are frequently the first point of contact with health services for many patients.

Differentiating referral hospitals from district hospitals, therefore, requires consideration of the different resources used by different levels of hospital. Such a differentiation will tend to revolve around three features—the availability of increasingly specialized personnel, of more sophisticated diagnostic technologies, and of more advanced therapeutic technologies—that permit the diagnosis and treatment of increasingly complex conditions.

This volume, including this chapter, uses a standard definition of hospital levels (Mulligan and others 2003). Table 66.1 presents some of the commonly used alternative terminology for different levels of hospitals. Note that this chapter deals only with general—that is, multispecialty—secondary and tertiary hospitals. Specialized hospitals, such as psychiatric, substance abuse, tuberculosis, infectious diseases, and rehabilitation hospitals, clearly have important roles to play in a well-functioning referral system. However, they are attended by specific features and challenges, account for a relatively small share of overall resources, and operate in a significantly different manner than general hospitals do.

FUNCTIONS AND BENEFITS

The functions of referral hospitals may broadly be categorized into (a) the direct clinical services provided to individual patients within the hospital and the community and (b) a set of broader functions only indirectly related to patient care.

Table 66.1 Definitions and Terms for Different Levels of Hospital

Disease Control Priorities Project: terminology and definitions	Alternative terms commonly found in the literature
<i>Primary-level hospital</i> : few specialties—mainly internal medicine, obstetrics and gynecology, pediatrics, and general surgery, or just general practice; limited laboratory services available for general but not specialized pathological analysis	District hospital Rural hospital Community hospital General hospital
<i>Secondary-level hospital</i> : highly differentiated by function with 5 to 10 clinical specialties; size ranges from 200 to 800 beds; often referred to as a <i>provincial hospital</i>	Regional hospital Provincial hospital (or equivalent administrative area such as county) General hospital
<i>Tertiary-level hospital</i> : highly specialized staff and technical equipment—for example, cardiology, intensive care unit, and specialized imaging units; clinical services highly differentiated by function; could have teaching activities; size ranges from 300 to 1,500 beds	National hospital Central hospital Academic or teaching or university hospital

Source: Definitions from Mulligan and others 2003, 59.

Range of Clinical Services Provided

The primary function of the referral hospital is to provide complex clinical care to patients referred from lower levels; however, no agreed international definition exists of which specific services should be provided in secondary or tertiary hospitals in developing countries. The exact range of services offered tends to vary substantially, even between tertiary hospitals within the same country, as much because of historical accident as deliberate design.

In South Africa, the National Department of Health is attempting to improve the quality and accessibility of referral hospital services through development plans that will try to ensure that hospitals at each level move toward providing a comprehensive set of clinical services (National Department of Health, South Africa 2003). The department has developed a target template of services (table 66.2) for regional (secondary) hospitals, tertiary hospitals, and so-called national referral services (which will be offered at only a small number of the

Table 66.2 Target Service Configurations by Level of Referral Hospital, South Africa

Specialist services available on site	Components explicitly included	Specialist services available on site	Components explicitly included
<i>Regional (secondary) hospitals</i>			
Anesthetics	—	Mental health (psychiatry and psychology)	Acute inpatient and outpatient treatment
Diagnostic radiology	X-ray, CT scan, ultrasound, fluoroscopy		Child and adolescent psychiatry
General medicine	Echocardiography, stress electrocardiogram		Electroconvulsive therapy
	Specialist immunology nurse		Liaison psychiatry
	Regional intensive care unit		Satellite clinics
	Diabetes, endocrine clinic	Obstetrics and gynecology	Emergency obstetrics and gynecology
	Gastroenterology, including endoscopy, proctoscopy, sigmoidoscopy, colonoscopy (with general surgery)		Ultrasound, prenatal diagnosis
	Geriatric care		Kangaroo mother care
	Genetic nurse and counseling	Orthopedic surgery	Basic urogynecology
	Oncology palliation and basic care		General orthopedic surgery
	Neurology basic care	Pediatrics	24-hour trauma service, accident and emergency
	Spirometry and oximetry		Neonatal low and high care
	Basic rheumatology		General pediatric medicine service
General surgery	Regional burns service	Rehabilitation center	General pediatric surgery (general surgeon)
	24-hour trauma service, accident and emergency		Physiotherapy, occupational therapy, orthotics and prosthetics, speech therapy, dietetics, podiatry
			Acute rehabilitation team
<i>Tertiary hospitals</i>			
Anesthetics	—	General medicine	As regional plus:
Burns unit	Specialized burns intensive care unit and operating theater		Angiography
Clinical pharmacology specialist	—		Coronary care
Critical care and intensive care unit	Full intensive care unit service		Echocardiography, stress electrocardiogram
Dermatology	Inpatient and ambulatory treatment		Endoscopy, proctoscopy, sigmoidoscopy, colonoscopy (with general surgery)
Diagnostic radiology	X-ray, multislice CT scan, ultrasound, fluoroscopy, mammography, color Doppler ultrasound	General surgery	Genetic nurse and counseling
Ear, nose, and throat surgery	—	Infectious diseases	Oncology palliation and basic care
Gastroenterology	—	Mental health (psychiatry and psychology)	Complex and high-acuity care
			—
			Child and adolescent psychiatry, old-age psychiatry, forensic psychiatry, substance abuse treatment, liaison psychiatry, treatment for eating disorders, inpatient psychotherapy, social psychiatry, acute psychotic (complicated) care, acute nonpsychotic (complicated) care

(Continues on the following page.)

Table 66.2 Continued

Specialist services available on site	Components explicitly included	Specialist services available on site	Components explicitly included
<i>Tertiary hospitals (continued)</i>			
Neonatology	Neonatal intensive care unit	Rehabilitation center	Physiotherapy, occupational therapy, orthotics and prosthetics, speech therapy, dietetics, podiatry, audiology
Nephrology	Tertiary dialysis and nephrology service		Acute rehabilitation team, including spinal beds
Obstetrics and gynecology service	As regional plus: Fetal and maternal medicine		Stroke unit
Ophthalmology	—	Respiratory medicine	—
Orthopedic surgery	Subspecialty orthopedics	Trauma	Tertiary major trauma center (protocol-based transfer only, no walk-in accident and emergency service)
Pediatric intensive care unit	Full pediatric intensive care unit		
Pediatric medicine	Specialist general pediatricians		
Pediatric surgery	Specialist pediatric surgery service	Urology	—
Plastic and reconstructive surgery	—	Vascular surgery	—
<i>National referral services</i>			
Cardiology	Echocardiography, ultrasound, electrocardiography, stress testing, Holter pacemaker follow-up, catheterization laboratory, electrophysiology, ablation	Obstetrics and gynecology service	Oncology Urogynecology Reproductive medicine
Cardiothoracic surgery	—	Orthopedic surgery	Orthopedic oncology
Clinical immunology	—	Pediatric cardiology	—
Cranio-maxillofacial surgery	—	Pediatric endocrinology	—
Critical care and intensive care unit	Additional intensive care unit capacity	Pediatric gastroenterology	—
Diagnostic radiology	MRI	Pediatric hematology and oncology	—
Endocrinology	—	Pediatric infectious diseases	—
Genetics	—	Pediatric intensive care unit	Additional pediatric intensive care unit capacity
Geriatrics	—	Pediatric nephrology	Dialysis and renal transplant
Hematology	—	Pediatric neurology	—
Medical and radiation oncology	—	Pediatric respiratory medicine and allergology	—
Neurology	—	Renal transplant	Renal transplant unit
Neurosurgery	—	Rheumatology	—
Nuclear medicine	—	Urology	—

Source: National Department of Health, South Africa 2003.
— = not available.

largest tertiary hospitals). Although certainly not directly applicable to all developing countries, the template does give a helpful picture of how services “build up” from one level of care to another, and it can be used as a starting point for considering the situation in different countries.

Clinical Services within the Community

Referral hospitals may perform a number of functions that provide population-level health benefits through direct involvement in public health interventions. Responding to the HIV/AIDS epidemic in Latin America and the Caribbean has

heightened awareness about the important role of the hospital in reducing incidence and preventing disease outbreaks. For example, hospitals scaled up services to prevent mother-to-child transmission and initiated follow-up clinics for mothers and babies. In Barbados, the main hospital scaled up voluntary counseling and testing services to address the prevention of horizontal transmission from mothers to their partners, with positive outcomes. The program also served to increase access to obstetric services at the primary health care level because of the screening campaign initiated through the hospital’s prevention of mother-to-child transmission program (Adomakoh, St. John, and Kumar 2002).

Referral hospitals often prove to be a highly effective focal point for disease-specific health promotion and education activities. Bermuda's diabetes education program serves all levels of care and provides a strong link between the primary, secondary, and tertiary health care levels. The program is centered in the main referral hospital and serves not only diagnosed patients but also families at risk. Overall, hospitals in the Caribbean are recognizing that central coordination of public health programs within hospitals can provide benefits by strengthening coordination with other services.

Valuing the Benefit of Clinical Services

Measuring the improvement in an individual's health status produced by the combined activities of a referral hospital, whether for patient care in the hospital or for population-based programs, would theoretically be possible, although practically and methodologically demanding. To our knowledge, such an effort has not been attempted at the referral hospital level, though two studies have attempted to proxy the effect of hospital interventions on health outcomes for small district hospitals, focusing on survival only (McCord and Chowdhury 2003; Snow and others 1994). Both studies indicate that district hospitals appear to have a significant positive effect on health outcomes.

Large numbers of patients receive care in referral hospitals, and most survive with their suffering alleviated, having gained substantial benefit from the care they receive. Therefore, the aggregate direct personal health benefits from referral hospital care will almost certainly be high. The question of whether referral hospital care is cost-effective relative to other interventions delivered at lower levels of care is less easy to answer in aggregate. By its nature, appropriate care in a referral hospital will tend to require more complex input mixes and higher skill levels and, hence, will be relatively expensive. Analysis of the costs and cost-effectiveness of individual interventions offered at different levels is tackled directly by the disease-specific chapters in this volume.

Wider Activities and Functions

Aside from direct patient care, referral hospitals serve other functions within the health system, some of which are offered within the facility, such as teaching and research, while others reach out to the lower levels of the health services, such as technical support and quality assurance.

Advice and Support to Lower Levels. The referral process does not simply entail transferring a patient from a lower to a higher level of care, nor does it end when a patient is discharged from a referral hospital. An effective referral system requires good communication and coordination between levels of care and support from higher to lower levels to help

manage patients at the lowest level of care possible. Too often, personnel in referral hospitals adopt an insular and inward-looking perspective, focusing exclusively on the patients directly under their care. However, referral hospitals should offer significant support to personnel in lower-level facilities, and specialist staff members should ideally spend a significant portion of their time providing advice and support beyond the walls of their own hospital, either in person or through various modes of telecommunication. Even in poor countries, a steady improvement in communications infrastructure means that such support functions should become easier to provide over time. Key dimensions of this support function include the following:

- availability by telephone or e-mail to advise referring practitioners on whether referral is required
- specialist advice to the patient's local practitioner on post-discharge care
- specialist advice on the long-term management of chronic conditions
- specialist attendance at lower-level facilities to provide regular outreach clinics
- provision of expert diagnosis or consultation through telemedicine
- coordination of discharge planning between levels of care
- coordination of the development of and training in the use of shared care protocols and referral protocols
- provision of technology support by skilled technicians and scientists.

Quality Assurance and Quality Improvement. Referral hospitals can and do play a pivotal role in quality assurance and improvement. The most important mechanism for quality assurance and improvement is through the training that referral hospitals provide. The other key mechanism is through the setting of standards for treatment. For example, experts at referral hospitals should review evidence of effectiveness and cost-effectiveness applicable to the local context, determine the formularies to be used at each level of the health system, and develop and amend treatment protocols. Referral hospitals can improve the quality of peripheral services by giving advice, offering on-site training, providing clinical services alongside local practitioners, and monitoring the quality of the referrals they receive.

Education and Training. Many tertiary referral hospitals in developing countries are associated with universities and medical schools and may, therefore, also be regarded as teaching hospitals. Any country wishing to train its own doctors will need one or more teaching hospitals. The number of doctors a country needs will be influenced by its level of development, resources, and personnel structure. Many will aim for a ratio of at least

Box 66.1

How Many Medical Students Should Be Trained Per 1 Million Population?

In a steady state (that is, the number of doctors being produced is equal to the number retiring from practice), and if we assume that doctors practice, on average, for 40 years after qualifying, the total number practicing will equal the number graduating in 1 year multiplied by 40 years. If a population of 1 million needs 1,000 doctors,

Source: Authors.

the number needing to be trained is $1,000/40 = 25$ per year. If 30 percent of doctors leave the country or leave medical practice within 8 years of qualifying, then each graduate, on average, contributes 30 years of service, and 1,000 practicing doctors $(1,000/30) = 33$ must qualify each year.

2 per 1,000 population, though most developing countries have 0.05 to 1.0 per 1,000 (Puzin 1996; WHOSIS 2004). If we assume a 40-year working life and loss through brain drain or other attrition of 25 percent, the number of doctors that must be produced each year is between 16 and 67 per 1 million population, resulting in 0.5 to 2.0 doctors per 1,000 population (box 66.1). A population of 40 million would, thus, need medical schools able to graduate between 640 and 2,680 doctors per year. Medical schools possess economies of scale, and although some extremely small schools train 50 or so students a year, agreement is widespread that a class size of about 150 to 200 is optimal (see, for example, Harden and Davis 1998). A country with fewer than 3 million population would really need to consider whether training doctors locally is justified on economic and other grounds, but for larger countries, the arguments for training doctors locally are strong, and a teaching hospital would, therefore, be required.

Basic generalist doctors should be trained in a range of facilities across all levels of care, reflecting the facilities in which they will work after graduation. Traditional approaches toward medical education have been widely criticized by educationalists and health planners for being dominated by training in tertiary settings by specialists. Not only is this setting inappropriate, but typical content and clinical experience do not reflect what the doctors will be doing or what they will need to know after qualification. Nevertheless, the university teaching hospital cannot be omitted from the basic training of doctors. If students and faculty were involved only in district-based services, they would miss many important advances in biomedical science and the care of complex problems (Husain 1996). Moreover, doctors need to know enough about what the various tertiary specialties do to be able to refer patients appropriately and to make personal career choices.

The training of specialists, of course, depends far more on the existence and proper functioning of referral hospitals. Again, a particular country will need to decide how many specialists it needs in which specialties and whether it should send its doctors abroad to specialize or train them internally. In

developed countries, 60 to 90 percent of doctors are specialists, whereas in developing countries the range is wider (for example, 76 percent of Indian doctors are specialists, 45 percent are specialists in Tanzania, and 31 percent are specialists in Morocco). A World Health Organization expert workshop agreed on a figure of 50 percent (Puzin 1996). Therefore, a country of 40 million would aim to train approximately 300 to 1,300 specialists per year. On average, such training lasts four years. Thus, at any time the academic referral hospital system would need to supply 1,200 to 5,200 residents. A guideline many countries use requires a ratio of postgraduate specialist supervision of not more than two residents per qualified specialist. This ratio can be used to get some idea of the referral hospital capacity required to train specialists.

Although basic doctors could spend most of their training time in primary care and district hospital facilities, with limited exposure to tertiary care hospitals, the training of specialists—as well as of other specialized allied staff members such as nurses for intensive care or specialized psychiatry, physiotherapists specializing in back injuries or burns, and pharmacists specializing in oncology—can take place only in referral hospitals.

In recent years, continuing medical education has grown in importance as the need for professionals to continually update their knowledge and acquire new skills has been more clearly appreciated. The coordination and provision of appropriate continuing medical education depends heavily on the specialists and academics associated with referral and academic hospitals.

Management and Administration. Referral hospitals in many developing countries play important roles in providing managerial and administrative support to other elements of the health system. These roles may include managing laboratory services on behalf of the whole health system; serving as the location for drug and medical supply depots and distribution systems and managing procurement systems; hosting and managing health information systems, often including epidemiological surveillance systems; managing centralized transport fleets; and, on occasion, providing financial management, payroll, and human

resource management services to other health units. Our intent is not to consider whether such arrangements are “right” or “wrong”—complex factors would have to be taken into account in every individual circumstance—but to note that making changes to the functioning of referral hospitals may have unintended consequences. For example, moving referral hospitals from funding based on a global budget to reimbursement systems based on patient activity may unintentionally cause hospitals to cease to provide these wider support functions if explicit alternative funding mechanisms are not established.

Research and Innovation. Referral hospitals tend to be where most health research is undertaken. Whereas in developed countries they may often be associated with the development of new technologies, in developing countries they are more often the site of research for the initial piloting and introduction of new technologies developed elsewhere and for the evaluation of their local suitability and field efficacy. Referral hospitals are also the vehicle for disseminating such technologies through the exposure of staff during training as well as through the role that referral hospitals frequently play in continuing professional education.

Research activities are vital in attracting and retaining specialist staff members who are required not just for the treatment of complex patients, but also for the training of new specialists. Research that is responsive to local conditions—that is, local disease burdens and technology constraints—fills a critical gap because researchers in developed countries and pharmaceutical companies do not generally pursue such research questions if they do not foresee sufficient returns to their investments.

Valuing the Indirect Contribution to the Health System. From the enumeration of the many roles of referral hospitals and their indirect effect on health through their contribution to the health system by way of supervision, administration, training, research, and quality improvement, it is immediately evident that these benefits cannot readily be translated into DALYs or any other metric to be used in a relative cost-benefit analysis.

Externalities and Intangible Benefits

The previous sections reviewed the various functions of referral hospitals within the health system, all of which contributed directly or indirectly to the health status of individuals. This section addresses other ways in which referral hospitals contribute to welfare and well-being, and comments on how they complicate the issue of valuing the contribution of referral hospitals in society.

Referral hospitals have a broader effect on overall societal welfare than can be captured by measures of health outcomes.

Utility, or welfare, includes health as one of many important outcomes, such as financial security, risk alleviation, and psychological reassurance. However, as Hammer and Berman (1995) note, health policy is typically conducted as if it has a unidimensional objective—namely the maximization of health (DALY) outcomes. Determining the appropriate resource allocation to referral hospitals purely on the basis of the cost of generating health (DALYs) may, therefore, seriously underestimate the optimum level of resources, because such measures will fail to capture the full welfare gains from the availability of higher-level health services. An example will highlight the difference between valuing hospitals on the basis of their contribution to health status alone compared with including wider concepts of welfare in the valuation.

Renal failure leading to the need for dialysis is relatively rare, and certainly rare in comparison to many other infectious and chronic diseases in lower- or middle-income countries. Treatment is lifesaving, but must continue indefinitely (involving visits two or three times every week) and is, therefore, extremely expensive. In many cases, dialysis can be justified only if it is linked to a renal transplant program, which terminates the need for dialysis and frees the equipment for someone else. The proportion of the total population who will benefit from such a referral hospital program is small; therefore, the DALYs generated are low, and the program would not rank high among the priorities given a limited budget. However, every member of the population is at risk of renal failure and, if affected, would find that, in the absence of a publicly funded program, he or she would either die or face extremely high costs to secure treatment in the private sector or abroad.

Even in poor countries, patients’ price elasticity of demand is low when faced with life-threatening illnesses, particularly when treatment can change the outcome. Studies on poverty have shown that a significant proportion of households that have become poor did so as a result of serious illness, which resulted in their liquidating assets to pay for health care (see, for example, Liu, Rao, and Hsiao 2003). Thus, people seek the peace of mind of knowing that they can obtain lifesaving treatment should they need it without the risk of incurring catastrophic costs of care. This additional welfare derives both from the financial security of not having to spend more than people can afford to save their lives and from the direct health benefits of treatment itself. The utility from the former (financial security) increases with the cost of the intervention required, whereas the utility derived from the latter (direct health benefits) is unrelated to the cost of the intervention. Paradoxically, one could, therefore, argue that the rarer a particular illness is—and the more costly the intervention required—the greater will be the welfare gain from public spending on that intervention.

This argument, of course, is likely to stand in direct contrast to the conclusions drawn from prioritization based on cost-effectiveness. For most individuals, willingness to pay is far less

than the costs of the procedure to them; however, because the whole population benefits from the security of knowing that each individual would be entitled to referral hospital care should he or she need it, in the aggregate the welfare value generated by public provision or funding may be many times greater than the value of the DALYs generated directly for those few patients who do receive treatment. This literature review did not find evidence of studies on national willingness to pay for referral hospital care in developing countries, but this area could be of interest for future research.

In practice, too, the public—particularly an urban, middle-income public—expects the government to provide care of last resort for complex trauma or diseases, especially for natural and man-made disasters. Thus, even though referral hospitals may provide care to a small number of people, often with limited health benefits, politicians and the public alike may value and prioritize them simply because they meet the public's expectations for what the government must provide. In addition, politicians and the public often regard a country's ability to provide the kind of complex, high-tech care offered in a referral hospital as a measure of that country's level of development and sophistication, and it is a source of national pride. Whether economically rational or not, this nonhealth benefit appears to drive public choices to some extent.

Negative Impacts

The “negative” impact of referral hospitals is largely attributable to their potential to exert distortionary effects on the health system by diverting resources from peripheral areas and from lower levels of care (Fiedler, Schmidt, and Wight 1998; Filmer, Hammer, and Pritchett 1997) for the following reasons:

- Tertiary hospitals and specialists have a high political and public profile.
- Urban and political elites are more likely to use referral hospitals than rural primary care facilities or district hospitals.
- Harmful competition with lower levels of care may result from the maintenance of higher-level referral hospitals in many poor countries, lowering use of the former.
- Referral hospitals can be entry points for the introduction into the health system of inappropriate and unaffordable technologies.
- Skilled personnel frequently find referral hospitals far more attractive to work at than rural and district hospitals for such reasons as preferences for a metropolitan location, better hospital resources allowing for a more rewarding professional experience, and better opportunities for private practice (official or unofficial). However, given the huge problem of global migration of health workers from poor to rich countries (Bundred and Levitt 2000), one could argue that well-functioning referral hospitals might

provide local health professionals with a good incentive to remain at home, whereas the absence of referral hospitals would increase the propensity of local professionals to emigrate.

DETERMINANTS OF AN APPROPRIATE BALANCE OF REFERRAL-LEVEL CARE

When one considers the ideal level of resources to be provided for referral hospital care and the appropriate balance between resources for referral hospitals and for other levels of the health care system, no simple formula is available that can be applied to different countries and contexts. However, certain key factors have an important influence on the need and demand for referral-level care, the resources that may be available to the health sector, and the ability of the health sector to provide adequate and effective care in different settings.

General Determinants

Arguably the most important determinant of demand for and ability to pay for referral hospital care is a society's level of economic development and wealth, captured (albeit imprecisely) by measures of GDP per capita. Extensive international evidence indicates that national health expenditure displays an unambiguously positive income elasticity both across countries and over time; that is, as a country gets richer, it spends relatively more on health (see, for example, Getzen 2000; Schieber 1990). Studies in developed countries indicate that in the United States, every 1 percent long-run increase in GDP leads to a 1.6 percent increase in health expenditure, and in other countries the increase is between 1.2 and 1.4 percent (Getzen 2000). Therefore, expecting developing countries to spend a higher proportion of their GDP on health care as they become wealthier seems to be reasonable. If the poorest countries were to focus their limited resources on highly cost-effective interventions in primary health care, somewhat better-off countries might be expected to spend progressively more on the referral hospital level as resources became available.

An overlapping set of demographic and geographical factors also plays an important role in determining the balance of referral care—namely, population size, population density, terrain, distances between main urban centers, and access. Populations of some millions are required to justify a major tertiary hospital with a full range of tertiary services. Small countries with populations of less than 1 million will certainly not be able to provide a full range of tertiary hospital services because of the need to achieve minimum volumes to ensure service viability and to attract a critical mass of specialized personnel. Countries with fewer than 100,000 inhabitants (generally island states) may find even secondary hospital services

beyond their means and capabilities. Supranational referral, reliance on larger neighbors, or regional collaboration may be unavoidable for smaller countries, especially for tertiary care provision, with the Caribbean and southern Africa providing clear examples of many smaller states relying on referral facilities in larger or wealthier neighbors. Within larger countries, population density can complicate the planning of referral services. Compact countries or regions with dense populations can typically provide high levels of access to referral care at a relatively small number of sites, whereas countries or regions with more dispersed populations face more complex tradeoffs regarding number of sites, volume thresholds, and transportation systems.

The other main influence on the appropriate balance of referral services for a given country is its particular pattern and burden of disease. Although referral-level services will always be needed, as a society passes through epidemiologic and demographic transitions, it is likely to require more of those services typically found at referral hospitals. For example, rapidly increasing rates of heart disease and cancers are typically encountered in industrializing nations and aging populations, and these are diseases whose effective management requires access to the interventions, skills, and equipment that will typically be concentrated at the referral hospital level.

Health System Determinants

A number of factors specific to the particular context of a country's health system will also influence the appropriate balance between referral hospitals and lower levels of care. These factors are especially important in considering the appropriateness of plans to change the balance of care between levels. Broadly, they can be summarized as follows:

- capabilities of lower levels
- availability of specialized personnel
- training capacity, organization, and needs
- cultural issues, political issues, and traditions.

The first three factors are closely interrelated. If primary health care and district hospital services are weak, cutting resources for referral hospitals without destabilizing the system will be more difficult. In such circumstances, rapid rebalancing of resources is unlikely to be possible because careful efforts will be required to develop lower-level services first, while still maintaining the referral service. Where lower-level services are strong, devoting relatively fewer resources to referral hospitals may well be possible. However, even though an effective district health system will be able to treat a large proportion of patients at lower levels of care, it will also be better able to identify patients who require referral for more complex care and, thus, may generate a greater appropriate demand for referral hospital care.

Referral hospital services require a specialized staff to fulfill their mission. If specialized personnel are not available in a country, then attempting to develop referral hospitals on a large scale will clearly be infeasible. However, many countries arguably have too many specialized staff persons and too few well-trained generalists. Where large numbers of specialists exist, their presence will likely tend to draw resources disproportionately toward the referral level and away from district health systems. Wherever such imbalances exist, positive changes will require a substantial training or retraining agenda. The feasibility of such efforts is closely linked to the professional and social status of different professional groups and subgroups—for example, whether medical specialists are viewed as having a higher status than general practitioners—and to the premium a society places on having access to “advanced” medical care.

CURRENT BALANCE OF CARE IN PRACTICE

In this section, we summarize data on the current balance between referral and lower levels of care. We first look at the share of total health expenditure going to these different levels, but given that referral care normally has much higher unit costs, we recognize that the balance also needs to be viewed in terms of volume of cases and access and equity.

Share of Health Expenditure

Different health systems categorize hospitals and services rendered differently. Methodologies in national health accounts in developing countries during the 1990s and early 2000s have tended to use a simple, catch-all category of “hospitals” or “acute hospitals” (for example, WHO 2002). Even high-income countries following the Organisation for Economic Co-operation and Development's system of health accounts provider classification (OECD 2000, 136) distinguish only between “general” hospitals and “mental health and substance abuse” and other “specialty” hospitals in their national health accounts. Consequently, making valid cross-country comparisons of spending by levels of hospital care remains extremely difficult.

Mills (1990a) reviews published data on hospital expenditure patterns in developing countries, and Barnum and Kutzin (1993) provide a comprehensive survey of expenditure on hospital services in a number of developing countries, drawing their information largely from World Bank sector reviews. These analyses remain the most authoritative assessment of the proportion of public health expenditure absorbed by secondary and tertiary hospitals, even though their data represent only a handful of countries at different points in time.

Overall, Mills (1990a) finds that hospitals in developing countries appear to absorb from 30 to 50 percent of total

health expenditure. Public hospitals of all types absorb some 50 to 60 percent of public health expenditure, and secondary and tertiary hospitals absorb about 60 to 80 percent of public hospital expenditure, with the remainder going to district hospitals. Her results are broadly similar to those of Barnum and Kutzin (1993, 26–33), who find that public hospitals at all levels absorb a mean of approximately 60 percent of recurrent public health expenditures. Across five countries (Belize, Indonesia, Kenya, Zambia, and Zimbabwe), they find that tertiary hospitals account for between 45 and 69 percent of total public expenditure on hospitals. In South Africa, Thomas and Muirhead (2000) find that tertiary hospitals account for 28 percent of hospital expenditure and 17 percent of total public health expenditure, but when taken together with regional referral hospitals, constitute 59 percent of hospital expenditure.

Unit Costs of Care

One of the explanations for the high share of expenditure that flows through higher-level referral hospitals is, of course, that the unit costs of a referral hospital are necessarily higher than the unit costs of a district hospital. This difference results from the more complex case mix they treat, their more expensive inputs, and the additional costs of their teaching functions (Barnum and Kutzin 1993, 26). Mills (1990b) reports that her analysis of available data indicated that secondary-level hospitals were typically twice as expensive per bed day as district hospitals and that tertiary hospitals were typically between twice and five times as expensive per bed day as district hospitals. Barnum and Kutzin (1993) find similar relationships between unit costs by level of hospital in a variety of different countries. This upward gradient in unit costs has also been found in econometric studies of hospital costs (Adam, Evans, and Murray 2003) and has been explicitly incorporated into the regression-based unit cost estimates used in other chapters in this volume.

Table 66.3 shows data on unit costs by level of care from Mauritius and highlights a commonly encountered contradiction of the preceding paragraph—namely, that costs appear

Table 66.3 Cost Per Bed Day in a Medical Ward by Level of Hospital, Mauritius, 1995
(2001 U.S. dollars)

Level of hospital	Cost
District	17
Regional	21
Tertiary	20

Source: Murray and others 1996.

Table 66.4 Cost Per Bed Day for Selected Specialties, Tertiary Hospitals, Mauritius, 1995
(2001 U.S. dollars)

Specialty	Minimum	Maximum
Medicine	16	20
Orthopedics	18	23
Pediatrics	29	43
Cardiothoracic surgery	36	39
Burns	37	37
Intensive care unit	106	120

Source: Murray and others 1996.

similar at all levels. This phenomenon is explained by average bed occupancy in Mauritian district hospitals of around 45 percent in 1995, compared with average bed occupancies of 90 percent or more in tertiary hospitals. Thus, the high cost of district hospital care in this case reflects not inputs, which are much less extensive than in a tertiary hospital, but the effect of low levels of utilization. Such a difference in utilization between levels of hospital tends to be the norm in many developing countries (Barnum and Kutzin 1993, 91–96). Note that the regression-based unit costs of district hospitals used in the cost analysis for this volume reflect an “optimized” bed occupancy of 80 percent (Mulligan and others 2003, 29). This assumption is entirely defensible from a long-run perspective, assuming cost-minimizing behavior is necessary and appropriate. It does, however, reflect quite a substantial shift from the levels of utilization and productivity commonly seen in rural district hospitals in most developing countries.

The use of a simple unit cost hides important cost differences between services and specialties within the same hospital, as demonstrated by the breakdown for Mauritian tertiary hospitals in table 66.4. Differences in length of stay for different specialties and conditions also obviously contribute to radically different costs per admission or patient; however, these differences should be captured by the condition and procedure costs used in the disease chapters in this volume.

Appropriateness of Utilization of Referral Hospitals

Perhaps the most frequent theme in the research literature on referral hospitals in developing countries is the inappropriate utilization of higher-level facilities and the apparent failure of most referral systems in developing countries to function as intended. Broadly speaking, hospitals of all levels, up to and including national tertiary centers—especially in their outpatients departments—are overwhelmed by patients who could have been treated successfully at lower-level facilities, many of

whom have self-referred, bypassing primary health care or district hospitals in the process (Holdsworth, Garner, and Harpham 1993; London and Bachmann 1997; Omaha and others 1998; Sanders and others 2001).

Atkinson and others (1999) describe an extreme manifestation of this phenomenon, whereby the University Teaching Hospital is actually the only public hospital in Lusaka. Combined with the bypassing of primary health clinics in the city, this situation results in the University Teaching Hospital's functioning primarily as a glorified health center and first-contact provider for most of Lusaka's population. The problem of bypassing typically seems to be driven by a number of factors, including patients' perception of superior quality of care and resource availability at referral hospitals, which often may be entirely well founded and rational (see, for example, London and Bachmann 1997; Nolan and others 2001); the desire to avoid delays in care if referral to a higher-level facility proves to be necessary; and the fact that for many urban populations a referral hospital may simply be the closest health facility. Grodos and Tonglet (2002) argue that many countries' failure to develop an adequate urban equivalent of the district health concept greatly exacerbates inappropriate utilization of hospitals. The urban phenomenon of widespread bypassing and self-referral is frequently accompanied by low rates of formal referral from rural and outlying facilities (see, for example, Nordberg, Holmberg, and Kiugu 1996; Omaha and others 1998).

These problems have a number of negative impacts and consequences. Simple conditions are unnecessarily treated in a high-cost environment; outpatient departments are congested by patients requiring primary care, thus causing long waiting times; scarce staff time is diverted from specialized areas and into inappropriate care; and more complex cases requiring specialized care are crowded out by more urgent but less technically demanding cases that could be cared for at lower levels. The latter has been a particular concern in those countries with more serious HIV/AIDS epidemics. As the number of patients falling sick with AIDS increases rapidly, they start to occupy a significant proportion of beds in hospitals at all levels (Gilks and others 1998), inevitably crowding out patients requiring other forms of care. Although AIDS cases may well require hospitalization, only a small proportion of cases require specialized or tertiary care. Gilks and others (1998) find that this crowding-out effect may fall over time as the health system adjusts to the pressures of AIDS, but countries facing impending AIDS epidemics should be prepared for its initial appearance.

Taken together, this complex of problems undermines the effective delivery of both specialized care and appropriate primary health care. Specialized care is pushed to the background by the human wave of demand for primary care, while hospitals unwittingly further undermine the credibility of the primary health care system through one-sided competition

(Stefanini 1994), which reinforces the cycle and ensures that primary health care facilities remain underused and inefficient.

Access and Equity

By their nature, referral hospitals must be limited in number and will inevitably be sited in major towns and cities. As a result, a significant portion of the population, especially people living in rural areas, will tend to live at some distance from the nearest referral hospital. Studies of the accessibility of referral hospital care in countries such as Ethiopia (Kloos 1990) and Nigeria (Lyun 1983; Okafor 1983) have repeatedly confirmed the existence of a steep distance-decay function, indicating that—other things being equal—individuals with a given need for a clinical service will be less likely to access that service the farther away from the referral center they live.

Compounding the impact of distance, investigators find that problems relating to the availability, regularity, and cost of transportation to referral centers also affect service utilization (Kloos 1990; Martey and others 1998). The same authors indicate that prohibitive hospital fees are often a significant barrier to utilization, especially among poorer patients. Other important barriers included perceived lack of drugs and essential supplies, even at referral centers; negative staff attitudes; and cultural and linguistic differences (for example, where the staff at a referral center does not speak the language of a patient from a remote area). As noted earlier, peripheral district hospitals also tend to have low rates of referral. These barriers, which all disproportionately affect rural patients, must be contrasted with the phenomenon noted earlier of excessive and inappropriate use of referral hospitals for primary care by urban residents.

In addition to finding that public hospitals favor urban residents over rural dwellers, a number of studies have indicated that public hospitals in many poor countries disproportionately benefit the better off, leading their authors to argue that diverting public funds from hospitals and toward primary health care would be pro-poor (see, for instance, Castro-Leal and others 2000; Filmer, Hammer, and Pritchett 1997; Mahal and others 2002). Other studies find this tendency in some countries but not in others (Makinen and others 2000). By contrast, in Latin American countries, Barnum and Kutzin (1993) find strong evidence that public hospitals are pro-poor in their distributional effect. Even if referral hospital services are not currently pro-poor, policy makers face two contradictory alternatives: either to retarget public funds toward primary health care for the poor, hence greatly reducing or abandoning public funding for referral hospitals, or to attempt to remove the barriers that prevent the poor from using higher-level services, which would probably require increased spending on all levels of care.

GETTING BETTER VALUE FOR MONEY FROM THE HOSPITAL SYSTEM

Although prescribing how resources should be allocated across levels of care is hard, at least they should be efficiently used, wherever they are spent within the hospital system. The preceding analysis has highlighted how deficiencies at the lower levels of the hospital system render referral hospitals less efficient and how factors that affect access lead to skewed benefits and inequity. Here we look more specifically at three areas for improving the efficiency of the hospital system: interventions within the referral hospital, the use of public-private partnerships, and strengthening of the referral chain.

Improving the Efficiency of Referral Hospitals

Although space does not permit a lengthy discussion of approaches to improve efficiency in the context of referral hospitals, this aspect is nonetheless important in planning and system strengthening (for a more detailed discussion see Barnum and Kutzin 1993; Hensher 2001; Walford and Grant 1998). In summary, the key areas on which planners and managers should focus are as follows:

- reducing inappropriate outpatient and inpatient use of referral
 - improving systems to allow early discharge from the hospital
 - ensuring that bed occupancy rates can be maintained as close as possible to optimal rates—namely, 85 percent for referral hospitals
 - developing systems for booked outpatient appointments, admissions, and procedures to permit better planning of activity and staffing
 - undertaking as much activity as possible on an ambulatory rather than an inpatient basis, supported by the use of “step-down” beds and patient hotels
 - evaluating the staff skill mix and the potential for skill substitution, as well as efficient remuneration strategies, on a continuous basis
 - evaluating and improving processes and systems, including cost-effective clinical guidelines for patient treatment, on a continuous basis
 - ensuring that new or replacement referral hospitals conform as much as possible to available evidence on economies of scale—that is, that hospitals with fewer than 200 beds are likely to be scale inefficient and that diseconomies of scale are likely to become increasingly evident in hospitals with more than 600 beds
 - adopting intelligent procurement processes and engaging in effective negotiations with suppliers in relation to prices and service levels
- ensuring effective ordering, stock control, and distribution systems to minimize theft and wastage of key supplies
 - undertaking planned preventive maintenance and programmed replacement of equipment and buildings.

Can Public-Private Interactions Improve Efficiency?

In the context of this discussion, privately owned hospitals that provide subsidized care to public patients, such as nongovernmental organization and mission hospitals, are regarded as public hospitals. *Private* refers to for-profit hospitals that are generally funded by paying patients and are minimally subsidized. Few studies have been undertaken of how private hospitals operate in developing countries (see, for example, Muraleedharan 1999). Although the exact balance of and relationship between the public and private health sectors varies greatly from country to country at all levels of the health system, a common theme in almost all low- and middle-income countries is that private hospitals do not follow the pyramidal referral form that public hospital systems have adopted almost universally. Most private health sectors do not clearly delineate district, secondary, or tertiary hospitals. Different private hospitals may offer different services and facilities on a more or less idiosyncratic basis, with independent medical specialists practicing and admitting patients at various different hospitals.

In most systems, scope exists for both positive collaboration and competition between public and private hospitals, especially for secondary and tertiary services. Competition between public and private sectors obviously has the potential to be beneficial by driving quality up and costs down, but it may also have negative effects by encouraging a duplication of services and resulting in the underutilization of fixed capital by creating perverse incentives for physicians and patients and by competing with the public sector for scarce human resources. In some settings, the private sector may be able to offer services that the public purse cannot afford to provide, thus allowing patients who could not afford private care some chance of accessing sophisticated treatments through the government’s paying private providers or by some pro bono provision of treatment for poor patients.

In many countries, government hospitals are establishing private wards as a vehicle for income generation. The fees for such units are lower than those at private hospitals, offering access to private facilities to patients who may not be able to afford private hospitals. The link with academic medicine often adds to the appeal of such facilities. However, as is the case in South Africa, effectively only tertiary hospitals and a handful of secondary hospitals are felt to be attractive enough to private patients to offer genuine opportunities as preferred providers. The mass of district and regional hospitals are unlikely to be attractive to private patients; therefore, the positive spinoffs of these initiatives may be limited in their scale and reach.

Contracting out services to private providers, particularly high-cost, low-volume services, may be an efficient way to offer such services to public patients. For example, the government of Barbados contracts out surplus demand for dialysis to a private facility on the island. In some provinces of South Africa, expensive imaging such as MRI has been contracted out to private radiology practices. South Africa is also experimenting with contracting out the management of some academic referral hospitals to a private hospital group that is assumed to have greater management expertise and is free from certain public sector constraints, such as salary scales for senior managers. It is too early to judge the success of this arrangement, but in all cases it is imperative that contracts be carefully regulated, monitored, and enforced. For a comprehensive review of contracting, see Bennet, McPake, and Mills (1997).

Particular problems may arise where the same doctors provide care in both public and private hospitals. Under fee-for-service arrangements, physicians may focus on their more lucrative private patients to the disadvantage of public hospital patients, refer patients with adequate insurance to their private practices and private hospitals, and transfer patients with expensive diseases or inadequate insurance to public hospitals.

Improving the Functionality of Referral Systems

An ideal referral system would ensure that patients can receive appropriate, high-quality care for their condition in the lowest-cost and closest facility possible, given the resources available to the health system, with seamless transfer of information and responsibility as that patient is required to move up or down the referral chain. Although few referral systems anywhere in the world live up to this ideal fully, it does provide a target in relation to improving the current situation. Improving the effective functioning of referral systems broadly requires progress in three areas: referral system design, facilitation of the smooth transfer of patients and information between levels, and what Walford and Grant (1998, 38) refer to as effective “referral discipline.”

Improving referral system design must start with a detailed attempt to assess which services should be provided at which level of care, encompassing community- and home-based care, primary health care, district hospitals, secondary hospitals, tertiary hospitals, and specialized hospitals. Such an assessment must take local circumstances into account, requires a significant analytical and consultative effort by planners and clinicians if it is to be credible, and must explicitly be open to revision in light of practical experience. After such an exercise has identified which services can appropriately be provided at each level of care, adequate resources must be dedicated to strengthening lower levels of care to make them attractive and credible in the eyes of patients. This effort will require significant

investment and funding to ensure the availability of appropriate staff members and supervision, to ensure continuous drug supplies, and to provide basic laboratory tests (Walford and Grant 1998, 38). Given the pervasiveness of inappropriate use of referral hospitals for primary health care problems by urban residents, both urban and rural primary health care and district health systems must be adequately strengthened. Financing strategies that redistribute funds from urban to rural regions may unwittingly hamper such strengthening of the referral system by failing to allow for the development of appropriate lower-level facilities for urban residents. This risk is especially high when a country is pursuing a redistributive agenda against a background of limited or zero overall growth in expenditure.

From a physical planning perspective, planners should consider providing primary health care and district hospital walk-in ambulatory services (emergency and general outpatients) in a physically distinct facility sited immediately next to the referral hospital. This arrangement not only enables triage and filtering of less severe cases (while proximity ensures that severe emergency cases can be transferred rapidly) but also enables rigorous enforcement of a referral-only policy within the referral hospital.

The development of effective patient transportation arrangements is also critical, not only to ensure that patients from remote areas have a fair chance of being successfully referred to a center of excellence (bearing in mind that most referral systems will almost certainly need to increase referral rates from rural areas), but also to ensure that patients can be discharged in a timely and well-planned fashion.

Perhaps more challenging is the concurrent need to align the incentives of referral hospitals, district hospitals, and primary health care services. This goal may or may not be achievable by means of an integrated management structure, but it certainly requires a good deal of communication, collaborative planning, and collaborative development of shared care protocols, and senior personnel need to be given responsibility for coordination and liaison across key interfaces of the referral network. A single, global budget controlled by an authority that is concerned with optimizing the cost-effectiveness of health care delivery would seem to be a necessary condition to achieve alignment across service levels; however, a consideration of financing mechanisms is beyond the scope of this chapter.

At the patient level, a number of mechanisms to improve referral discipline can be considered. In situations in which eliminating nonreferred patients entirely from the referral hospital is impossible, queuing systems should be redesigned to separate referred patients from nonreferred patients so that referrals can be fast-tracked. Explaining to nonreferred patients why other patients are being fast-tracked past them is important to encourage them to seek referral in future. Ideally, they should be diverted to an on-site primary health care facility where they can be treated more quickly than in the referral

hospital. Another possibility may be to institute bypass fees for nonreferred patients, charging them a penalty fee for failing to use the referral system. Such a decision requires careful consideration and planning. Credible lower-level care must be readily available, and substantial efforts to communicate the new policy to the public will be required if this approach is to be seen as fair. More broadly, intensive public communication and education will be essential to inform the public how, where, and when they should seek health care at different levels and to build their confidence that lower-level facilities really will be able to offer acceptable quality care when they need it.

CONCLUDING COMMENTS

This review of the available evidence indicates that referral hospitals frequently do command a large share of health sector resources and expenditure, yet no simple way exists of assessing what an appropriate share would be. Strong referral hospitals can distort priorities and undermine basic services, but they also provide important health benefits to large numbers of patients whom they treat successfully. Referral hospitals provide essential support to lower levels of the system, which cannot function effectively without access to upward referral, and they are frequently the most functional component of the health system, paying greatest attention to quality of care.

Overall, we have argued that both national and international policy makers should be cautious before demanding the reallocation of resources away from referral hospitals and should be still more cautious in allowing themselves to believe that such a reallocation is likely to be achievable in practice. In particular, this chapter has made the case that a unidimensional focus on cost-effectiveness analysis and cost per DALY gained will fail to capture the importance of referral hospital services adequately. In reality, in most developing countries, the scope for reallocation of resources from referral hospitals to lower levels of care is limited, and the managerial demands of achieving a successful reallocation are great. Lower levels of care certainly require strengthening, but this need is more likely to reflect inadequate financing of the entire public health system than a grossly excessive allocation to referral hospitals. Instead, referral hospitals should perhaps be seen as the capstone of the referral pyramid: they should not be too heavy, but if they are too light, the levels below them will lose cohesion. A restructuring of referral hospital services is certainly called for to improve appropriate referral and utilization, especially by remote and rural populations; to transform the inappropriate use of referral hospitals as primary health care providers; to improve efficiency; and to provide much better outreach and support to lower levels of care.

This restructuring should not be confused with wholesale demolition. Undermining referral services will be far more

likely to undermine and destabilize the entire health system than to liberate resources for primary health care. Clearly, countries must critically evaluate their health priorities and their balance of care and resources between levels, but they should do so carefully and thoroughly, with a clear understanding of the analytical effort required to draw meaningful conclusions, of the planning and managerial capacity that they will require to bring about successful change, and of the long time frames required to develop and implement robust plans for major system changes.

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