POLICY BRIEF
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#01

COST-EFFECTIVENESS OF COMMUNITY-BASED PRIMARY CARE DELIVERY MODELS FOR DIABETES PREVENTION AND MANAGEMENT

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Non-communicable diseases (NCDs) such as diabetes, hypertension, cardiovascular diseases account for more than 60% of all deaths in India and an annual loss of 5-10% of its GDP.[1,2,3] The estimated health care expenditure on diabetes mellitus in India was US$31 billion in 2017. Diabetes care can take up 5% to 25% of the income of the average Indian household.[4,5,6] Alarmingly, India is experiencing a shift in diabetes prevalence from urban to rural areas, and from higher- and middle-income groups to lower-income groups.[7] There is a need for innovative operating models that integrate frontline healthcare providers and technological innovations to provide primary care for diabetes. Effectiveness of different care delivery models to screen and prevent diabetes have been studied previously. However, cost-effectiveness of these models for long-term diabetes management among low-income groups remains untested.

A study conducted by Max Institute of Healthcare Management at Indian School of Business evaluated the cost-effectiveness of three technology-enabled delivery models: community health worker (CHW) based, telemedicine unit (TMU) based, and mobile medical unit (MMU) based models for improving diabetes care. Programs under each of the three models provided primary care for diabetes to low-income groups in different settings and geographies in India. The CHW model leveraged community health workers to provide door-to-door screening and diabetes management services to those screened as diabetic. The TMU model delivered formal care through teleconsultation by setting up e-clinics. The MMU model provided screening and management services through MMUs and complemented it with follow-up care through a diabetes center.

The study developed a cohort-based simulation model to estimate costs and disability-adjusted life years (DALY) over a period of 20 years and considered the cost-effectiveness threshold of $6,600/DALY averted. In the study, cost-effectiveness was measured as the additional cost incurred to improve health outcomes.

Overall, the study found that although all the models were capable of improving health outcomes, they were not cost-effective. Across models, the ICER values improved with age. Across age groups, the TMU model had the lowest ICER ($50,775–$109,787), and the MMU model had the highest ICER ($155,655–$334,990). The CHW model had better ICER ($129,224–$261,723) than the MMU model. There were various underlying reasons for this. First, the screening and follow-up (disease management) cost, particularly of the CHW model, adversely affected its cost-effectiveness. Second, poor user acquisition rate under the program accrued limited benefit of the increased door-to-door screening. Third, the high dropout rate observed among individual post-enrolment; implying that the quality of care (i.e., adherence to medication, consultation, etc.) obtained by individuals remained almost the same under the programs as compared to standard care. This effect of improved quality of care was tested by considering zero dropouts from follow-up care. The model effectiveness improved after considering zero dropouts; however, the model was still found to be not cost-effective. Fourth, the models did not result in higher proportion of individuals with glycaemic control, as compared to standard care. In the long term, the CHW and TMU models increased the proportion of individuals with controlled blood glucose to 28% and 38.5% respectively (from 21% under standard care). The MMU model had the lowest probability of having controlled blood glucose at 14.5%. This could be because the model did not involve regular follow-up with individuals. Key factors for this limited effect were because (i) majority of individuals who sought care under the program had a previous history of diabetes, and (ii) among those who had a previous history, most had uncontrolled blood glucose concentration when they initiated care under the program.

The study had some limitations. First, due to paucity of data, the study did not model the risk of microvascular complications such

KEY MESSAGES

- All models improved health outcomes, but were not cost-effective.
- The models suffered due to low outreach, poor acquisition rate and high dropout rate.
- A reduction in out-of-pocket expenditure can reduce dropout among patients.
- Case management can be improved by using technological measures for better adherence.
- Government insurance schemes could consider providing coverage for such programs at the community-level. It could help reduce out-of-pocket expenditure for patients and help overcome their resistance to join and continue on such programs.

as nephropathy, retinopathy and others. Second, the study estimated the transition probabilities for standard care (across three models) under the assumption that the initial/ baseline probability of individuals with controlled blood glucose was the same as that observed among individuals when enrolled in the CHW model. Third, the study did not incorporate the heterogeneity in the ability of individuals to control blood glucose based on duration of unknown diabetes, and the duration of their treatment. Fourth, the clinical effectiveness across three models was measured as change in blood glucose concentration unadjusted for covariates. Fifth, the interventions did not capture the progression of individuals who chose to drop out of the program, and assumed the future disease progression of dropouts based on care provided in the status quo. Finally, conservative estimates for population parameters were used whenever the data was not available from the intervention.

It is important to note that while the interventions were not cost-effective, they held promise. All three models improved health outcomes and can be worth pursuing if they could either reduce the cost of intervention or improve the health outcomes further. The cost of doctor consultation and medication for diabetes under each program was through out-of-pocket expenditure, which could be an important reason for discontinuation of treatment by the individuals under each of these models.[8] If such costs were covered by an external payor such as an insurance program, the health outcomes could improve further due to higher retention rate under the programs. Additional measures such as electronic DOT (Directly Observed Therapy) and IVR-based (Interactive Voice Response) telephonic follow-ups have improved TB control, and hold promise in improving outcomes of diabetes care.[9] Further, prior economic evaluation suggests that lifestyle modification programs are cost-effective in reducing incidence of diabetes.[10] Inclusion of such initiatives will reduce the expenditure on diabetes care as well as on complications due to CVD. Therefore, the models should focus on inculcating monitoring strategies on behavioral and lifestyle changes such as better diet and exercise to improve health outcomes without increasing incurred cost.

Also, the coverage under all models needs to be improved to get a greater number of individuals under treatment along with providing better care than currently available to patients under standard care. This would require both financial and operational support for the implementers to reduce the out-of-pocket expenditure for patients, and help the models reach scale. Further, these models can then be implemented within the ambit of public health infrastructure to improve health outcomes among patients accessing care at public health facilities. As India moves towards universal health coverage through the Ayushman Bharat initiative, the expenditure of the government exchequer is poised to increase. Given the growing NCD disease burden in India, without preventive care, total health expenditure is bound to increase with time as well. Given that all the three models studied lead to a reduction in CVD expenditure, involvement of a payor can further reduce out-of-pocket expenditure; improving healthcare equity as well.

The novel diabetes models, although provided an effective and scalable solution for early screening and long-term management of diabetes, were not found to be cost-effective. These results should not be considered at par value as cost-effectiveness analysis does not address equity in distribution of costs and the benefits of an intervention, societal or personal willingness to pay, or ethical issues associated with each intervention.[11] Hence, these models could become cost-effective, given that health outcomes and cost effects accrue with time. Strategies to overcome barriers such as out-of-pocket expenditure should be sought by partnering with public payers or plugging into integrated health systems where the benefits of early diagnosis and disease management can be internalized through reduced diabetes complications.

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