

Polypill holds promise for tackling cardiovascular disease

September 5 2019, by Lindsey Diaz-Macinnis

Heart attacks and strokes are collectively the leading cause of death in most low- and middle-income countries (LMICs) worldwide. Treatment with four drugs— aspirin, a statin, an angiotensin converting-enzyme (ACE)-inhibitor, and a beta blocker— improves survival and quality of life among patients who have had a heart attack or stroke in the past; however, fewer than a quarter of eligible patients in LMICs receive these medications due to concerns about pill burden and cost.

To address this gap, a team of researchers led by Dhruv S. Kazi, MD, MSc, MS, Associate Director of the Smith Center for Outcomes Research at Beth Israel Deaconess Medical Center (BIDMC) evaluated whether it would be cost-effective to combine several medications into a single "cardiovascular [polypill](#)" for patients who have had a previous [heart attack](#) or stroke, instead of prescribing the four drugs individually. The findings were published on August 30 in *Lancet Global Health*.

The researchers built a [mathematical model](#) that simulated all adults with a prior [heart](#) attack or stroke in five LMICs across a wide range of economic development: India, China, Mexico, Nigeria, and South Africa. These countries were chosen because they have a large burden of cardiovascular disease in their population. Kazi and colleagues used real-world data to model each country's current rates of medication use and cardiovascular outcomes, and then examined what would happen if patients currently receiving one or more of the evidence-based therapies for cardiovascular disease were switched to the polypill instead. In this simulation model, the researchers followed individuals for their entire

lifetime, keeping track of heart attacks, strokes, and deaths, as well as all [health care costs](#). They also estimated patients' survival and [quality-of-life](#), allowing them to estimate, for each country, a metric called the incremental cost-effectiveness ratio (or ICER). The ICER indicates how much money it would cost to prevent the loss of one disability-adjusted life year.

Overall, the team found that the polypill may represent an unprecedented public health opportunity. "In cardiovascular disease, we seldom identify interventions that have the potential to save a lot lives and, over the short term, also save money," said Kazi. "LMICs that adopt the cardiovascular polypill for secondary prevention are likely to receive excellent clinical and health economic returns on investment—an important consideration when health care budgets are extremely tight."

The study generated three compelling findings. First, the polypill was projected to be cost-effective compared with the standard of care in each of the countries studied. Because using a polypill results in downstream savings from prevented heart attacks and strokes, adopting the polypill in some settings was projected to save money while also saving lives.

Second, most of the benefit of the polypill would be derived from the fact that doctors, instead of prescribing four separate pills, would only need to prescribe a single pill. Because a single prescription would ensure that patients receive all four life-saving therapies, more patients would receive these drugs. This is a novel finding, as it was previously believed that the polypill primarily works by improving patient adherence: since patients prefer taking fewer pills, they are more likely to take the polypill instead of individual medications. While the effect of the polypill on patient adherence is important, this study shows that the effect on physician prescriptions delivers much of the polypill's benefit in LMICs.

Finally, because very few eligible patients in LMICs are receiving any of the evidence-based treatments at all, maximizing the public health impact of the polypill will require that many more patients with a history of a heart attack or stroke are diagnosed in a timely manner and initiated on the cardiovascular polypill to prevent recurrent events.

The researchers caution that their work shows that the polypill is not a panacea for the epidemic of cardiovascular disease facing these countries. "In order to achieve meaningful improvements in health outcomes, LMICs adopting the polypill must also make strategic investments in high-quality [health](#) infrastructure and effective supply chains to ensure that patients with a prior history of heart disease or [stroke](#) have reliable access to an affordable cardiovascular polypill," said Kazi.

Provided by Beth Israel Deaconess Medical Center

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