Alma-Ata: Rebirth and Revision 3

Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care

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The burden of chronic diseases, such as heart disease, cancer, diabetes, and mental disorders is high in low-income and middle-income countries and is predicted to increase with the ageing of populations, urbanisation, and globalisation of risk factors. Furthermore, HIV/AIDS is increasingly becoming a chronic disorder. An integrated approach to the management of chronic diseases, irrespective of cause, is needed in primary health care. Management of chronic diseases is fundamentally different from acute care, relying on several features: opportunistic case finding for assessment of risk factors, detection of early disease, and identification of high risk status; a combination of pharmacological and psychosocial interventions, often in a stepped-care fashion; and long-term follow-up with regular monitoring and promotion of adherence to treatment. To meet the challenge of chronic diseases, primary health care will have to be strengthened substantially. In the many countries with shortages of primary-care doctors, non-physician clinicians will have a leading role in preventing and managing chronic diseases, and these personnel need appropriate training and continuous quality assurance mechanisms. More evidence is needed about the cost-effectiveness of prevention and treatment strategies in primary health care. Research on scaling-up should be embedded in large-scale delivery programmes for chronic diseases with a strong emphasis on assessment.

Introduction

The health transition to chronic, non-communicable diseases becoming the leading causes of death and disability worldwide is well underway. However, many low-income and middle-income countries are still facing large burdens of infectious diseases and serious maternal,

Key messages

- The burden of chronic diseases, which require care for extended periods or even throughout life, is increasing in low-income and middle-income countries
- An integrated approach to the prevention and management of common chronic diseases, irrespective of cause, is needed in primary health care
- Chronic disease management is distinct from health care for acute problems, and a refocusing and strengthening of primary health care is urgently required
- Chronic diseases need opportunistic case finding for assessment of risk factors, detection of early disease, and identification of high risk status; a combination of pharmacological and psychosocial interventions, often in a stepped-care fashion; long-term follow-up with regular monitoring and promotion of adherence to treatment
- Improved strategies in primary health care should be accompanied by public policies to prevent chronic diseases, particularly through tobacco control and reduced salt intake
- Research on scaling-up should be embedded in large-scale programmes; this will require collaboration between policy makers, practitioners, consumers, public-health researchers, development agencies, and funding organisations

newborn, and child health challenges. In these countries, an estimated 28 million people die annually from chronic, non-communicable disorders, such as cardiovascular disease (mainly heart disease and stroke), cancer, chronic respiratory disease, and diabetes.[1] Another 2·1 million are estimated to have died from HIV/AIDS in 2007.[2] The challenge to the health system in low-income and middle-income countries in terms of people living with chronic diseases is huge: around 33 million with HIV/AIDS; 246 million with diabetes;[3] and around 1 billion with hypertension.[4] Hundreds of millions suffer from mental disorders including depression, alcohol misuse disorders, and schizophrenia.[5]

Though these disorders all have different causes, the demands (including financial costs) they place on patients, families, health-care systems, and governments are remarkably similar and substantial. From a health-care perspective, all are chronic diseases: they persist over time and require continuing care. Primary health care (see accompanying paper for discussion of the definition and taxonomy of different approaches[6]) is, in theory, best-positioned to address the challenges of chronic disease prevention and management. The delivery of care in primary health care settings is compromised in most low-income and middle-income countries by underfunding and an orientation towards acute problems. Health systems must evolve rapidly to manage common chronic diseases, irrespective of cause.

Generic disease-management strategies, including system-level changes in primary health care, hold promise for improving quality of care across a range of chronic diseases. In this article, we make the case that primary

health care strategies need to be developed, assessed, and implemented in low-income and middle-income settings to address the increasing burden of chronic disease and outline the requirements for such strategies.

Chronic diseases as a public-health priority

To help the worldwide community and national authorities to focus on prevention and control of chronic diseases, WHO proposed a goal, in addition to the Millennium Development Goals, that aims to reduce chronic-disease death rates by 2% per year over current trends.[7] The goal is ambitious but achievable on the basis of current knowledge as summarised in the recent series on chronic diseases in *The Lancet* (panel 1);[8,9] nonetheless strengthened and reoriented primary health care systems are needed.

With the advent of affordable highly active antiretroviral therapy (HAART) in low-income and middle-income countries and improved survival prospects, HIV/AIDS is increasingly viewed as a chronic disease. Prevalence seems to be stable worldwide with the numbers of people living with HIV increasing as the population grows and survival time increases.[2] More than two-thirds of people living with HIV/AIDS are in sub-Saharan Africa where eight countries have an adult prevalence of 15% or more. In many countries, dual epidemics of tuberculosis and HIV/AIDS require an integrated response. The challenge now is to expand access to HAART and to treatment for tuberculosis further in settings where health systems are struggling to respond (panel 2).[13–16] Much of the provision so far has been focused on hospitals and clinics; there is, however, a need to extend provision to rural settings and urban slums in which such facilities are lacking.

A compelling case has been made for investment in expanded programmes for the control, elimination, and eradication of neglected tropical diseases with highly cost-effective community-delivered interventions for schistosomiasis, lymphatic filariasis, intestinal helminths, onchocerciasis, and trachoma.[17] Although such programmes are imperative for the poorest 1 billion people who lack access to treatments for neglected diseases, we focus on chronic conditions that cannot be dealt with in this way. Apart from tobacco control, we have not attempted to address the prevention and management of cancer in this article.

Interventions for chronic diseases in primary health care

Interventions selected for use in primary health care must lead to favourable changes in risk status and outcomes, be cost effective, and be financially and logistically feasible. Cost-effective interventions for chronic diseases are available for implementation across a range of resource settings.[18] Several of these interventions are financially feasible for scaling-up and have the potential to substantially reduce the burden of chronic disease in low-income and middle-income countries. The most

Panel 1: **Chronic diseases and global mental health**

The 2007 series on chronic diseases in *The Lancet* began with an update of the burden of chronic diseases and the implications of the Global Goal for Chronic Disease Prevention and Control for the 23 countries with 80% of the total chronic-disease burden in low-income and middle-income countries. The evidence on scaling up cost-effective interventions for the prevention and control of chronic diseases was reviewed and strong support found for population-wide reductions in salt intake, key elements of the WHO Framework Convention on Tobacco Control, and opportunistic screening of patients at high risk of cardiovascular disease and the treatment with a multidrug regimen for people with a 15% or greater risk of an event in the next 10 years.[8,9] Together, population-wide and high-risk interventions will, in the 23 countries, avert 32 million deaths by 2015, half under the age of 70 years; cost US$5·8 billion per year with major economic benefits, even if a life saved is valued at as little as $2000; and exceed the global goal in these countries. The series ended with a call to action for all major stakeholders and a commitment to review global progress in 2 years time.[10]

Mental disorders affect people across the life-course, from autism in childhood, alcohol misuse and depression in adults, to dementia in older people. *The Lancet*'s series on global mental health in 2007[11] showed that, apart from the large burden and associated disability and mortality attributable to mental disorders, they are so intimately linked with other health concerns, including other chronic diseases, that there can be no health without mental health. Global mental-health resources are characterised by three features: scarcity; inequity in their distribution; and inefficiency in their allocation, with the lion's share being spent on psychiatric hospitals and institutional care rather than primary and community care. There is evidence that low-cost drug and psychosocial treatments are feasible, affordable, and effective for many mental disorders. These treatments can be delivered by community or lay health workers with adequate training and supervision. Despite this evidence, in many countries the treatment gap exceeds 50% even for the most severe disorders. Scaling-up a package of cost-effective treatments for a core group of three mental disorders (schizophrenia, depression, bipolar affective disorder) and one risk factor (hazardous alcohol use) would cost about $2 per person per year in low-income countries and $3–4 in lower middle-income countries.[12]

compelling evidence is for tobacco cessation,[19] as one component of a comprehensive approach to tobacco control; a multidrug regimen for people with pre-existing cardiovascular disease or at high risk of developing cardiovascular disease;[8,9] the management of non-insulin-dependent diabetes;[20] and several interventions for depressive disorders and alcohol misuse disorders.[21] Scaling-up of the provision of HAART for eligible people living with HIV requires simplification of management with a standardised approach.[14]

Cost-effective interventions can be delivered as a package in primary health care (table).[21–33] Although strong evidence on the care of type 2 diabetes in primary health care in low-income and middle-income countries is limited, no reason exists, in principle, why management could not be dealt with as in high-income countries with behavioural interventions, treatment of cardiovascular-disease risk factors, and generic antidiabetic agents, particularly metformin.[34] All interventions could be delivered by stepped care with supervision by a physician where available or, if unavailable, a specially trained non-physician clinician.

Tobacco control in primary health care

Despite its potential for a rapid decrease in tobacco-induced death and disability, cessation advice and services have not received sufficient attention, especially in the context of routine health care. The goal of tobacco control policy in primary health care is to ensure that all adult patients are briefly questioned about tobacco habits, all tobacco users are advised to quit, and appropriate follow-up cessation services are offered to people who express interest. Much of the evidence, however, relates to advice by physicians in high-income countries.[30] In low-income and middle-income countries, wider access to nicotine replacement therapy, one part of a complete cessation service, might be achieved for between US$55 and US$761 per disability-adjusted life year saved.[19] This estimate is similar to those for other non-price tobacco-control interventions, but considerably less cost-effective than price increases for tobacco products.

Health promotion in primary health care

Despite their popularity, evidence is limited to support community-wide interventions based on primary health care for the primary prevention of cardiovascular disease through multiple risk factor intervention.[35] A systematic review of the trial evidence on advice and counselling to reduce dietary fat, increase exercise, and stop smoking, involving over 130 000 people in primary health care and occupational health settings, did not detect any substantive effect on mortality from coronary heart disease.[36] However at least in high-income settings, similar interventions to reduce risk behaviours in people with serious risk factors or pre-existing disease—hypertension, cardiovascular disease, impaired glucose tolerance and diabetes—are more successful in achieving reductions in risk factors and, in some circumstances, improving clinical outcomes.[36]

Pharmacological interventions for people at high risk of cardiovascular disease and diabetes

There is a dearth of large trials of drug interventions for primary and secondary prevention of cardiovascular disease in low-income and middle-income countries, but such treatments will probably have similar outcomes to those reported in trials from high-income countries. The wide use of a single combination pill for people at high risk of cardiovascular disease has long been advocated[37] and clinical trials are underway to investigate its acceptability, feasibility, and safety. Evidence is, however, available on the likely cost-effectiveness of a multidrug regimen in low-income and middle-income countries.[31] Reductions in cost of drugs have put them within reach of increasing numbers of people, especially in middle-income settings. The annual costs for hydrochlorothiazide (25 mg), atenolol (50 mg), and enalapril (10 mg) are around US$1, $3, and $8, respectively,[38] and statins are becoming progressively more affordable. Drug costs vary greatly from one country to another and between the private and public sectors within countries. Individuals suitable for preventive use of drugs could be identified through opportunistic screening in primary health care by use of easily measured risk factors, such as a brief history of alcohol and tobacco consumption, body-mass index or

	Interventions	Level of evidence
Depressive disorders	Generic antidepressants; brief psychotherapies	Randomised controlled trials in several countries[12,21-26]
Hazardous alcohol use	Brief counselling	Cochrane systematic review,[27] WHO multicentre randomised controlled trial[28]
Tobacco use	Brief counselling and cessation advice and follow-up, nicotine-replacement therapy	Cochrane systematic reviews[29,30]
High risk of cardiovascular disease	Multidrug regimen and health promotion advice	Randomised controlled trials of components of multidrug regimen and systematic reviews[9,31]
Impaired glucose tolerance	Risk-factor modification through lifestyle intervention or metformin	Randomised controlled trials[32,33]

Table: Cost-effective interventions for chronic, non-communicable diseases in low-income and middle-income countries that could be delivered in primary health care

waist circumference, blood pressure, and a clinical history of cardiovascular disease; secondary prevention could be directed to individuals with known cardiovascular disease.

This approach to scaling-up a multidrug regimen for individuals with existing cardiovascular disease or who are at high risk of cardiovascular disease could avert almost 18 million deaths over the next 10 years in 23 low-income and middle-income countries. The annual financial cost would be an average of US$1·10 per person.[9] Laboratory measurements, such as cholesterol concentrations, offer no additional predictive value above measurement of blood pressure and body-mass index and history taking in routine primary care.[39] Thus, scale-up of such programmes in low-income and middle-income countries should be possible, even where widespread laboratory measurements are not feasible.

Prevention of diabetes

There is evidence from a trial in India that progression to diabetes from impaired glucose tolerance can be prevented by behavioural interventions and drug treatment with metformin;[33] the cost-effectiveness of behavioural interventions was comparable with that of metformin, and the number needed to treat with either intervention to prevent one case of diabetes would be seven. Several other clinical trials in high-income countries and one in China have shown that lifestyle interventions can reduce the incidence of diabetes in people with impaired glucose tolerance.[32] However, to be implemented, blood-glucose testing would need to be available to detect glucose intolerance. In many high-income countries, non-insulin-dependent diabetes is routinely managed in primary care, often largely by nurses. A similar approach has been used for diabetes, hypertension, and asthma in rural South Africa and resulted in successful control of the disorders in a high proportion of patients.[20] Mexico provides an example of the application of chronic disease management approaches to diabetes in a primary health care setting (panel 3);[40] more evidence of cost-effectiveness and sustainability of such approaches in low-income and middle-income countries is needed.

Treatment of mental disorders in primary care

The Lancet series on Global Mental Health (panel 1) has called for action to scale up services for mental disorders in low-income and middle-income countries with an emphasis on primary care and community-based delivery systems. There is robust international evidence on the efficacy of pharmacological and psychological treatments (notably cognitive-behavioural therapy and interpersonal therapy) for common mental disorders, such as depression, anxiety, and somatoform disorders;[21–23,41] there is also a growing global evidence base testifying to the cost-effectiveness of these interventions.[12,24–26] The strongest evidence for the management of alcohol misuse in primary

> ### Panel 3: Mexico's Veracruz initiative for diabetes awareness[40]
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> Mexico's Veracruz initiative for diabetes awareness (VIDA) shows the potential of implementing chronic disease management principles in low-resource primary health care settings.
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> VIDA was designed to improve primary health care for people with diabetes. The 1-year study included ten health centres, half of which were randomly selected as intervention sites. Health workers received in-service training on diabetes management, including foot care, and also learned about principles of effective health care for chronic disease as represented by the chronic care model. Importantly, health workers were taught how to apply a continuous quality improvement method (plan-do-study-act) to identify service gaps and areas for improvement, to generate and to implement potential solutions, and to assess organisational changes. A range of team-generated solutions were applied, including the implementation of a structured diabetes education programme for patients and their families.
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> Results suggest that both clinical process indicators (eg, documented foot care education) and health outcome indicators (eg, HbA$_{1c}$) improved significantly more in the intervention group than in the control group. Notably, the project's success was not the result of a single intervention, but rather of a systems-based approach that included patients' education and self-management support. No single factor seemed to have a greater effect on outcomes than any other, although the patients who learned the most (those with scores greater than 80% on the postintervention diabetes knowledge examination) achieved better metabolic control and greater reduction of total cholesterol. A key lesson from this experience is that the responsibility for health-care delivery does not lie exclusively with the physician and the nurse; a well-operating team is fundamental, and most importantly, the participation of people with diabetes contributes substantially to successful outcomes.

health care settings is for brief psychological interventions and motivational interviewing delivered by physicians or nurses.[28]

Despite evidence on the efficacy of specific treatments for mental disorders, the treatment gap is large.[42] Training of primary health care workers shows short-term benefits;[43,44] however, without sustained support these benefits diminish over time.[45,46] Several resource materials and manuals are available for integration of mental health in primary care materials,[47,48] but practice guidelines for mental health disorders in the UK also show little integration.[49] Experience in low-income and middle-income countries indicates that to be fully effective and efficient, primary care tasks must be limited and feasible.[50] Primary mental health care (as with primary health care for other chronic diseases) must be complemented by additional levels of service, including components of secondary care to which primary health workers can turn for referrals, support, and supervision.

Detection of mental disorders should be done through opportunistic screening of adults attending primary health care facilities by use of validated brief screening questionnaires for common mental disorders and excessive alcohol consumption.[51–53] In literate populations, such screening can be done while patients are waiting to see a primary care worker. Although recognition is important, it must be accompanied by an evidence-based treatment plan to lead to long-term recovery.[54] The effectiveness of

Positive policy environment
- Strengthen partnerships
- Support legislative frameworks
- Integrate policies
- Provide leadership and advocacy
- Promote consistent financing
- Develop and allocate human resources

Links

Community
- Raise awareness and reduce stigma
- Encourage better outcomes through leadership and support
- Mobilise and coordinate resources
- Provide complementary services

Prepared

Health-care organisation
- Promote continuity and coordination
- Encourage quality through leadership and incentives
- Organise and equip health-care teams
- Use information systems
- Support self-management and prevention

Community partners
Informed

Health-care team
Motivated

Patients and families
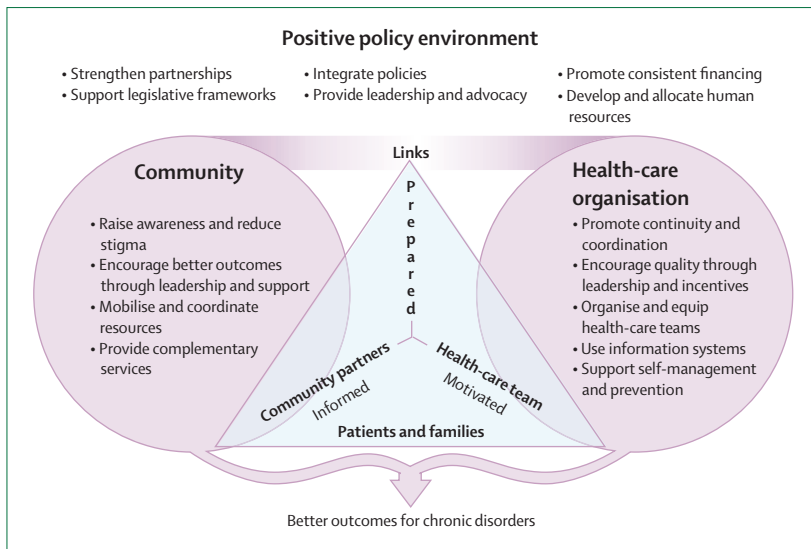
Better outcomes for chronic disorders

Figure: Innovative care for chronic conditions framework

psychosocial interventions and adherence management delivered by appropriately trained and supervised lay health workers is being assessed in India.[55,56]

Integration of care for HIV/AIDS and other chronic diseases

The integration of HIV/AIDS and tuberculosis care is essential especially where co-infection is a serious problem; both are chronic disorders. A compelling case has also been made for the integration of mental health care into care for people living with HIV/AIDS.[57] Several issues related to mental health are relevant to the management of HIV/AIDS, such as cognitive impairment and dementia caused by viral infection of the brain and depression and anxiety due to the effect of the infection on a person's life. Despite the coexisting high burden of HIV, diabetes, and cardiovascular disease in several low-income and middle-income countries,[58] little work has been published on the integration of care for these disorders. A recent paper on the experience of combined clinics for diabetes, HIV/AIDS, and hypertension in provincial hospitals in Cambodia, showed good acceptability by patients and over 70% retention of patients after 24 months.[59] With appropriate resources and support, there seems no reason why such approaches could not be used in primary health care. The increased risk of myocardial infarction with antiretroviral therapy (most clearly established for protease inhibitors) is an additional reason for developing integrated programmes.[60] Adaptation of the DOTS tuberculosis programme in Africa for chronic disease management has also been advocated.[61]

Organisation and delivery of chronic disease management in primary health care

The challenge now is to ensure that primary health care systems in low-income and middle-income countries are

capable of delivering these interventions. Primary health care for chronic diseases is inherently different from care for acute problems and requires a greater level of organisation that must be sustained, commonly over a patient's lifetime. In addition, because patients are in many ways their own primary carers, their needs and preferences must be taken into account in the development of management plans. Primary health care has several advantages: the relative proximity of providers to the patients' homes reduces travel costs; knowledge of individual patients, families, and local communities by primary care workers; the possibility of caring for defined populations makes coverage and follow-up easier to assess and monitor; and better continuity of care, including that for comorbid illnesses. These advantages might, of course, not be realised or might be offset by deficiencies in training, supervision, drug supply, and morale, but they offer the hope of improved chronic disease management for millions.

Several organisational models of management for chronic diseases have been proposed and implemented internationally. According to a comprehensive report published in 2006,[62] the best known and most influential is the chronic care model,[63] which focuses on linking informed, actively engaged patients with proactive and prepared health-care teams. In 2002, WHO produced an expanded version of the chronic care model, the innovative care for chronic conditions framework (figure), which gives greater emphasis to community and policy features of improving health care for chronic diseases.[64]

The innovative care for chronic conditions framework in turn influenced the development of WHO's integrated management of adolescent and adult illness programme[65] (panel 4).[66] Several related approaches are being used to guide the provision of chronic care in specific countries.[67–69] Although details vary, they emphasise the central importance of primary health care in chronic disease prevention and management. Other models of chronic disease management that have had international influence include a stepped-care approach, best-known as the "Kaiser Pyramid";[70] the chronic disease self-management programme[71] (known in the UK as the expert patient programme); and WHO's service organisation pyramid for an optimal mix of services for mental health.[72]

According to the chronic care model, six areas need improvement to facilitate chronic care: community resources; health systems; self-management support; decision support; delivery-system redesign; and clinical information systems. Each is described below for its relevance to strengthening primary health care in low-income and middle-income countries.

Community resources

People with chronic diseases spend the most of their time outside of a primary health care setting. Primary health care services that establish formal linkages with their communities leverage untapped resources and help

to ensure healthy and facilitative environments for people, especially elderly people living with chronic diseases[73] or mothers with depression.[74] Action by various sectors at the community level was a key component of primary health care in the Alma-Ata declaration and has the potential to influence risk factors for chronic disease, for example by encouraging and supporting changes in health behaviour. However, further evidence is needed on both how to implement intersectoral actions at all levels of society and the cost-effectiveness of this approach.

Health systems

For patients to be attracted and retained and continuity of care provided, several features of health systems must be strengthened. Private and informal health-care sectors are presently the main providers of chronic care in most low-income and middle-income countries. Stewardship from government policy makers will be essential to the improvement of quality of care and integration of fragmented provision of chronic care across the many different providers. The funding and implementation of robust supply systems for drugs and equipment are priorities for health systems. Implementation of information systems at both the clinical and management levels will form the backbone of high-quality health programmes. Finally, the development of fair and affordable financing options that lower barriers to treatment will be essential in improving outcomes for patients.

Self-management support

Primary health care workers have a central role in supporting patients to self-manage their illnesses successfully, and importantly, this support goes well beyond disease education. Patients and their carers need to be informed about self-management strategies and motivated and skilled to implement them. Self-management support programmes led by lay people have been researched, largely in high-income countries, and evidence suggests they have a modest effect on some outcomes, such as pain, disability, and depression, as well as self-efficacy (ie, patients' confidence about managing their own illness).[75] Self-management support groups led by health workers have been associated with improvements in important disease outcomes, such as blood pressure, body-mass index, and HbA_{1c},[76,77] as well as adherence to HAART.[78]

Decision support

To be effective, guidelines must be integrated into the fabric of decision making, for example through visual reminders and performance feedback. In addition to guidelines, primary health care workers must have continuous access to professionals with expertise and experience in the care of specific illnesses. These may be physicians or non-physician specialists. The

Panel 4: Integrated management of adolescent and adult illness

WHO's integrated management of adolescent and adult illness (IMAI) programme has been in development since 2001, when it was conceptualised as a set of guidance and tools for the comprehensive management of adult illness (both acute and chronic features) in low-resource primary health care settings. In 2003, IMAI was re-focused exclusively towards the management of HIV/AIDS, although it remains applicable to other adult illnesses.

IMAI provides practical tools for country adaptation, including health-service management at national and district level; training and guidelines for clinical teams; post-training support; patients' education and self-management materials; and a standardised monitoring system for patients. Treatment teams are typically headed by doctors or medical officers but composed mainly of non-physician clinicians, people living with HIV, and other lay providers. Task shifting is a key feature of IMAI and promotes sharing of clinical management responsibilities to the lowest relevant cadre and into the community, which is vital for effective chronic disease management. The most important task shift is to the patient, who is informed and equipped by the health-care team for effective self-management and adherence.[13] Health workers are taught to use the "5As"[66] (assess, advise, agree, assist, arrange) in all clinical interactions, which helps develop and refine self-management, and reinforces treatment partnerships with patients.

One of IMAI's most distinctive elements is its focus on the management of chronic disease and prevention, rather than just the treatment of acute illness. This supports the shift from an exclusively acute care model of health service delivery to a chronic care model. Assessment has not yet been completed but observations indicate that the chronic-care approach has been well received by health workers. The programme is now being implemented in more than 40 low-income and middle-income countries. An IMAI diabetes module is in preparation and will be field-tested in three such countries that are already using IMAI HIV/AIDS modules.

effectiveness of guideline implementation and other decision support strategies are reviewed in an accompanying article.[6]

Delivery-system design

Primary health care design (or redesign) typically includes the introduction of planned follow-up visits for all patients with chronic disease and the reorganisation of health workers' roles and responsibilities, usually towards a multidisciplinary team approach. Multidisciplinary teams can take several forms. Frequently, non-physician team members and sometimes "expert patients" are designated to have clear, circumscribed roles in primary health care. Case managers and outreach workers are sometimes recruited to provide close follow-up of patients with complex care needs. Continuous support from specialists to primary health care workers is effective for the management of mental disorders in high-income settings.[79] However, a recent Cochrane review of shared-care interventions for a range of chronic diseases, including depression, revealed mixed results.[80,81] Shared care significantly improved appropriate prescribing and drug adherence and use; however, health status was not improved. Results for low-income and middle-income countries have yet to be well assessed.

Clinical information systems

Primary health care workers can use monitoring systems to identify patients' needs, plan care over time, monitor responses to treatment, and assess health outcomes. Monitoring of patients typically involves use of individual patients' cards or records, which are subsequently aggregated to provide information about the clinical population. Simple paper-based systems, if designed properly and shown to be cost-effective, can be used to monitor individual patients' treatment, outcomes, and preventive activities, to remind health workers about care plans, and to provide information about the prevalence of disorders in the clinical population. In the future, paper-based systems are likely to be superseded by low-cost IT systems, including the use of mobile technology.

Improving the quality of chronic-disease management

Controlled studies and reviews from high-income countries have shown that, across a wide range of chronic disease, the implementation of primary-care-led management models can produce improved health outcomes.[34,82–87] Complex interventions that incorporated clinician education, an increased role of the nurse (nurse case management), and a greater degree of integration between primary and secondary care (consultation-liaison) were more likely to be beneficial in depression.[86] However, effect sizes show heterogeneity between assessments in asthma, congestive heart failure, diabetes, and depression that makes pooled effect sizes of debatable value.[87] No single intervention component has emerged as the underlying driver of success. Rather, multidimensional intervention packages that incorporate several distinct features of chronic-disease management seem to be most effective, including both pharmacological and psychosocial interventions, collaboration between different members of the primary care team, involvement of patients and families together with a stepped-care approach and clear referral pathways, and appropriate supervision depending on response to intervention and severity of disease. Analogous evidence from low-income and middle-income countries is sparse but promising.[20,23,40,88]

Improvement of adherence to treatments

A systematic review of interventions to improve adherence in chronic disease showed that adherence increased most consistently with behavioural interventions that reduced dosing demands (all of three studies) and those involving monitoring and feedback (three of four studies).[89] Adherence also improved in six multisession informational trials and eight combined interventions. 11 studies (four informational, three behavioural, and four combined) showed improvement in at least one clinical outcome, but effects were variable and not consistently related to changes in adherence; only two studies were in low-income or middle-income countries. Such strategies need to be adapted to and assessed in primary health care in resource-constrained settings. For adherence strategies to be effective, a constant supply of treatments must be ensured.

Addressing the challenges of scaling-up

Scaling-up of efficacious interventions in primary care faces several challenges,[90] notably that health workers are already overburdened with many responsibilities, lack supervision and specialist support after training, and often do not have a guaranteed continuous supply of drugs. The shortage of health workers around the world has attracted much attention in recent years.[91–94] In response, global strategies have been developed to scale up the workforce in low-income and middle-income countries and to provide adequate incentives and better working conditions to ensure the retention of health workers.[95] Amidst the urgency to train and retain a health workforce, the related importance of ensuring that health workers have the right competencies to manage their clinical populations must not be ignored. Given the rapid increase of chronic diseases in low-income and middle-income countries, consideration is being given as to how best to prepare health workers for effective management of these disorders. In 2005, WHO published a review that elucidated five core competencies for delivery of effective health care for patients with chronic diseases.[96,97] The five basic competencies that apply to all members of the workforce caring for patients with chronic diseases are patient-centred care, partnering, quality improvement, information and communication

technology, and a public health perspective. The competencies now must be translated into reality by initiation of reform efforts in health training institutions and centres of continuing education around the world.

Scaling-up the workforce for chronic diseases also involves task shifting and the use of multidisciplinary teams. Non-physician clinicians (including health officers and nurses) are common in many low-income and middle-income countries.[98] There are many advantages to the use of such clinicians in primary care settings; in some roles with adequate support, they seem to function as effectively as—or better than—physicians.[6,99–102] With appropriate training and equipment, these health workers can screen adult patients, provide appropriate interventions, and promote adherence to treatment with evidence-based strategies.[103,104] Task shifting can extend to non-professionals, including community members and expert patients.[105,106] Specialist nurses (eg, psychiatric nurses) and physicians have important parts to play in supervising non-physician clinicians and in providing direct care in complex cases.

In many countries, strengthening the capacity of the state to manage different providers of care is crucial to scaling-up because many patients currently use several providers, both public and private, resulting in lack of continuity of care. Improved governance and regulation are needed to address variable quality.

Conclusions

Many research questions still need to be addressed, but this is no excuse for inaction. Research on scaling-up should be embedded in large-scale programmes needing collaboration between national policy makers, practitioners, public-health researchers, development agencies, and funding organisations. Many of these questions are within the scope of public health and health policy and systems research (panel 5). There are important unresolved questions about cost-effective treatments for specific disorders, the role of management packages of integrated interventions, and more general issues concerning implementation of available knowledge.

Integrated primary health care approaches are of central importance in tackling the growing burden of chronic diseases, irrespective of cause. Management of chronic diseases in primary health care is fundamentally different from that for acute care. Primary health care is probably more effective when complemented by effective public policies to tackle major risk factors, such as tobacco use, obesity, and excessive salt consumption. Much of the evidence about chronic disease management comes from high-income countries, and the approaches need adapting to settings in which there is often a lack of medically qualified staff, many patients commonly with comorbidities, and lack of laboratory support for basic biochemistry. Opportunistic screening may be difficult to operationalise when consultations last only a few minutes, which, in turn, will necessitate addressing deficiencies in the health workforce. To avoid unnecessary delay while ensuring that lessons are learnt, research-funding organisations, donors of aid, and national governments must work together to ensure that assessment is integrated within major health-care delivery programmes as they are scaled up.

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