Cost-Effectiveness of Rapid Direct Multiplex PCR Test for Diagnosing Meningitis and Encephalitis from the Brazilian Public Perspective

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Summary

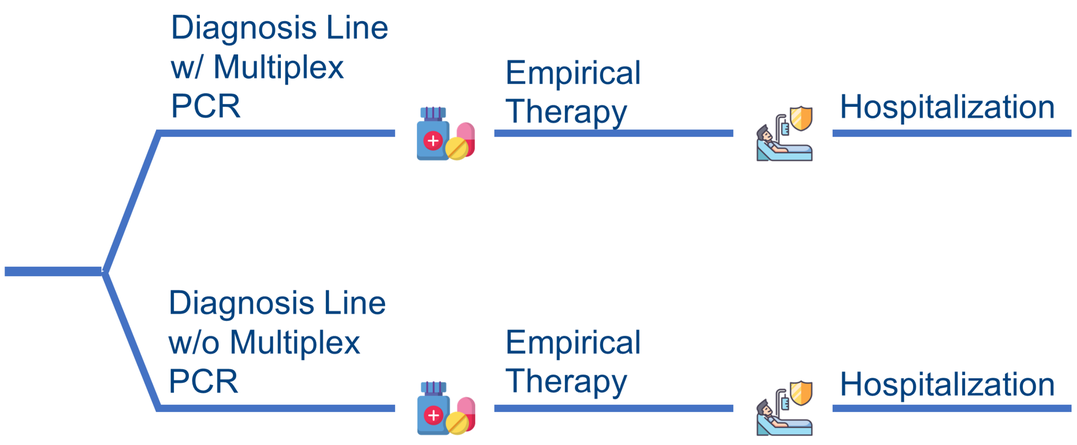
A cost-effectiveness analysis was conducted to compare the use of the rapid direct multiplex PCR test combined with standard methods versus the use of standard methods alone for diagnosing meningitis/encephalitis. The effectiveness measures adopted were hospitalization days and empirical treatment days needed from the perspective of the Brazilian public healthcare system.

OBJECTIVE

A cost-effectiveness analysis was conducted to compare the use of the rapid direct multiplex PCR test combined with standard methods versus the use of standard methods alone for diagnosing meningitis/encephalitis. The effectiveness measures adopted were hospitalization days and empirical treatment days needed from the perspective of the Brazilian public healthcare system.

METHODS

The time horizon was the period until the diagnostic result, and the chosen transition model was a decision tree with corresponding deterministic and probabilistic sensitivity analyses. The data resources were extracted from official Brazilian government database.



RESULTS

The rapid direct multiplex PCR test demonstrated better cost-effectiveness by reducing hospitalization time and empirical treatment time for both the base case (general population) and alternative scenario (pediatric population).

The cost reduction was R$ 474 for the base case and R$ 1,733 for the alternative scenario, with 1 and 2 days of hospitalization avoided for the general and pediatric populations, respectively. Empirical treatment with the rapid direct multiplex PCR test avoided 12 days and 4 days for the general and pediatric populations, respectively. The ICER of the rapid direct multiplex PCR test represents a dominant strategy compared to its comparator, with more hospitalization days avoided, more empirical treatment days avoided, and cost reduction from the inclusion of the new technology in the current scenario.

Population Adult and Pediatric	Cost (R$)	Effectiveness	ICER
Conventional Test	**8,086**	**0.477**	
BioFire® FilmArray®	**7,611**	**0.957**	
Average Incremental	**-474**	**0.48**	**Dominant**

Cost reduction and higher effectiveness → dominant

Deterministic sensitivity analysis → average cost reduction of R$ 474 and an effectiveness increase of 0.48

Pediatric population	Cost (R$)	Effectiveness	ICER
Conventional Test	**6,119**	**0.53**	
BioFire® FilmArray®	**4,386**	**0.957**	
Average Incremental	**-1,733**	**0.427**	**Dominant**

Average cost reduction of R$ 1,733

CONCLUSION

The use of multiplex PCR test for diagnosing patients with suspected meningitis/encephalitis is dominant in a cost-effectiveness dimension, reducing hospitalization and empirical drug therapy duration compared to the current conventional approach. This new technology can make decision-making more efficient by providing a faster, more accurate, safer, and more economical diagnosis in Brazilian healthcare system.