Cardiovascular disease (CVD) and related chronic diseases are now recognized as the leading causes of death worldwide, with >80% of all CVD-related deaths now occurring in low- and middle-income countries (LMICs). Cardiovascular disease risk factors have also increased globally. In addition to the disease burden, global CVD imposes a substantial economic burden on LMICs at both population and household levels.

The accelerating rates of unrecognized and inadequately addressed CVD and related chronic diseases in LMICs are cause for immediate action. Despite several recent calls for action to translate epidemiological data into strategies and policy frameworks, a profound mismatch remains between the compelling evidence documenting the health and economic burden of CVD and the lack of concrete steps to increase investment and implement CVD prevention and disease management efforts in LMICs.

To catalyze the action needed to control global CVD, the Institute of Medicine (IOM) has produced a report titled Promoting Cardiovascular Health in the Developing World (http://www.nap.edu/catalog.php?record_id=12815). The IOM committee was charged with evaluating the available evidence to offer conclusions and recommendations to reduce the global burden of CVD, with an emphasis on developing guidance for partnerships and collaborations among a range of public- and private-sector entities involved with global health and development. The recommendations of the report include a set of specific actions targeted to specific stakeholders, which are intended to encourage a sufficient shift in the global health and development agenda to facilitate critical next steps that will build toward the eventual goal of widespread dissemination and implementation of evidence-based programs, policies, and other tools to address CVD and related chronic diseases in LMICs. This article presents the recommendations of the IOM report with a condensed version of the committee’s commentary describing the rationale and implementation of the recommendations. In this summary, the recommendations are grouped by theme in a numeric order that does not match exactly with the IOM report.
tiveness and feasibility of policies, programs, and services in the local contexts in which they need to be implemented. Finally, global CVD stakeholders remain fragmented, inadequately coordinated, insufficiently accountable, and without clear leadership or international governance. Ultimately, the success or failure of global CVD control will depend on coordinated public and political will across the globe.
Moving Forward: Actions to Control Global Cardiovascular Disease

The IOM committee identified several essential functions that are needed to overcome these barriers. These include the following: (1) priority building, advocacy, and funding at global and national levels; (2) developing policy and program implementation; (3) improving systems for data management and conducting locally relevant research; and (4) global coordination and reporting. Using a framework that builds on the committee’s recommendations, we present below the critical next steps that are needed to materialize these essential functions and thereby overcome the barriers.

The evidence base for these recommendations is not uniform, and can be strengthened. However, implementation of the report’s recommendations, which reflect the currently available evidence, need not wait. The practical solution is both to begin to intervene and to build the knowledge base simultaneously by evaluating feasibility, effectiveness, and impact alongside implementation. To have the greatest impact on the global CVD epidemic, all of the essential functions and recommendations should ideally be addressed at the same time, and these actions should be coordinated among all of the involved stakeholders (international, national, and local).

Priority Building, Advocacy, and Funding

Recommendation 1: Recognize Chronic Diseases as a Development Assistance Priority

Multilateral and bilateral development agencies that do not already do so should explicitly include CVD and related chronic diseases as an area of focus for technical assistance, capacity building, program implementation, impact assessment, and other areas of activity.

Comment

International advocacy efforts to raise awareness of the growing CVD epidemic in LMICs have continued to grow with increasing intensity over the past several decades, as evidenced by a steady stream of declarations, campaigns, and conferences to raise awareness. Although these efforts have not yet resulted in substantial new investment, they have successfully placed CVD and related chronic diseases on the agenda of the international development assistance and global health donor community. This is demonstrated most clearly by the decision of the United Nations General Assembly in September 2011.4

The challenge for advocacy efforts, moving forward, will be to convince ministries of health in LMICs, development assistance agencies, and other donors to invest in CVD prevention and control despite their highly constrained health budgets and many competing priorities. A key strategy in this undertaking will be to promote the integration of basic prevention and management for CVD and related chronic diseases into existing global health programs that are currently addressing infectious diseases, maternal and child health, and strengthening of health systems. To achieve this synergy, CVD and related chronic diseases must be consid-

Recommendation 2: Advocate for Chronic Diseases as a Funding Priority

Leading international and national nongovernmental organizations (NGOs) and professional societies related to CVD and other chronic diseases should work together to advocate to private foundations, charities, governmental agencies, and private donors to prioritize funding and other resources for specific initiatives to control the global epidemic of CVD and related chronic diseases. To advocate successfully, these organizations should consider the following: (1) raising awareness about the population health and economic impact and the potential for improved outcomes with health promotion and chronic disease prevention and treatment initiatives; (2) advocating for health promotion and chronic disease prevention policies at national and subnational levels of government; (3) engaging the media about policy priorities related to chronic disease control; and (4) highlighting the importance of translating research into effective individual- and population-level interventions.

Comment

Adequate funding is a critical requirement to execute each of the actions needed at local and national levels. A recent analysis of current trends in global funding showed that chronic diseases are the least funded area in global health, receiving <3% of all development assistance for health from 2001 through 2007.5 This level of investment is clearly inadequate to address the magnitude of the global burden of CVD and related chronic diseases.

Going forward, support for CVD and related chronic diseases will be required from national governments (health and nonhealth sectors), bilateral and multilateral international agreements, private foundations, international NGOs, civic groups, community-based organizations, and public-private partnerships. Over the long term, new sources of funding may emerge as a result of CVD prevention efforts. For example, some proposed approaches, such as tobacco taxes, generate
revenue that could be applied to other prevention efforts. Although these are rarely earmarked for additional tobacco reduction or other health promotion programs, some precedent exists. For example, Thailand’s Health Promotion Foundation uses funds from tobacco taxes to invest in physical activity interventions, tobacco and alcohol control, and other health promotion programs.7

Financial and technical assistance for health and development in LMICs can come from multilateral agencies as well as bilateral programs, such as the US President’s Emergency Plan for AIDS Relief, which substantially increased the funding available for global health issues.6 Private foundations are another important source of funding for global health; in 2005, nearly $4 billion was given for international projects, the majority of which were health related.9 The Bill & Melinda Gates Foundation dwarfs most other private sources of funding with respect to the absolute amount of the outlay; its global health grants are nearly equal to the annual budget of the World Health Organization (WHO).10 Although the Gates Foundation funds tobacco control and has recently launched a new initiative to support antismoking programs in Africa, it otherwise does not include chronic diseases as one of its priority areas,11 despite the large and growing burden of such diseases in low-income countries. These agencies and donors can expand their scope of work to include CVD and related chronic diseases.

Policy and Program Implementation

Recommendation 3: Improve National Coordination for Chronic Diseases

National governments should establish a commission that reports to a high-level cabinet authority with the specific aim of coordinating the implementation of efforts to address the needs of chronic care and chronic disease in all policies. This authority should serve as a mechanism for communicating and coordinating among relevant executive agencies (eg, health, agriculture, education, and transportation) as well as legislative bodies, civil society, the private sector, and foreign development assistance agencies. These commissions should be modeled on current national human immunodeficiency virus/AIDS commissions and could be integrated with these commissions where they already exist.

Comment

A broad-based set of programmatic initiatives will need to be implemented in a sustained fashion to promote global cardiovascular health. These programs should include provision of health services, both treatment and prevention; health communication and education in communities; and policy initiatives in a range of sectors. One of the primary goals in meeting the challenges of CVD is to create environments that support and empower individual behavior choices that help to prevent the acquisition and augmentation of risk.

CVD control efforts must occur through a coordinated intersectoral approach that includes the whole of government. For example, reducing tobacco use or promoting healthy lifestyles will require actions by a range of governmental agencies (health, agriculture, urban planning, transportation, finance, broadcasting, and education) as well as private sector producers and retailers. To coordinate these efforts, ensure the allocation of necessary resources, and have the best chance for real impact requires a mechanism, such as a Chronic Disease Commission, that is insulated from the relative influence of different ministries within the government. In addition, these efforts must be coordinated with stakeholders in the private sector and civil society as well as donors and agencies providing external development assistance. A useful model for this approach comes from successful examples to achieve national coordination of efforts in the fight against human immunodeficiency virus/AIDS.

Recommendation 4: Implement Policies to Promote Cardiovascular Health

To expand current or introduce new population-wide efforts to promote cardiovascular health and to reduce risk for CVD and related chronic diseases, national and subnational governments should adapt and implement evidence-based, effective policies based on local priorities. These policies may include laws, regulations, changes to fiscal policy, and incentives to encourage private-sector alignment. To maximize impact, efforts to introduce policies should be accompanied by sustained health communication campaigns focused on the same targets of intervention as the selected policies.

Comment

A range of policy approaches for CVD control can be considered by policy makers, including tobacco taxes, restrictions on marketing of certain foods to children, school physical education policies, subsidies or import duties on certain foods, and clinical guidelines. An intersectoral approach with input from civil society and the private sector can help to determine the balance of regulatory measures, incentives, and voluntary measures that is likely to be most effective and realistic in the local political and governmental context. This is especially true when the feasibility of policy changes is challenged by economic aims that may be in conflict with goals for improving health outcomes.

A policy approach that is supported by a strong evidence base is implementation of the Framework Convention for Tobacco Control. In addition, a collection of successful strategies to reduce salt consumption could potentially be adapted to LMIC settings. Such strategies to reduce salt are already being initiated in some high-income countries,12 and similar policies should be initiated in LMICs. Analogous efforts could be explored to reduce consumption of other unhealthy dietary components, including saturated fats and trans fats, unhealthy oils, and sugars. Agriculture policies could also be considered, where feasible, to avoid overproduction of meat and unhealthy oils and to encourage greater production of healthy foods such as fruits and vegetables. Finally, for those countries on the verge of rapid urbanization, policies for future urban planning could promote physical activity and improve access to healthy food sources. Many of these policies would be in synergy with aims to minimize potential negative environmental and safety effects of rapid urban development. Health communications and education efforts can also be targeted at the population level with the
aim of both affecting CVD-related behaviors and building public support for policy changes.13

Recommendation 5: Include Chronic Diseases in Health Systems Strengthening
Current and future efforts to strengthen health systems and healthcare delivery funded and implemented by multilateral agencies, bilateral public health and development agencies, leading international NGOs, and national and subnational health authorities should include attention to evidence-based prevention, diagnosis, and management of CVD. This should include developing and evaluating approaches to build local workforce capacity and to implement services for CVD that are integrated with primary healthcare services, management of chronic infectious diseases, and maternal and child health.

Comment
The rising burden of global CVD will worsen an already severe shortage of public health and clinical workers with the capacity to implement and sustain public health or healthcare delivery programs in LMICs. Thus, capacity-building strategies should include the development of the multidisciplinary skills, knowledge, and capabilities required to effectively address CVD and related chronic diseases. Domains of capacity building would include clinical medicine, public health, health communications, economics, health systems and program management, health policy, and behavioral sciences. In addition, this process would need to develop and fortify academic, NGO, and government institutions that are involved in addressing CVD. Academic institutions in high-income countries can support and collaborate with training and research centers in LMICs. These approaches should include systematic plans to develop public health and healthcare leaders and workforce who are better prepared with chronic disease competencies. Thus, as part of current and future strategies to strengthen the overall health and public health workforce in LMICs, international and national CVD stakeholders need to work to build capacity in the areas of cardiovascular health promotion, CVD prevention, CVD clinical services, and CVD-related research.

Recommendation 6: Collaborate to Improve Diets
The WHO, the World Heart Federation, the International Food and Beverage Association, and the World Economic Forum, in conjunction with select leading international NGOs and select governments from developed and developing countries, should coordinate an international effort to develop collaborative strategies to reduce dietary intake of salt, sugar, saturated fats, and trans fats in both adults and children. This process should include stakeholders from the public health community and multinational food corporations, as well as the food services industry and retailers. This effort should include strategies that take into account local food production and sales.

Recommendation 7: Collaborate to Improve Access to Cardiovascular Disease Diagnostics, Medicines, and Technologies
National and subnational governments should lead, negotiate, and implement a plan to reduce the costs of and ensure equitable access to affordable diagnostics, essential medicines, and other preventive and treatment technologies for CVD. This process should involve stakeholders from multilateral and bilateral development agencies; CVD-related professional societies; public and private payers; pharmaceutical, biotechnology, medical device, and information technology companies; and experts on healthcare systems and financing. Deliberate attention should be given to public-private partnerships and to ensuring appropriate, rational use of these technologies.

Comment
The global CVD community should seek opportunities to create stronger interactions with existing major global initiatives that are increasing support for broad strengthening of health systems as part of their current mission, such as the International Health Partnership; the US human immunodeficiency virus/AIDS programs implemented under the President’s Emergency Plan for AIDS Relief; the Global Fund for AIDS, Tuberculosis, and Malaria; and the Global Alliance for Vaccines and Immunization. Such an integrated approach dovetails with current efforts to transition from costly, disease-specific approaches toward more efficient approaches that promote better primary healthcare to meet a range of health needs. It also fits into a shift in the global health paradigm from acute, short-term interventions to longer-term investments in overall health and chronic diseases. Active involvement in the upcoming high-level meeting will be of critical importance for the global CVD community.

Some efforts related to global CVD are particularly in need of collaboration with multiple stakeholders, including the private sector, such as improving equitable access to affordable health services, essential medicines, diagnostics, and technologies for prevention and treatment; monitoring clinical practice and improving the quality of care; introducing innovative mechanisms for financing health services; using information technologies; and increasing healthy food choices in the food supply chain.

Data Management and Research

Recommendation 8: Improve Local Data
National and subnational governments should create and maintain health surveillance systems to monitor and more effectively control chronic diseases. Ideally, these systems should report on cause-specific mortality and the primary determinants of CVD. To strengthen existing initiatives, multilateral development agencies and the WHO (through, for example, the Health Metrics Network and the regional chronic disease network, Global Noncommunicable Disease Network) as well as bilateral public health agencies (such as the Centers for Disease Control and Prevention in the United States) and bilateral development agencies (such as the United States Agency for International Development) should support chronic disease surveillance as part of financial and technical assistance for developing and implementing health information systems. Governments should allocate funds and build capacity for long-term sustainability of disease surveillance that includes chronic diseases.
Recommendation 9: Define Resource Needs
The Global Alliance for Chronic Disease should commission and coordinate case studies of the CVD financing needs for 5 to 7 countries representing different geographic regions, stages of the CVD epidemic, and stages of development. These studies should require a comprehensive assessment of the future financial and other resource needs within the health, public health, and agricultural systems to prevent and reduce the burden of CVD and related chronic diseases. Several scenarios for different prevention and treatment efforts, training and capacity building efforts, technology choices, and demographic trends should be evaluated. These assessments should explicitly establish the gap between current investments and future investment needs, focusing on the manner in which to maximize population health gains. These initial case studies should establish an analytical framework with the goal of expanding beyond the initial pilot countries.

Comment
A sound evidence base should underpin all actions. Therefore, research, monitoring, and evaluation are critical elements of the overall package of global CVD efforts. Although the health and economic burdens of global CVD have been elucidated by several investigators, further research will be required to develop and evaluate initiatives to control global CVD. In particular, research priorities include determining the intervention approaches that will be most effective and feasible in the resource-constrained settings of LMICs. This new knowledge about program and policy effectiveness within local realities will facilitate national governments, NGOs, and multilateral organizations as they implement interventions to address the CVD epidemic.

A first step for each country’s CVD research community is to determine the extent and nature of cardiovascular risk in their local population and to assess their needs and capacity to address CVD and related chronic diseases. Improved population data are crucial to compel action, to inform local priorities, and to measure the impact of implemented policies and programs. This assessment will determine choices about the implementation of both evidence-based policies and programs and also capacity-building efforts. Ongoing evaluation of implemented strategies will allow policy makers and other stakeholders to determine whether implemented actions are having the intended effect and meeting the defined goals and to reassess needs, capacity, and priorities over time.

In addition, the level of investment required for CVD control program implementation needs to be defined more clearly. There is a need for high-quality analyses of the gap between current resources and future needs. This will help to inform the best balance of intervention approaches for future investments and resource allocation, including health promotion, prevention, treatment, and disease management. Conducting such analysis at the country level in LMICs will be an important planning tool for national and subnational governments as well as for funders and development agencies.

Recommendation 10: Research to Assess What Works in Different Settings
The National Heart, Lung, and Blood Institute and its partners in the newly created Global Alliance for Chronic Disease, along with other research funders and bilateral public health agencies, should prioritize research to determine the intervention approaches that will be most effective and feasible to implement in LMICs, including adaptations based on demonstrated success in high-income countries. With the use of appropriate rigorous evaluation methodologies, this research should be conducted in partnership with local governments, academic and public health researchers, NGOs, and communities. This research will serve to promote appropriate intervention approaches for local cultural contexts and resource constraints and to strengthen local research capacity:

A. Implementation research should be a priority in research funding for global chronic disease.
B. Research support for intervention and implementation research should include explicit funding for economic evaluation.
C. Research should include assessments of and approaches to improve clinical, public health, and research training programs in both developed and developing countries to ultimately improve the status of global chronic disease training.
D. Research should involve multiple disciplines, such as agriculture, environment, urban planning, and behavioral and social sciences, through integrated funding sources with research funders in these disciplines. A goal of this multidisciplinary research should be to advance intersectoral evaluation methodologies.
E. In the interests of developing better models for prevention and care in the United States, US agencies that support research and program implementation should coordinate to evaluate the potential for interventions funded through their global health activities to be adapted and applied in the United States.

Comment
A critical priority is to generate knowledge about the manner in which to translate what is already known into action and implementation, that is, to close the knowledge-action gap. This research agenda will need to be multidisciplinary, spanning basic sciences, behavioral and social sciences, media and communication analysis, information technology and engineering, epidemiology, health policy and economics, clinical trials, and service delivery and implementation science. CVD research should also extend into nontraditional areas of agriculture, economics, health systems, and intersectoral disciplines.

Monitoring and evaluation will be central forces of any successful effort to reduce the burden of CVD in LMICs as ongoing tools to inform investments in CVD and ensure that strategies and programs are being implemented as intended and have their desired impact. Efforts to improve monitoring and evaluation at program, country, and global levels and to disseminate the knowledge gained will collectively contribute to an ongoing cycle of feedback and quality improvement. High-quality evaluations of programs are needed in settings that are analogous to those in which they are intended to be implemented to generate knowledge about effective as well as feasible efforts.

There has been substantial progress in many areas of monitoring and evaluation in global health that can offer
important lessons and models to meet chronic disease measurement needs. For example, well-established models for national surveillance, behavioral surveys, electronic medical records, and tools for program evaluation can be adapted to include or be applied to CVD-related measures. Although there will also be a need for some CVD-specific measurement approaches, it is important, when feasible, to build on current approaches used in monitoring and evaluation both locally and globally to take advantage of existing infrastructure and to avoid the inefficiencies of duplicate systems.

Global Coordination and Reporting

Recommendation 11: Disseminate Knowledge and Innovation Among Similar Countries

Regional organizations, such as professional organizations, WHO observatories and chronic disease networks, regional and subregional development banks, and regional political and economic organizations, should continue to expand regional mechanisms for reporting on trends in CVD and disseminating successful intervention approaches. These efforts should be supported by leading international NGOs, development and public health agencies, and research funders (including the Global Alliance for Chronic Disease). The goal should be to maximize communication and coordination among countries with similar epidemics, resources, and cultural conditions to encourage and standardize evaluation, help to determine locally appropriate best practices, encourage innovation, and promote dissemination of knowledge. These mechanisms may include, for example, regional meetings for researchers, program managers, and policymakers; regionally focused publications; and registries of evidence-based practice.

Comment

Several international and regional meetings have been convened to share the latest developments in CVD treatment and prevention. Although the global meetings provide an opportunity to gather stakeholders and focus on international issues, the regional meetings (especially those in LMICs) are key opportunities to provide local implementers with training and information to which they might otherwise not have access. Such regional coordination and reporting provide a much-needed mechanism for countries to share knowledge, innovation, and technical capacity among countries with similar epidemics, resources, and cultural conditions and to help build international support for national-based solutions.

Recommendation 12: Report on Global Progress

The WHO should produce and present to the World Health Assembly a biannual World Heart Health Report within the existing framework of reporting mechanisms for its Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. The goal of this report should be to provide objective data to track progress in the global effort against CVD and to stimulate policy dialogue. These efforts should be designed not only for global monitoring, but also to build capacity and support planning and evaluation at the national level in LMICs. Financial support should come from the Global Alliance for Chronic Disease, with operational support from the Centers for Disease Control and Prevention. The reporting process should involve national governments from high-, middle-, and low-income countries; leading international NGOs; industry alliances; and development agencies. An initial goal of this global reporting mechanism should be to develop or select standardized indicators and methods for measurement, leveraging existing instruments where available. These would be recommended to countries, health systems, and prevention programs to maximize the global comparability of the data they collect.

Comment

In addition to the regional, national, and subnational mechanisms for coordination and reporting, a global, multilateral effort is also critical. Progress on CVD requires that many players better coordinate their efforts, define clear goals, communicate shared messages, and take decisive action together on the areas identified above. To accomplish this, a consistent reporting mechanism at the global level is needed to track progress, to stimulate ongoing dialogue about strategies and priorities, and to continue to galvanize stakeholders at all levels. This global mechanism can be built within ongoing efforts by the WHO to report on the global status of noncommunicable diseases, including developing guidance for surveillance systems and standardizing core indicators.

Conclusion

Given the high and growing burden of global CVD, it will be impossible to optimize global health without more effective and sustained efforts to promote cardiovascular health around the world. We believe that better control of CVD and related chronic diseases worldwide, and particularly in LMICs, is eminently possible. However, to achieve that goal will require longstanding commitment, strong leadership, collaboration among stakeholders based on clearly defined goals and outcomes, intersectoral interventions, and an investment of financial, technical, and human resources (Table). Rather than competing against other global health and development priorities, and instead of creating separate vertical programs, the CVD community needs to engage policy makers and global health colleagues to integrate attention to CVD within existing global health missions and efforts. Given that many chronic diseases (in addition to CVD) share the same behavioral risk factors (tobacco use, physical inactivity, poor diet) and given that similar social determinants (poverty, access to

<table>
<thead>
<tr>
<th>Table. Key Principles for Organizing and Coordinating for Action to Control Global Cardiovascular Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recognize and respect the realities of multiple competing priorities</td>
</tr>
<tr>
<td>• Recognize the realities of resource constraints</td>
</tr>
<tr>
<td>• Integrate health promotion and prevention efforts with other diseases that share common risk factors and common social, structural, economic, and development-related determinants</td>
</tr>
<tr>
<td>• Build partnerships across sectors such as agriculture, finance, education, transportation, and the private sector</td>
</tr>
<tr>
<td>• Integrate healthcare delivery and capacity-building efforts with ongoing initiatives to strengthen health systems</td>
</tr>
<tr>
<td>• Balance integrated approaches with disease-specific approaches where appropriate for research, training, and clinical care</td>
</tr>
</tbody>
</table>

Downloaded from http://circ.ahajournals.org/ by guest on April 13, 2017
medicines, urbanization) affect both communicable and non-communicable diseases, an intersectoral and integrated approach will yield the greatest benefit.

Although an integrated approach to shared-risk-factor reduction, health promotion, and health systems strengthening is critical for success, within this approach there remains a need for disease-specific approaches in some areas, such as training the health workforce to effectively implement secondary prevention and treatment. For instance, although shared-risk-factor reduction is vital to combating CVD, investment in scalable CVD-specific diagnostic tools and interventions such as medications for hypertension or dyslipidemia are also critical. Therefore, flexibility is needed to implement these disease-specific strategies simultaneously with the integrated efforts. To achieve this, coordination and organization of stakeholders at all levels—global, national, and regional—will be required to ensure that implementation of programs and policies is maximally streamlined and harmonized.

Responding to the global CVD epidemic has profound implications for the CVD community. In addition to mobilizing ourselves in agreement with the recommendations outlined above, we will also need to work with the public health community, health promotion experts, and policy makers. Specific potential roles have been described in this article and in the IOM report, which provide a way forward to promote global cardiovascular health. In light of the upcoming high-level meeting of the United Nations dedicated to non-communicable diseases, this is an opportune moment for the cardiovascular community to significantly affect the future course of global health.

Sources of Funding

The National Heart, Lung, and Blood Institute funded the IOM report.

Disclosures

None.

References

Promoting Global Cardiovascular Health: Moving Forward
Valentin Fuster, Bridget B. Kelly and Rajesh Vedanthan

Circulation. 2011;123:1671-1678
doi: 10.1161/CIRCULATIONAHA.110.009522
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2011 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/123/15/1671

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org//subscriptions/