



Redefining global health-care delivery

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Initiatives to address the unmet needs of those facing both poverty and serious illness have expanded significantly over the past decade. But many of them are designed in an ad-hoc manner to address one health problem among many; they are too rarely assessed; best practices spread slowly. When assessments of delivery do occur, they are often narrow studies of the cost-effectiveness of a single intervention rather than the complex set of them required to deliver value to patients and their families. We propose a framework for global health-care delivery and evaluation by considering efforts to introduce HIV/AIDS care to resource-poor settings. The framework introduces the notion of care delivery value chains that apply a systems-level analysis to the complex processes and interventions that must occur, across a health-care system and over time, to deliver high-value care for patients with HIV/AIDS and cooccurring conditions, from tuberculosis to malnutrition. To deliver value, vertical or stand-alone projects must be integrated into shared delivery infrastructure so that personnel and facilities are used wisely and economies of scale reaped. Two other integrative processes are necessary for delivering and assessing value in global health: one is the alignment of delivery with local context by incorporating knowledge of both barriers to good outcomes (from poor nutrition to a lack of water and sanitation) and broader social and economic determinants of health and wellbeing (jobs, housing, physical infrastructure). The second is the use of effective investments in care delivery to promote equitable economic development, especially for those struggling against poverty and high burdens of disease. We close by reporting our own shared experience of seeking to move towards a science of delivery by harnessing research and training to understand and improve care delivery.

Introduction

Global health as an endeavour has expanded strikingly over the past two decades and offers great promise to improve lives in resource-poor settings. Broad public interest in the health and wellbeing of people in the developing world, and of poor and marginalised individuals in advanced economies, has grown. Complex diseases recently held to be untreatable, and thus universally fatal in such settings, are tackled with increasing success. Scholarly work on or relevant to global health is also growing rapidly. Funded research is on the rise, focusing principally on basic-science discovery, the development of new clinical resources (preventive, diagnostic, and therapeutic), and more recently evaluation of particular interventions. This focus on technological solutions is a source of great optimism and consistent with the flow of funds that has supported career advancement in academic medicine and in science for the better part of a century. In our view, however, the biggest obstacle facing global health is a failure of delivery. The gritty business of actually delivering health care in developing countries has not attracted much academic interest, even though improving capacity to deliver care in these settings will save lives, leverage substantial and growing philanthropic support of global health, and increase returns on existing and new investments in both discovery and development of new resources.

Knowledge about the delivery of health care to the poor is highly fragmented around narrow topics reflecting funding streams; the design of programmes in the field is often ad hoc, and there are few mechanisms to capture what practitioners learn in the field and thereby add to a shared store of knowledge about effective care delivery in settings of privation. What scant attention to research and teaching of health-care delivery exists is focused on specific

questions about particular interventions (eg, the feasibility of administration of a vaccine, and its cost-effectiveness) rather than on the broader systems and conditions. These bottlenecks and barriers—ranging from problems in supply-chain management to an absence of trained personnel to questions of how components of a health system best fit together—are rooted in rapidly changing social context, as opposed to unalterable circumstance, and thus amenable to improvement. All too often, and especially in settings of poverty and social inequality, systems-level improvement does not occur. The price of failing to improve delivery is a worsening of health disparities both local and global. In many such settings, advances in health technologies benefit largely a minority well served by existing health systems.

The present article is a call to harness existing resources and dedicate new ones to the issues of global health-care delivery. We define this term, and the new endeavour it describes, in relation to the existing specialties of health care, global health care, and health-care delivery systems.

Health care is almost too familiar a concept to require definition, but here we emphasise its inclusiveness: the profession of health care includes many subspecialties of clinical medicine (from surgery to mental health, delivered by a broad range of professionals), public health, sanitary and nutritional support, and health infrastructure.

Global health care is understood to mean the provision of a limited set of health services to underserved populations in resource-poor areas of the world. Although this pursuit was for decades termed “international health”, its aspirations limited sharply because of scant resources, we take the term “global” to indicate applicability to the human species as a whole.

By health-care delivery we mean the effective provision of services to people with diseases for which proven

therapies exist. This provision is always local. It does a sick person no good to be living in a country with world-class health-care facilities if financial, social, or geographical obstacles render those facilities inaccessible. Rational, inclusive efforts to bring high-quality diagnostic and clinical services within ready reach of populations previously considered (by purveyors of such services or by those setting health policy) too remote, too “backward,” or too poor to make use of them. Considerations of equity and justice, though not always explicitly acknowledged, have a powerful role in expanding access to health services (prevention, diagnosis, and care) to those in great need of them. We here advocate study and improvement of such efforts, and provide clinical, economic, political and moral justifications for the endeavour we call global health-care delivery.

We also believe that this new specialty of global health delivery will lead to innovations that could improve care delivery and outcomes in developed countries, including our own. We will illustrate by drawing on lessons learned in responding to AIDS.

Reconceiving delivery, reimagining global health

The prevailing goal of global health has been to increase access to goods and services that might improve health outcomes. Access to care is not only crucial in view of acute needs; health care planners are under a moral imperative to address disparities in access to life-saving preventives, such as vaccines, and to care for afflictions new and old. But experience since the Alma-Ata Declaration of 1978, with its slogan of “health care for all”, teaches us to look beyond facile notions of ready access to a fixed set or minimum package of services.

The focus must shift to delivering value for patients. How do we assess value in health care? Values are, as social scientists know, subjective and rooted in context. From the patient’s point of view, the value of a particular health service, if it forestalls certain death, may well approach infinity. From the point of view of the managers of a national health-care system, the term value is trickier to define, since resource allocations inevitably involve trade-offs. An increase in the budget of the tuberculosis control programme may entail a corresponding reduction in cancer screening, say; an unforeseen epidemic, such as HIV/AIDS, may play havoc with expectations, as does the advent of promising new technologies. From the clinician’s point of view, the value of an intervention may not be limited to the specific ill it was designed to treat, as it might have further beneficial consequences (or baleful ones, in the case of the withholding of an effective intervention, or the delivery of an ineffective or harmful one).

Without brushing aside any of these perspectives, and for the sake of a comparative framework that does not ignore the term’s subjectivity, we define “value” for global health-care delivery research as a measure of the aggregate health outcomes achieved per dollar (or

pound or rand, etc) spent.^{1,2} The aimed-for product of a delivery system is health, not treatment per se. Quantification of treatments received is a crude mechanism of evaluation relating to the volume model of health care. We define patient value as arising from the full cycle of care for the patient’s health problem (or problem averted), along with its results, rather than the sum of discrete interventions or services. Spending choices are better evaluated from the perspective of the overall value delivered by the entire cycle of care, rather than by narrow cost-effectiveness studies that compare isolated interventions, often out of epidemiological and social context.

A strategic approach to global health delivery must also move beyond the traditional debates about vertical versus horizontal programmes, or prevention versus care. Clearly, neither a rigidly vertical nor a horizontal approach is likely to deliver as much value in an underserved setting as would a diagonal approach, seeking to integrate sound disease-based management into strong health systems focused on the equitable delivery of high-quality care and effective prevention.³⁻⁵ Wide adoption of such an integrated approach, however, remains elusive. The current, fragmented approach is costing us dearly in terms of duplication, inefficiency, poor use of human resources, and high procurement costs. It is costing patients most of all: they are dying of preventable diseases and suffering without therapies readily available elsewhere. A strategic approach to global health delivery will help us to move from the fragmentation of services and providers registered in most developing (and many developed) countries towards integrated, effective delivery systems that provide value for patients.

Global health professionals understand well the realities of patient circumstances in resource-poor settings, including barriers to adherence (poor nutrition, limited patient transportation, social norms with adverse health impacts, among other endemic issues). Unless these realities are addressed, delivery systems cannot provide good value. Yet while such external constraints to the provision of health care are well known, there is no comprehensive body of knowledge on how to address them in practice. Since local conditions vary from country to country, and as markedly within countries, the specialty of global health delivery requires a rich set of heuristics to enable the tailoring of delivery strategies to local circumstances.

Many major global health organisations have recently undertaken to evaluate the effectiveness of their interventions—a welcome step.⁶ However, programme measurement is not the same as outcomes measurement, to say nothing of assessment of value. Nor is measurement focused on particular interventions sufficient. Outcomes measurement concerns patients’ results (eg, survival rates, degree of recovery achieved, and sustainability of recovery), not just programme results (eg, process compliance, volume of treatment dispensed).

It is the measure of patients' results, not the programme results, that determines success and failure, pinpoints possible efficiencies, and saves lives.

What has been missing, beyond adequate investment, is a focus on value, an overall strategic perspective and a broader normative framework for global health delivery. The framework outlined here also suggests an expanded approach to measurement. In a value-based delivery system, the focus is on measuring overall patient health outcomes by medical condition, and the cost of achieving them. Comparative effectiveness studies focused on the intervention level and evaluating specific interventions have a role. However, our framework stresses the need to understand the combined outcomes of a set of interventions over the care cycle and to understand the overall value achieved. The investigation of tradeoffs among interventions also has its place, as does the attempt to assign monetary value to the extension of life; in a systemic framework hinging on value to the patient, however, these are subordinate issues that should not dominate all discussion of cost and effectiveness.

A strategic approach to global health delivery

A strategic framework for global health delivery aims to define the core principles that underpin a high-value delivery system and its component parts. It provides a common structure and language to use in accumulating knowledge about delivery. It informs value-based system design, management structures, and operational best practices to be disseminated among those responsible for managing health-care systems as well as to funders and regulatory bodies evaluating new and existing programmes. By focusing on the design and operation of delivery systems in practice, greater attention is paid to developing systems that may be brought to scale. The framework can also guide choices about appropriate public policies, including financing mechanisms, procurement policies, human resource development practices, and governance.

Traditionally, the basic unit of analysis in global health delivery has been the intervention for a particular disease state or set of symptoms. This accords with the way physicians are trained and the way clinical research has

been done. Properly chosen and carefully evaluated interventions clearly contribute to value. In this framework, however, value is created and understood at four broader levels (figure 1): first, by integrating care for every individual medical condition over the full cycle of care, using the concept of the care delivery value chain (CDVC); second, by using shared delivery infrastructure across medical conditions to capture synergies in preventing and treating related and concurrent medical conditions and to better use personnel and facilities; third, by incorporating knowledge of local patient and community constraints to delivering value in the design of CDVCs and shared delivery infrastructure; and fourth, by designing health delivery systems to maximise their contribution to equitable economic and community development, thereby relaxing underlying constraints to health and to the delivery of high-value care.

Care delivery value chains for medical conditions

The core level of value creation is the prevention, diagnosis, and care for a particular medical condition or set of related conditions (eg, HIV/AIDS, tuberculosis, breast cancer, diabetes, major mental illness). The CDVC offers a framework for the understanding, improvement, and integration of the set of activities involved in the full cycle of care for any medical condition (figure 2). A medical condition is not a single disease state, but the set of interrelated patient circumstances involved in the full disease cycle across time, including common complications and cooccurring conditions. The CDVC framework conceives of the delivery of care (and the creation of patient value) as an overall system, not a collection of discrete or free-standing vertical interventions. It is also a tool for understanding how to deliver integrated care at scale, moving beyond the pilots and demonstration projects that have to date dominated global health. For purely preventive services, the CDVC should be constructed for distinct patient populations with distinct prevention and care challenges.⁷

The cycle of care for a condition often begins with prevention and screening and ends with ongoing disease management to reduce recurrence of disease and its severity. The CDVC highlights questions such as how each activity in the care cycle is best performed, and by whom; how the effectiveness of one activity is affected by others; what sets of activities are best performed within a single care centre and which are shared; how the patient is best reached over time; how patients should be informed and engaged in their own care; and what patient overall outcomes and risk factors need to be measured to guide care decisions. Such a systemic view of cycle of care draws our attention to effects invisible in a vertical analysis. Value created by one intervention can be lessened or negated by improperly delivered or ill-advised interventions elsewhere in the care cycle. Investments in some activities often improve overall value by reducing the cost or improving the

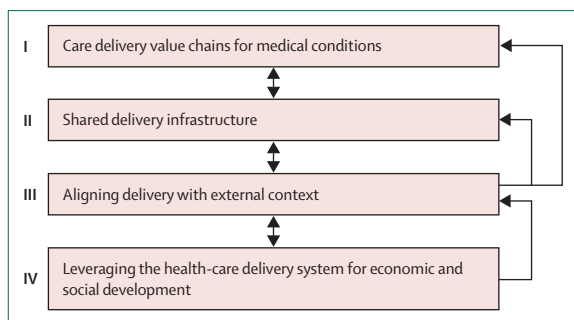


Figure 1: Framework for global health delivery

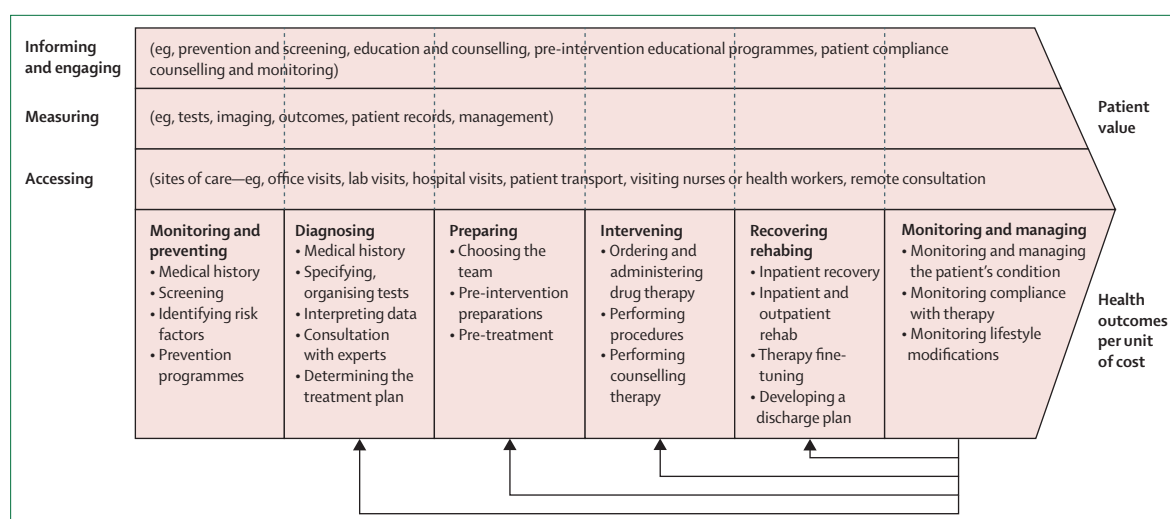


Figure 2: Care delivery value chain

effectiveness—or both—of activities elsewhere in the care cycle. Overall, value arises from the integration of care across the entire chain, not just from improving each individual intervention or service. The CDVC highlights that the value of the cycle of care is not simply the sum of the parts, since improvements in discrete activities can often improve value system-wide.

The CDVC, then, is a resource for looking at global health programmes in a new way. It enables the identification and evaluation of innovations in care delivery. It also highlights the need to integrate care for commonly cooccurring conditions, driving up the effectiveness, and thus the value, of care. Well designed and implemented CDVCs for each important medical condition that affects individuals in a given setting can become the building blocks of a high-value global health delivery system. In developing a CDVC for HIV/AIDS or any other medical condition, the categories of activities are tailored to reflect understanding of the disease. Figure 3 shows a simplified CDVC for HIV/AIDS in resource-poor settings. In HIV/AIDS, delaying the progression of disease requires an especially important category of activities that might be less important in other medical conditions. Ongoing disease management is another essential part of the care cycle shared by HIV/AIDS and other chronic medical conditions.

Viewing HIV/AIDS care from a CDVC perspective, rather than an intervention perspective, carries several implications for design of delivery efforts. First, the identification and testing of the right populations to discover cases earlier in the course of disease improves value more than does the maximisation of the sheer number of individuals tested, regardless of their risk of infection. Second, early diagnosis can improve value by improving the ability to forestall disease progression; early initiation of therapy also acts as a preventive measure.⁸ Third, slowing disease progression (for

example, through nutritional interventions, aggressive prevention of and care for opportunistic infections, including tuberculosis) calls for a crucial set of activities that may be scanted when the focus is only on testing or enrolment in treatment. Fourth, improving adherence to first-line drug therapy can create substantial value by maintaining the individual patient's health and decreasing infectiousness, but also contributes to value (for the individual patient and the system) by slowing the emergence of drug resistance, thereby avoiding or delaying the need to move to much more costly second-line therapies. Although data are only now emerging for the role of compliance support in reducing drug resistance, it seems clear that substantial investments to achieve greater adherence to therapy will be justified from an overall value perspective. Training and support of community health workers, and the provision of community-based care, offer one means of boosting adherence.

The deployment of this analytic method is still recent in settings of great poverty. In designing CDVCs for every medical condition, the task is to pull together existing knowledge while identifying new opportunities to maximise value in responses to the range of local conditions encountered in practice. Further research will show, we expect, the power of this analytic method to open bottlenecks, and to discover efficiencies and other junctures of maximum impact.

Shared delivery infrastructure

The second level of value creation in global health delivery is shared delivery infrastructure, which distributes and integrates care delivery for the range of conditions across sites of care. Shared delivery infrastructure includes various common components: health clinics, district hospitals, referral hospitals, and community-based care; many of these levels require laboratory services. There are

Informing and engaging	<ul style="list-style-type: none"> Prevention counselling on modes of transmission and condom use 	<ul style="list-style-type: none"> Explanation of diagnosis and the implications Explaining the course of HIV and the prognosis 	<ul style="list-style-type: none"> Explanation of the approach to forestalling progression 	<ul style="list-style-type: none"> Explanation of medication instructions and side-effects 	<ul style="list-style-type: none"> Counselling about adherence; understanding factors for non-adherence 	<ul style="list-style-type: none"> Explanation of the comorbid diagnoses and the implications End-of-life counselling
	<ul style="list-style-type: none"> HIV testing Screen for sexually transmitted infections Collect baseline demographics 	<ul style="list-style-type: none"> HIV testing for others at risk Clinical examination CD4+ count and other labs Testing for common co-morbidities such as tuberculosis and sexually transmitted diseases Pregnancy testing 	<ul style="list-style-type: none"> CD4+ count monitoring (continuous staging) Regular primary care assessment HIV testing for others at risk Laboratory evaluation for medication initiation 	<ul style="list-style-type: none"> HIV staging and medication response Highly frequent primary care assessments Assessing/managing complications of therapy HIV testing for others at risk (bi-annually) Laboratory evaluation 	<ul style="list-style-type: none"> HIV staging and medication response Regular primary care assessment Laboratory evaluation 	<ul style="list-style-type: none"> HIV staging and medication response Regular primary care assessment Laboratory evaluation
Measuring	<ul style="list-style-type: none"> Testing centres High risk settings Primary care clinics Prenatal services 	<ul style="list-style-type: none"> Primary care clinics On-site laboratories at primary care clinics Testing centres Prenatal clinics 	<ul style="list-style-type: none"> Primary care clinics Laboratories (on-site at primary clinic) Pharmacy Food centres Community health workers/home visits Support groups 	<ul style="list-style-type: none"> Primary care clinics Laboratories (on-site at primary clinic) Pharmacy Food centres Community health workers/home visits Support groups 	<ul style="list-style-type: none"> Primary care clinics Laboratories (on-site at primary clinic) Pharmacy Food centres Community health workers/home visits Support groups 	<ul style="list-style-type: none"> HIV Staging and medication response Regular primary care assessment Laboratory evaluation Primary care clinics Pharmacy Laboratories (on-site at primary clinic) Community health workers/home visits Hospitals & hospice facilities Support groups Food centres
	<ul style="list-style-type: none"> Screening/preventing Connect patients with primary care system Identify high-risk individuals Test at-risk individuals Promote appropriate risk reduction strategies Modify behavioural risk factors Create a medical record Prevent mother-to-child transmission of HIV 	<ul style="list-style-type: none"> Diagnosing/Staging Formal diagnosis and staging Determine method of transmission and others at potential risk Identify others at risk Screen for tuberculosis, syphilis, and other sexually transmitted diseases Pregnancy testing and contraceptive counselling Create management plan, including scheduling of follow-up visits Formulate a treatment plan 	<ul style="list-style-type: none"> Delaying progression Initiate therapies that can delay onset, including vitamins and food Treat comorbidities that affect progression of disease, especially tuberculosis Improve patient awareness of disease progression, prognosis, and transmission Connect patient to care team, including community health work 	<ul style="list-style-type: none"> Initiating antiretroviral therapy Initiate comprehensive anti-retroviral therapy and assess medication readiness Prepare patient for disease progression and side-effects of associated treatment Manage secondary infections and associated illnesses 	<ul style="list-style-type: none"> Ongoing disease management Manage effects of associated illnesses Manage side-effects of treatment Determine supporting nutritional modifications Prepare patient for end-of-life management Provide primary care and health maintenance Provide psychosocial support 	<ul style="list-style-type: none"> Management of clinical deterioration Identify clinical and laboratory deterioration Initiate second-line, third-line drug therapies Manage acute illness and opportunistic infection either through aggressive outpatient management or hospitalisation Provide additional community/social support if needed Ensure access to hospice care
Accessing						

Figure 3: HIV/AIDS care delivery value chain in resource-poor settings
Source Rhatigan J and colleagues⁷

also cross-cutting systems and processes, such as procurement and human resource management and information systems, that link the components in a coherent delivery platform. In advanced economies, providing integrated care for high volumes of patients with a particular medical condition is often value-maximising.⁹ In resource-poor settings, however, individuals often present with multiple health problems; facilities, supplies, and personnel are scarce; and patients face physical challenges and other

obstacles to accessing care. In such settings, functional vertical programmes for specific conditions have often shown a tendency to become miniature and semi-autonomous health-care systems, expanding well beyond the scope of the initial disease being addressed.

Shared delivery infrastructure in resource poor settings can create patient value in four broad ways: (1) capturing synergies in care for related pathologies; (2) improving reach and access for patients; (3) enabling better utilisation

of scarce personnel and facilities; and (4) allowing care activities to take place in the most cost effective setting while integrating care. At the disease level, connections are present across related or cooccurring conditions. This is obvious to those who practice medicine among elderly people, who often face more than one chronic disorder. In some regions in which we have worked, HIV/AIDS, malaria, tuberculosis, and other chronic infections, such as helminthiasis, often cooccur, especially among children and young adults. Addressing these disorders together, along with the anaemia and malnutrition they can cause or worsen, leads to improved effectiveness of treatment for each disorder.

In some cases, understanding and addressing such noxious synergies are imperative: treatment for HIV/AIDS is not effective unless active tuberculosis is diagnosed and treated simultaneously.^{10,11} Moreover, in patients with active tuberculosis and HIV infection, even brief delays in the initiation of antiretroviral therapy are associated with increased mortality.¹² Care must be taken to design or retrofit shared facilities and schedules to minimise the risks of exposure to airborne infectious diseases, most notably tuberculosis, for all patients and staff but especially for those with HIV infection. Shared delivery infrastructure, if poorly designed, can increase the risk of rapid nosocomial spread of tuberculosis, including drug-resistant strains.^{13–15} Decreasing risks of such epidemics is another reason community-based care of HIV/AIDS and tuberculosis increases value for patients and their providers.¹⁶

Shared infrastructure can also improve the overall effectiveness of primary prevention, screening, and care as compared with vertical programmes and facilities. HIV/AIDS again provides a good example. Screening will often be far more efficient and effective when integrated into a primary care system that can surface individuals at risk than when done in stand-alone facilities, designed and funded to do voluntary counselling and testing. Similarly, prevention of HIV transmission is more effective if other sexually transmitted infections are diagnosed and treated effectively.^{17,18}

Shared delivery infrastructure across conditions, such as community health workers and health clinics, also improves access to patients for screening and care. For example, a decade of experience in developing countries has shown that patients are more likely to seek or accept HIV screening when they have the ready option of receiving care if they test positive.^{19–21} Integrating screening into primary care also helps create an environment in which supportive health professionals can encourage an individual to be tested.

Additionally, shared delivery infrastructure for multiple conditions and services enables better utilisation of scarce facilities and personnel than occurs with stand-alone disease-specific interventions, often based largely on available funding. Delivering HIV/AIDS care and maternal or child health care in shared

Panel: Strategic questions in shared delivery infrastructure design and operation

- What are the distinct types of facilities and service units needed to deliver the best overall value?
- What range of services should be offered by every system component?
- How should every type of facility or service unit be distributed across geography, balancing access, scale, and capabilities?
- How should patients be directed to the appropriate facility for their needs?
- How might facilities be better designed with patient and provider safety in mind?
- How can community health workers help serve as a bridge between facilities and patients' homes?
- How can care be better integrated across the care cycle?
- What shared systems (eg, information technology, procurement) are needed to improve efficiency and enable coordination across facilities or system components?
- How should scarce physicians, nurses, and other skilled personnel be best recruited, trained, utilised, and retained from a systems perspective?

infrastructure, for example, can avoid duplicative investments in stand-alone programmes funded to prevent mother-to-child transmission of HIV rather than to support family planning, prenatal care, and primary prevention and care.²²

Shared infrastructure can also enhance use of staff and reduce cost by simplifying supply chains for medicines, reagents, and other supplies, and thereby reap economies of scale. Community health workers can improve efficiency by addressing common disorders and helping to manage chronic disease closer to (and in) patients' homes; such task shifting can leverage the time of scarce clinical staff, but is also the best means of improving clinical outcomes and thus value to patients and their families.²³ We have also learned that education and counselling of new patients with HIV/AIDS in groups (instead of individually), which patients themselves have requested in projects we have studied and implemented, makes better use of scarce medical personnel and takes advantage of mutual patient encouragement and support to reinforce compliance with care.²⁴ Finally, shared delivery infrastructure across conditions can enable care to occur at the most effective location. Most patients receive care at health clinics able to provide the care at lower cost than if the same care took place in a district hospital.

The panel shows the strategic questions in shared delivery infrastructure design and operation. Many of the components of shared delivery infrastructure, and their benefits and challenges, are well known in the global health specialty. Surprisingly, however, there is still too little research that pulls together all that is known about how to design, organise, operate, and manage every component to maximise value. There is even less work on how to meld these components into an integrated system. The emerging specialty of global health-care delivery research seeks to pool knowledge about how to design, organise, operate, integrate, and manage various components of complex health systems in various settings

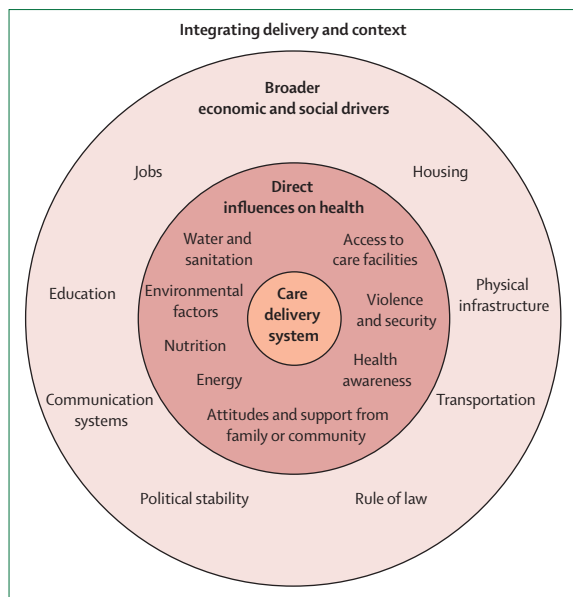


Figure 4: Integrating delivery system and external context

each with particular constraints and opportunities, to maximise aggregate value for patients.

Integrating delivery and external context

In developing countries, circumstances that have sometimes been seen as external to health-care delivery—including nutrition, family and gender roles, transportation and communication infrastructure, social disparities, and political violence—profoundly affect both the incidence and outcomes of health disorders and the effectiveness and efficiency of care delivery.

External influences on health care can be divided broadly into those directly affecting disease distribution and outcome of care, such as nutrition, and those broader economic and social factors that underlie the more direct influences, such as poverty and education (figure 4). Many of these influences are also important in advanced economies, especially where populations are sharply divided as regards income, education, or access to other essential goods and services.

Direct contextual influences on health-care delivery can be grouped into: (1) those affecting the incidence of diseases and injuries; (2) those affecting the ability to access health-care services (eg, cost of care to patients, availability of insurance, ease of transportation, stigma, alleged resistance from traditional healers); and (3) those affecting the effectiveness of care delivery itself, including adherence to prescribed preventative measures and to therapies (eg, nutrition, adherence barriers, family support). These groupings have blurred boundaries, of course, but here we are seeking to understand how to build value-based delivery systems that incorporate understanding of these external circumstances and constraints directly into the design and operation of care

delivery itself. For example, providing nutritional support is necessary to the success of drug therapy for any chronic and wasting disease, including AIDS. Curbing violence affecting sex workers can increase condom use and other behaviours beneficial to HIV/AIDS prevention.²⁵ Community health workers can help overcome the constraints of transportation and education, enabling earlier detection of disease. Incentives for local healers can turn an obstacle to reaching patients or keeping them in care into an enabler. Integrating routine HIV screening into primary care facilities can reduce the social stigma of presenting for screening for a sexually transmitted disease.

To identify contextual influences on care delivery, the starting point is an understanding of the social circumstances of patients and their families.²⁶ Often there are multiple groupings of patients with different circumstances who are best approached in different ways, even within a single city or region. For example, in HIV/AIDS prevention, female sex workers face a very different challenge from male sex workers, whereas brothel-based workers differ from those working on the street.^{27,28} In prevention, segmenting target groups is essential to high-value approaches. In prevention as in care, context is always important and understanding social circumstances is essential to high-value approaches.

Many of the factors and determinants shown in figure 4 are well known, and the list is by no means exhaustive. A key task of global health delivery research is to pool knowledge about how to identify the locally salient external constraints as well as synthesise the best learning on how to address them (singly or in combination) in seeking to maximise value to patients and other beneficiaries. These constraints will also change as social circumstances change and as new technologies for prevention, diagnosis, and care continue to emerge.

Health-care delivery systems and economic development

Many of the external contextual factors affecting the incidence of illness and constraining the value of care delivery are linked directly or indirectly to economic development. Poverty causes poor nutrition, just as it leads to inadequate transportation and housing and restricted access to clean water; these in turn predispose people to disease or challenge access to care, which further deepens their poverty. In our own work in developing countries we have documented the enormous negative impact of illness on the economic wellbeing of individuals, their families and caregivers, and entire communities; we have also been fortunate to see the positive effects of good prevention and care in such settings. However, public spending on the health-care delivery system has too often been seen as a drain on the economy because it competes for resources with other investments seen as having a more direct economic development impact.²⁹ This perspective fails to note that the catastrophic illness is, in many studies,

the leading cause of tipping people from poverty into destitution.³⁰ It also fails to recognise not only the impact of health on productive work, but also the power of investments made in health-care delivery systems to catalyse and enhance economic development in low-income countries.

Harnessing positive linkages with economic development is an essential component of designing value-based systems of global health-care delivery. Such systems directly catalyse economic development through at least four primary mechanisms. The first is obvious: a healthier population is more productive. The second is employment. Health sector jobs often represent an important employment opportunity that contributes to the formation of a middle class of individuals with improving skills and good incomes. Such jobs are not just those held by skilled health professionals, but also much larger numbers of support staff and community health workers whose education and training takes less time. Third, health systems can drive economic development through local procurement of goods, services, and equipment including food, certain supplies, support services, maintenance, construction services, and other health system inputs. Health-care organisations that seek out local suppliers and build local capacity can hope for a double impact, as health system procurement can stimulate business and cluster development that goes well beyond the health sector. Fourth, the purposeful development of health-care delivery systems in poor communities can be a catalyst for improving infrastructure—ie, cellular phone towers, internet access, electrification, clean water access, and local transportation systems—that will likely have wider economic benefits. Economic development, in turn, is synergistic with the development of the health system and fundamental to the improvement of value in health care delivery over the long run.

Implications for the development of a health system

The call for integration is common in policy discussions of global health, but the definition of integration has not been clear. Our framework aims to make the notion of integration concrete, and reveals the need for it at various levels. First, integration is needed across interventions in the CDVC for each medical condition. Second, integration of prevention and care is needed for related diseases. Third, integration is needed across the care provided in components of delivery infrastructure, such as within and between health clinics and hospitals and laboratories, and among providers, including physicians, nurses, and community health workers. Fourth, delivery-system design must be integrated with a deeper knowledge of local context. Finally, health system development should be integrated with economic development to enhance the value of resources devoted to each of them.

Many of the lessons learned in addressing a chronic infectious disease through a value-based, integrated

approach to delivery are of course relevant in seeking to better address prevention and care for chronic disease of non-infectious aetiology. Such integration is moving beyond policy discussions into practice. For example, Rwanda is one of only two countries on the African continent to achieve the goal of universal access to HIV/AIDS therapy, which it has accomplished through a “diagonal approach” that has strengthened the full set of components of its national health system, especially in rural areas. Over the past decade, death during childbirth has declined by more than 60 percent. Deaths attributed to AIDS, tuberculosis, and malaria have dropped even more steeply, as have deaths registered among children under five. More than 93% of Rwandan infants are inoculated against eleven vaccine-preventable illnesses, up from 25% against five diseases in the year after the 1994 genocide. Rwanda is on-track to meet each of the health-related Millennium Development Goals by 2015.³¹ It is also, and not co-incidentally, one of the fastest growing economies in the region; the World Bank estimates that a million Rwandans have been lifted out of poverty during the past decade.³²

A policy focus is well represented in the published work on topics including health-care financing, insurance systems, social safety nets, health-related human resource development, and drug pricing. Scholars in global health have also addressed high-level policy topics, such as the nature of inputs to and outputs from health systems, the debate on vertical versus horizontal interventions, and diffusion of innovation and best practices. However, a detailed understanding of value-based delivery systems themselves has been largely absent. A value-based delivery framework may guide the design of public policies in areas such as system configuration and financing, insurance design, stakeholder roles, non-governmental organisation policies, and human resource development. Here, research in global health-care delivery can lead to better implementation by showing, through a rich and well-analysed body of examples, how to shape and improve public policy choices. This framework, and research and practice around it, aspires to reverse the situation of long standing in which policy too often acts largely to constrain what is possible, or even imaginable, in health-care delivery for the poor.

An action research and policy agenda

Many individual elements we have described will be familiar to global health scholars and practitioners. Many lessons have been learned in discrete areas. What we lack is a true field. We need a clearing-house for information about programme design, best practices, lessons learned, synergies, policy constraints, environmental determinants, and other elements of global health-care delivery. In an age of information, the collection of data can run seamlessly from bedside to seminar room and back to the field. Every technique available for tracking patients and aggregating data should be put to use, as should

qualitative methods drawing on patients' and providers' experience of delivery systems.

We embarked several years ago on a research and teaching programme, called the Global Health Delivery Project, to help fill this gap between policy, research, training, and delivery in settings of poverty. The project is a joint effort of Harvard Medical School, Brigham and Women's Hospital, Harvard Business School, Harvard School of Public Health, and Partners In Health (Boston, MA, USA); it is supported by the schools and hospital involved, as well as by private philanthropy. A substantial body of open-source case studies examining care delivery in response to various diseases has been developed,³³ and a family of complementary courses is being taught at Harvard University, Dartmouth College, Columbia University (New York, NY, USA), and by the Ministry of Health and other partners in Rwanda. Courses in global health effectiveness have already brought hundreds of professionals together from two dozen countries together to improve their own delivery efforts, and are linked during and after by an online platform, GHDonline, which disseminates field experience and clinical information to nearly 10000 professionals from 2800 organizations across 175 countries.³⁴ At both Dartmouth and Harvard, new masters-level programmes in Health Care Delivery Science have been established, also with a strong focus on global health delivery case-based teaching; enrolees are doing (and will disseminate) field-based research exploring ranking delivery challenges. Articles and framework reports are beginning to appear, as are studies drawing on mixed methods and including greater consideration of social context, of implementation efforts now underway in settings of poverty. Executive courses for senior practitioners and decision makers have also been launched.

The research and training components of these efforts are all linked to, and informed by, efforts to deliver high-value health services. Because of this synergy, such initiatives will help constitute, we hope, no less than a new field of research and practice seeking to explore the full complexity of building health systems and delivering care in resource-poor settings.³⁵ With support from local universities and teaching hospitals, such a knowledge base can be built by practitioners working with non-governmental organisations and within government health systems. Donors should embrace the concept of improving global health care delivery and work to channel resources to the highest value programmes and delivery systems; students and trainees should adopt these new ways of thinking as they prepare to become the next generation of global health practitioners and leaders.

Moving to high value global health delivery systems will also require a supportive public policy environment. Public policy should enable high-value delivery for the poor, rather than to slow or disable it. Since health ministers and other national policy makers are often the most important architects of overall system design, they too must contribute to efforts to establish new links

between research and practice, between government and private industry, between health-care networks and those they are designed to serve.

Conclusions

Interest in improving health-care delivery for the world's poorest inhabitants is greater than ever. There is a pressing need to define a field of global health delivery and, in so doing, improve health outcomes among those who do not yet enjoy ready access to high-value health care. The future of this field lies in bringing new disciplines, perspectives, and methodologies to bear, including management, anthropology, sociology, epidemiology, and economics and health policy, integrated into overall strategy.³⁶ Opportunities for study and research—along with the funding to support them—are steadily increasing. Universities, teaching hospitals and other health-care institutions can engage this agenda in new ways, and develop frameworks, knowledge, and practices that will benefit patients and practitioners as well as the specialty as a whole.

Donors and governments are sure to ask that real value be demonstrated for every dollar invested, and they are right to do so. Assessing value comprehensively reveals the error of viewing investments in health care as a drain on the productive forces of an economy. Well designed health-care delivery systems are powerful resources for economic development: a virtuous cycle of mutual reinforcement takes place between health system development and equitable and sustained economic growth. We contend, moreover, that it is often health interventions that best prime the pump for this virtuous cycle. This is especially true wherever people struggle with a heavy burden of disease that is readily prevented or cured. Effective care delivery helps break the cycle of poverty and disease. We will not end extreme poverty without sustained investments in health-care delivery. If delivery systems can be transformed around the principle of value, the promise of health and productivity for those now facing both poverty and disease will not be squandered.

Contributors

Together with their teams, JYK and PF worked with MEP, in Boston, MA, USA, and Rwanda, to elaborate a framework MEP developed and apply it to resource-poor settings. JYK led the drafting of the report. The authors all participated in the edits and contributed equally to the finalisation of the report.

Conflicts of interest

We declare that we have no conflicts of interest.

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For GHDonline see <http://GHDonline.org>

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