Decentralized dengue screening strategy at primary health care level for reducing the dengue disease burden in Tamil Nadu

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Policy Brief

Summary

Lack of effective early screening is the major obstacle for reducing the fatality rate and disease burden in dengue. Considering which the Government of Tamil Nadu has adopted decentralized dengue screening strategy at Primary health care settings using blood platelet counter. This policy brief focusses on the cost-effectiveness of this proposed strategy, so as to inform the policy makers and assist in evidence based scaling up of this strategy. A model based study was conducted to find out the cost-effectiveness of this proposed strategy in comparison to the current practice at tertiary health care level. The study found that the decentralized dengue screening strategy was cost saving and more effective than the current practice. However, it is recommended to consider economic human resource cost and collateral benefits of the equipment for implementation.

Problem Statement

Dengue is the most common vector borne infection globally, with an estimated 100 to 400 million infections occurring every year.[1] There is no effective vaccine or medicine available to prevent or cure dengue and it leads to around 20,000 deaths per year.[2] High dengue disease burden and frequent outbreaks result in an adverse impact on country's economy and strain the health system. Lack of effective early screening is the major obstacle for reducing the fatality rate and disease burden in dengue. India contributes around 34% of the global burden of dengue.[3] Although dengue is a notifiable disease in India, studies and modelling estimate suggests that the disease is grossly under reported due to the existing gaps in the public health surveillance system. Tamil Nadu is a one of the largest state in India which reported high burden of dengue infection.

Recommendations

- Decentralized dengue screening strategy at primary health care (PHC) level for dengue fever suspects helps in early diagnosis. This enables the patient to receive appropriate early treatment and timely care, which will subsequently reduce the dengue severe and death cases. Thereby reducing the morbidity and mortality due to dengue.
- The dengue screening at PHC level for fever suspects in Tamil Nadu is cost saving when compared to the current practice at tertiary health care (THC) level.
- Considering implementation cost the proposed decentralized screening strategy is found to be cost at 80% coverage in the PHC over a period of five years. The high implementation cost will gradually decrease over years as majority of which is attributed to the one time capital investment of the equipment.
- The implementation of dengue screening strategy may effectively address the dengue disease burden in the state with cost saving to the NVBDCP in Tamil Nadu. However, it is recommended to take economic cost of human resource and collateral benefits of the equipment into consideration before scaling up of this screening strategy.

Background

Although dengue is a notifiable disease in India, studies and modelling estimate suggests that the disease is grossly under reported due to the existing gaps in the public health surveillance system. Dengue surveillance in India is conducted through a network of more than 600 sentinel hospitals under the national vector-borne disease control programme (NVBDCP), Integrated Disease Surveillance Program (IDSP) and a network of 52 Virus Research and Diagnostic Laboratories (VRDL).[4] High dengue disease burden and frequent outbreaks result in an adverse impact on country's economy and strain the health system.

Tamil Nadu is a one of the largest state in India which reported high burden of dengue infection. Lack of effective early screening is the major obstacle in the timely detection of dengue in the state which could reduce the fatality rate of dengue. The diagnosis of dengue is usually made clinically. Diagnosis of dengue hemorrhage fever (DHF) can mask end stage liver disease and vice versa. The clinical diagnosis of dengue is complex due to non-specific symptoms and symptoms similar to other infections. One of the major hindrance in the control and management of dengue infection is the lack of timely and point-of-care diagnosis. The complex clinical presentation of dengue symptoms and lack of rapid screening and diagnostic tests results in delay in diagnosis and leads to rapid disease progression and mortality.

Key Messages

- The burden of dengue in India is high due to its high prevalence and high mortality rate. Lack of effective early screening is the major obstacle for reducing the fatality rate of dengue. At present dengue control in Tamil Nadu is being prioritized to strengthen diagnostic services and surveillance.
- One of the strategy adopted by the Government of Tamil Nadu is to implement blood platelet counter for screening of dengue at primary health care settings in Tamil Nadu. Under this strategy the present delay in diagnosing dengue at an earlier stage is prioritized, which could help in reduction of dengue morbidity and mortality.
- The proposed screening strategy for dengue at PHC level was found to be less costly and more effective than the current strategy. This was mainly due to the reduction in the number of deaths and severe dengue cases as a result of early detection and management in proposed strategy.

The policy brief is based upon the Health Technology Assessment of " implementation of cell counters (Haematology Analysers) for diagnosing suspected dengue cases at Primary Health Care settings in Tamil Nadu" and can be found on the link: https://dhr.gov.in/sites/default/ files/

Policy Brief

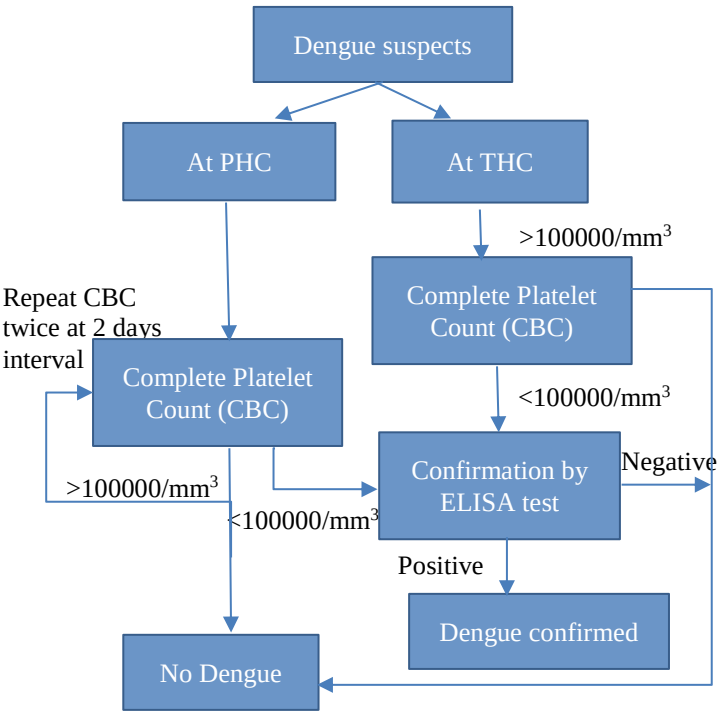
Decentralized dengue screening strategy

Screening and diagnosis are done at Tertiary Health Care (THC) facilities in Tamil Nadu. The Government of Tamil Nadu has recently proposed a decentralized dengue screening strategy at Primary Health Care (PHC) settings using blood platelet counter using hematology analyzer. Platelet count is assessed and those with less than 100000/mm3 platelet count will be referred to the THC facility for further management. In dengue suspects with more than 100000/mm3 platelet count will be re-assessed at two days interval. A maximum of two times repeat platelet count will be undertaken to rule out dengue (Figure-1). Under this strategy the present delay in diagnosing dengue at an earlier stage is prioritized which could help in reduction of dengue morbidity and mortality.

Summary of Evidence

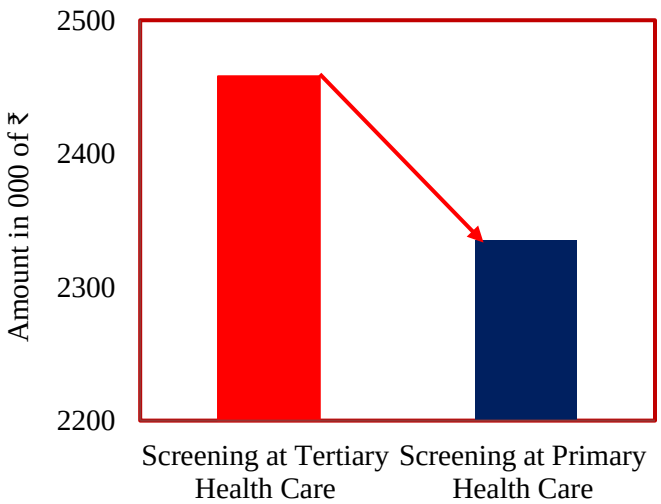
Implementation of haematology analyser at PHC is cost saving. The ICER was estimated to be -41197 for proposed strategy over current strategy. Average incremental net monetary benefit (INMB) for the proposed strategy over control strategy was estimated to be ₹6105504. Sensitivity analysis showed the parameter utility of dengue hemorrhage fever and dengue shock syndrome, indirect cost of fatal cases, life expectancy of the cohort, non-medical cost of non-fatal cases, hospitalisation cost and ambulatory cost of non-fatal cases had higher influence on ICER value.

Current & proposed dengue screening strategy



Probabilistic sensitivity analysis found that 84% of the resulting ICER value was less costly and more effective. Budget Impact analysis showed additional budget requirement of ₹57 million for government in the base year for implementation of the proposed screening strategy.

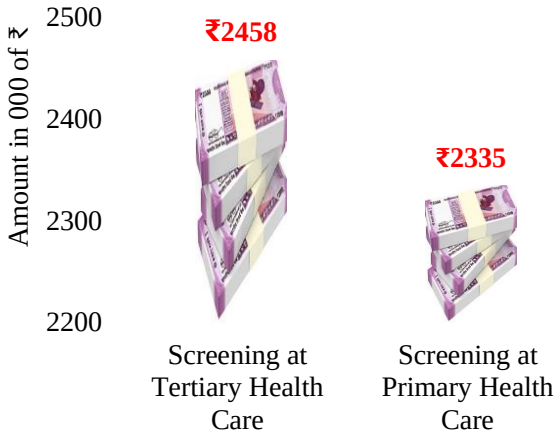
Total cost



Conclusion

The decentralised nature of our proposed diagnostic strategy was identified as a cost-saving intervention for both health system and patients. The out-of-pocket expenditure experienced by patient was found to be decreased due to the proposed intervention. The cost saving strategy could be due to early diagnosis followed by early treatment resulting in prevention of acute and prolonged illness due to delayed diagnosis.

Reduction of out-of-pocket expenditure



References

1. World Health Organisation. Dengue and severe dengue. World Health Organisation 2020; https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue
2. Stanaway JD, Shepard DS, Undurraga EA, Halasa YA, Coffeng LE, Brady OJ, Hay SI, Bedi N, Bensenor IM, et al. The global burden of dengue: an analysis from the Global Burden of Disease Study 2013. Lancet Infect Dis 2016;16(6):712-723.
3. Murhekar MV, Kamaraj P, Kumar MS, Khan SA, Allam RR, Barde P, Dwibedi B, Kanungo S, Mohan U, Mohanty SS, et al. Burden of dengue infection in India, 2017: a cross-sectional population based serosurvey. Lancet Glob Health. 2019; 7(8):e1065-e1073
4. Department of Health Research, Government of India. Establishment of a network of Laboratories for managing epidemics and Natural Calamities (VRDL). http://dhr.gov.in/schemes/establishment-networklaboratories-managing-epidemics-and-natural-calamities