Policy Brief

The health technology assessment of a pediatric cardiac surgery program (Hridyam) for congenital heart disease in Kerala

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Summary Conclusions

Why this disease?

Congenital heart disease (CHD) has emerged as a leading contributor to infant mortality in many low-and middle-income countries (LMICs).

Why is this program a priority and an appropriate topic for HTA for the state of Kerala?

The state of Kerala launched Hridyam to bring down the state's IMR to a single digit. This was a state-wide population-based neonatal congenital heart defects screening program.

How is 'Hridyam' different?

The additional component of this program titled 'Hridyam' was the use of pulse oximeters at all delivery points to screen for CHDs along with the usual physical examination. Early detection, prompt stabilization and expedited referral to a tertiary centre were the program's key components.

How many hospitals are empanelled in the Hridyam programme?

In addition to two public hospitals, five private hospitals with advanced pediatric cardiac surgery capabilities were empanelled (public-private partnership).

How did the costs and the QALY compare with the non-intervention arm? Is the intervention cost-effective?

The cost borne by the health system for the detection and management of congenital heart diseases was compared for the current and non-intervention scenarios. The total cost incurred for the birth cohort of 550,000 in the current scenario is Rs. 53,58,46,555, compared to the non-intervention arm, for which the total cost is Rs. 44,73,73,631. The QALY gained was 3947, yielding an ICER of Rs. 22,415, making the intervention **cost-effective** compared to the comparator arm.

What are the most sensitive parameters to the ICER value?

The sensitivity of the pulse oximeter used for neonatal screening had the highest effect on the ICER when assessed with a variation of 10% in the base case values.

What are the results of the budget impact analysis?

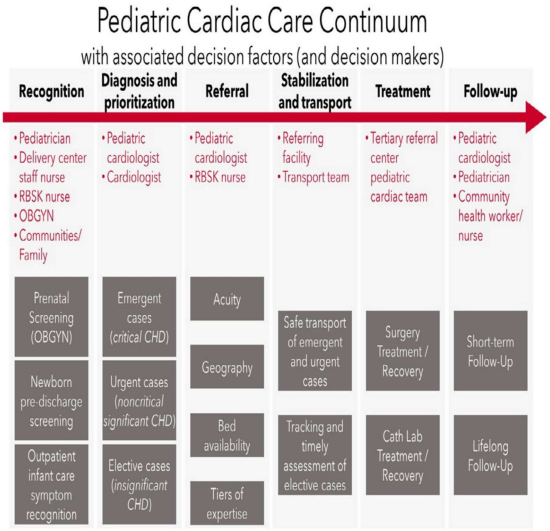
The Hridyam pathway costs Rs 53.6 crores compared to the comparator arm, which costs the health system Rs 44.7 crores. The net increase in the budget because of the Hridyam project on an annual basis is Rs 8.9 crores. This model has potential applications for other conditions and in other jurisdictions, especially LMICs considering building CHD capacity.

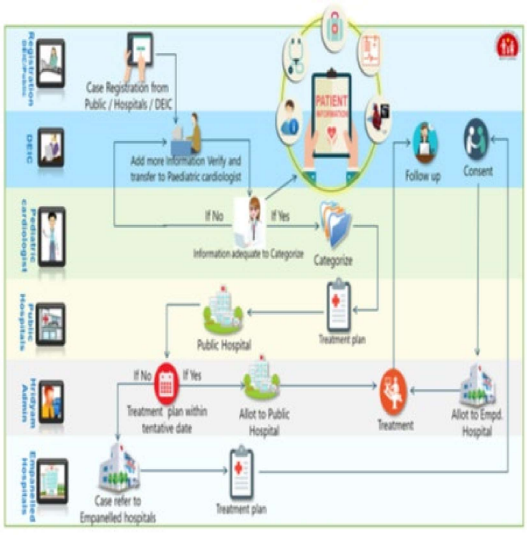
Recommendations

The package of newborn screening includes a pulse oximeter examination (sensitivity 83% (75-91)), followed by the necessary quality clinical examination. The economic evaluation shows the intervention to be cost-effective, with a budget impact of 8.9 crores for the population of Kerala.

Background

In 2012, concerned that its infant mortality rate (IMR) had been stagnant for so long, the Government of Kerala commissioned studies to evaluate the causes of IMR in the state. It showed that infant deaths from infection and malnutrition had significantly declined, birth defects were a significant cause of infant mortality (30%), and a significant reduction in IMR would require addressing this burden[1]. Among these, congenital heart disease (CHD) represents the world's most common class of major birth defects, affecting one in 120 newborns[2]. About one-fourth of all CHDs are considered critical congenital heart disease (CCHD), which requires a lifesaving procedure in the first year of life[3]. In 2012, the Government of India started the Rashtriya Bal Swasthya Karyakram (RBSK). This program, administered by the National Health Mission (within the Ministry of Health and Family Welfare), provides funding and technical assistance to individual States. With the addition of funds and commitment by the state Government, adequate financial resources were available for 'HRIDYAM' to address the burden of CHD in the state. This HTA aimed to conduct the economic evaluation and the budget impact analysis of the Hridyam Program.

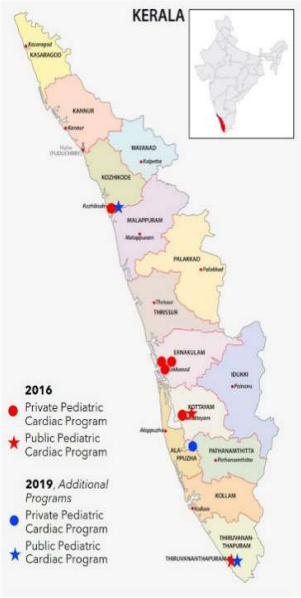




Figures: (1) Hridyam CHD Patient Care Continuum; (2) Hridyam Process Map

Methods

- *Population*
  - All newborn infants delivered in healthcare facilities
- *Intervention*
  - CHD Patient Care Continuum under Hridyam
- *Comparator*
  - Routine physical examination for screening
- *Outcomes*
  - ICER (Incremental cost-effectiveness ratio) (cost per QALY gained)
  - Budget impact of implementing the program in the state of Kerala.
- *Study Perspective*
  - Health system
- *Time Horizon*
  - Lifetime Horizon
- *Study Setting*
  - Kerala (14 administrative units, 7 existing pediatric CHD surgery centres (2 government, 5 private).



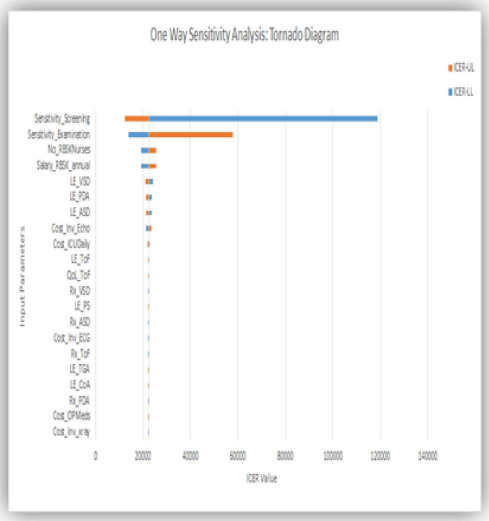
Cost-effectiveness (including sensitivity analysis) and Budget Impact Analysis

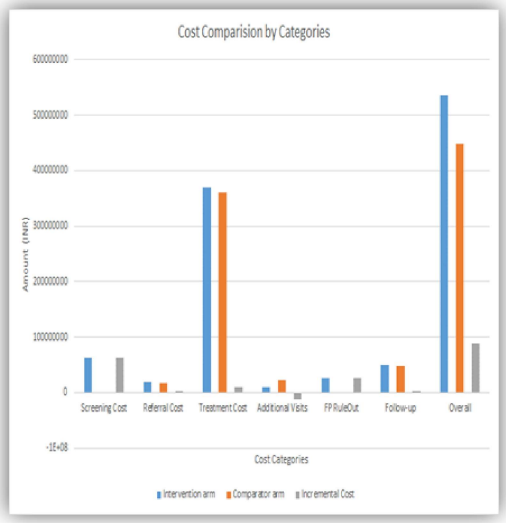
a) ICER Calculation and BIA: The study found that compared to the usual care scenario, the Hridyam program had an incremental cost of INR 8.85 crores and generated 3947 additional QALYs, resulting in an ICER of **22,145**. This makes the program cost-effective at the threshold of one GDP per capita.

Strategy	Costs	QALYs	Incremental Costs	Incremental QALYS
No-intervention	44,73,73,631	153227		
Current	53,58,46,555	157174	8,84,72,925	3947
ICER	**22415**			

b) Sensitivity analysis: On one-way sensitivity analysis, the sensitivity of the pulse oximeter used for neonatal screening had the highest effect on the ICER when assessed with a variation of 10% in the base case values. Other parameters that influenced ICER values were the number of RBSK nurses, the salary of the RBSK nurses, the life expectancy of certain types of CHDs, the cost of the investigations (Echocardiogram), and the cost of ICU admission.

c) The budget impact analysis showed that the Hridyam pathway costs Rs 53.6 crores compared to the comparator arm, which costs the health system Rs 44.7 crores. The net increase in the budget because of the Hridyam project on an annual basis is **Rs 8.9 crores**.





Figures: (3) Tornado Diagram; (4) Cost comparison by categories

Conclusions

- Hridyam program for congenital heart diseases is cost-effective relative to the threshold of GDP per capita from a health system perspective.
- To scale up the key elements of the Hridyam care continuum model to the entire state of Kerala, the burden on the exchequer will be to the tune of INR 53.6 crores.

Acknowledgement

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References

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