

Health Technology Assessment of Strategies for Oral Cancer Screening in India



Health Technology Assessment in India (HTA In)
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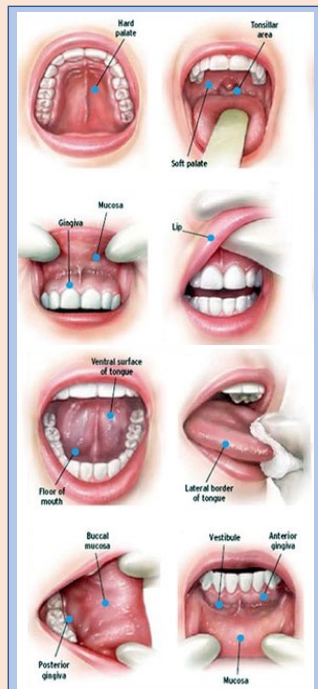
POLICY BRIEF

Policy Recommendations

1. Conventional oral examination after training frontline health workers should be considered for screening of oral cancer and potentially malignant disorders.
2. Oral screening of high-risk populations (tobacco &/or alcohol users) above 30 years using conventional oral examination at 10-years interval is the most cost-saving approach.

Summary

- In India, oral cancer is the second most common cancer in terms of incidence and is often diagnosed at an advanced stage. This health technology assessment study aims to assess the clinical and cost-effectiveness of commonly used oral cancer screening strategies.
- Systematic review and meta-analysis were conducted to assess pooled sensitivity and specificity of screening strategies namely Conventional oral examination (COE), Toluidine blue staining (TBS), Oral cytology (OC), and Light-based detection (LBD).
- A Markov model approach was undertaken to derive the lifetime costs and health outcomes of various screening strategies at different intervals from a societal perspective using a discount rate of 3%.
- The high-risk screening strategy was cost-effective as compared to the mass-screening approach across all strategies and at various intervals.
- The most cost-saving approach was the conventional oral examination at an interval of 10 years for oral cancer screening in high-risk populations (tobacco &/or alcohol users) above 30 years of age.



Background

- GLOBOCAN 2020 estimates showed that the annual number of incident cases for lip and oral cavity cancer was more than 100,000 (1).
- Most patients with oral cancer present at an advanced stage, requiring costly and aggressive combined modality treatment (2).
- This study was designed to evaluate the clinical and cost-effectiveness of commonly used oral cancer screening techniques namely, Conventional oral examination (COE), Toluidine blue staining (TBS), Oral cytology (OC), and Light-based detection (LBD) at various screening intervals.

Objectives

1. To assess the clinical and cost-effectiveness of commonly used screening modalities for oral cancer. i.e., COE, TBS, OC, and LBD.
2. To determine the most appropriate strategy between mass screening and high-risk screening strategy.
3. To determine the most cost-effective interval (out of 3, 5, and 10 years) between periodic screening check-ups.

Methods and Approach

1. Assessment of clinical effectiveness

- Systematic review and meta-analysis were conducted to assess pooled sensitivity and specificity of screening strategies.
- Population - apparently healthy individuals
- Intervention - COE, TBS, OC, and LBD screening by frontline health workers.
- Comparator - evaluation by specialist/histopathological examination (gold standard test).
- Outcome - sensitivity, and specificity of screening strategies.
- Random effects meta-analysis was performed for pooling the estimates.

2. Cost-effectiveness analysis (CEA)

- Due to the high prevalence of risk factors (tobacco and alcohol) in the Indian population and its established relation with the causation of oral cancer, we identified the high-risk individuals with habits of tobacco &/or alcohol (3).
- Hence, two Markov models were developed. Model A adopted a mass screening strategy versus no screening, whereas Model B adopted a high-risk screening strategy versus no screening. (Figures 1 and 2).
- The CEA was conducted using the Markov model technique for estimating the lifetime costs and health outcomes in a hypothetical cohort of 1 lakh men and women above 30 years of age.
- The outcomes were measured in terms of oral cancer incident cases, oral cancer deaths averted, quality-adjusted life-years (QALYs) gained, and incremental cost-effectiveness ratio (ICER).
- Perspective - Societal.
- Discount rate - 3%.
- Probabilistic Sensitivity analysis (PSA) was done to address any parameter uncertainty.
- Software – Microsoft Excel.

Figure 1 Model A

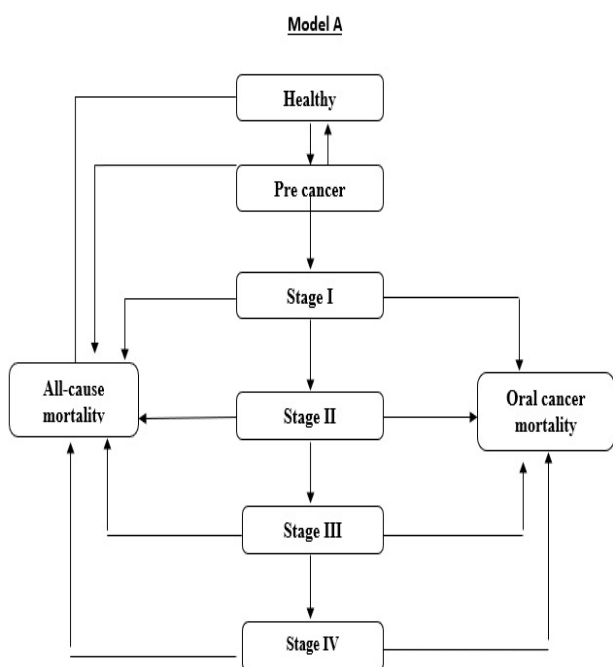
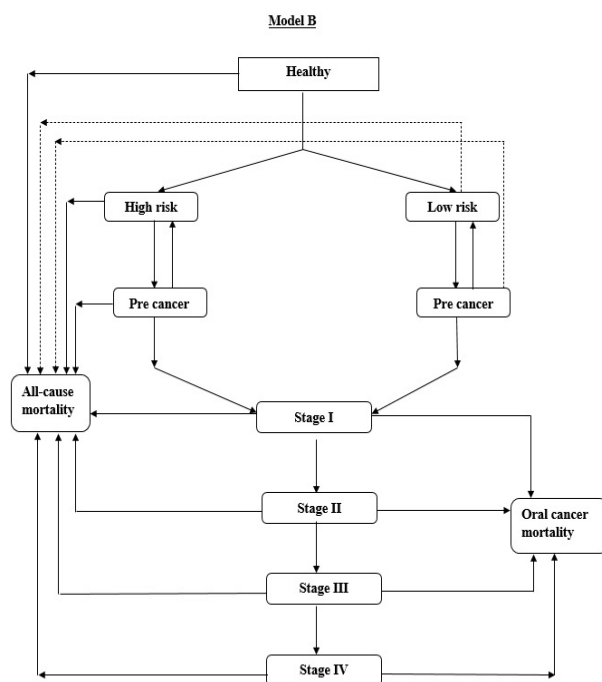


Figure 2 Model B



Results

1. Clinical effectiveness

- There were no studies identified fitting the inclusion criteria for TBS, OC, and CLI.
- Five studies were identified where screening was done using COE performed by a frontline health worker.
- A total of 10,069 participants above the age of 20 were included.
- Pooled sensitivity of COE - (88.8% (95% CI: 71.6-96.1)).
- Pooled specificity of COE - (91.9% (95% CI: 78.3-97.3)).

2. Cost-effectiveness analysis

- On comparing no screening vs mass screening and high-risk screening, the no-screening arm had the maximum number of new cases (5,673.59 cases).
- Mass-screening strategies (number of incident cases) namely LBD - 3 years (3271.68 cases) had the least number of incident cases followed by OC - 3 years (3276.92 cases), and COE - 3 years (3309.91 cases).
- Mass screening/ high-risk screening averted the higher number of oral cancer deaths as compared to no screening.
- Mass screening using LBD and OC at 3 years interval averted the maximum number of oral cancer deaths (459.76 each).

Table 1 Outcome indicator in 1 lakh cohort (ICER values) for the high-risk (HR) strategies

Screening strategy		ICER (INR/QALY)
COE	3 years HR	2,156.35
	5 years HR	-2,331.41(D)
	10 years HR	-7,213.46(D)
TBS	3 years HR	5,288.47
	5 years HR	2,376.54
	10 years HR	-4,815.80 (D)
OC	3 years HR	13,437.25
	5 years HR	10,958.36
	10 years HR	3,716.65
LBD	3 years HR	9,545.34
	5 years HR	3,867.66
	10 years HR	-1,075.17(D)

Note: The ICER value in negative denotes dominant strategy (D)

- Across all the strategies, the high-risk screening was cost-saving as compared to mass screening (Figure 3).
- The high-risk strategies (ICER values) namely COE 5 years (-2331.41), COE 10 years (-7213.46), TBS 10 years (-4815.80), and LBD 10 years (-1075.17) were dominant over no-screening (Table 1).
- PSA showed COE HR at 10-years was more than 80% cost-effective at the willingness to pay threshold of India (Figure 4) (4).
- The budget impact analysis showed that oral screening using COE for high-risk population at 10-year interval would cost 257 crores which is only 0.03% of annual healthcare budget of India of 86,200.65 crores

Figure 3 Base-case cost-effectiveness plane

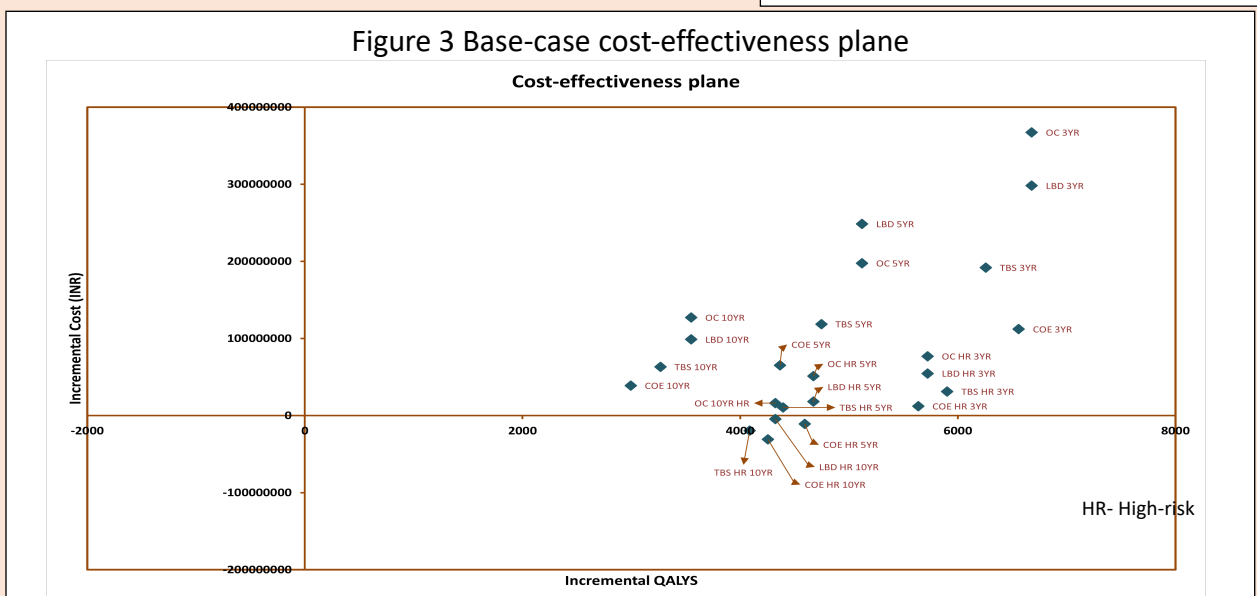
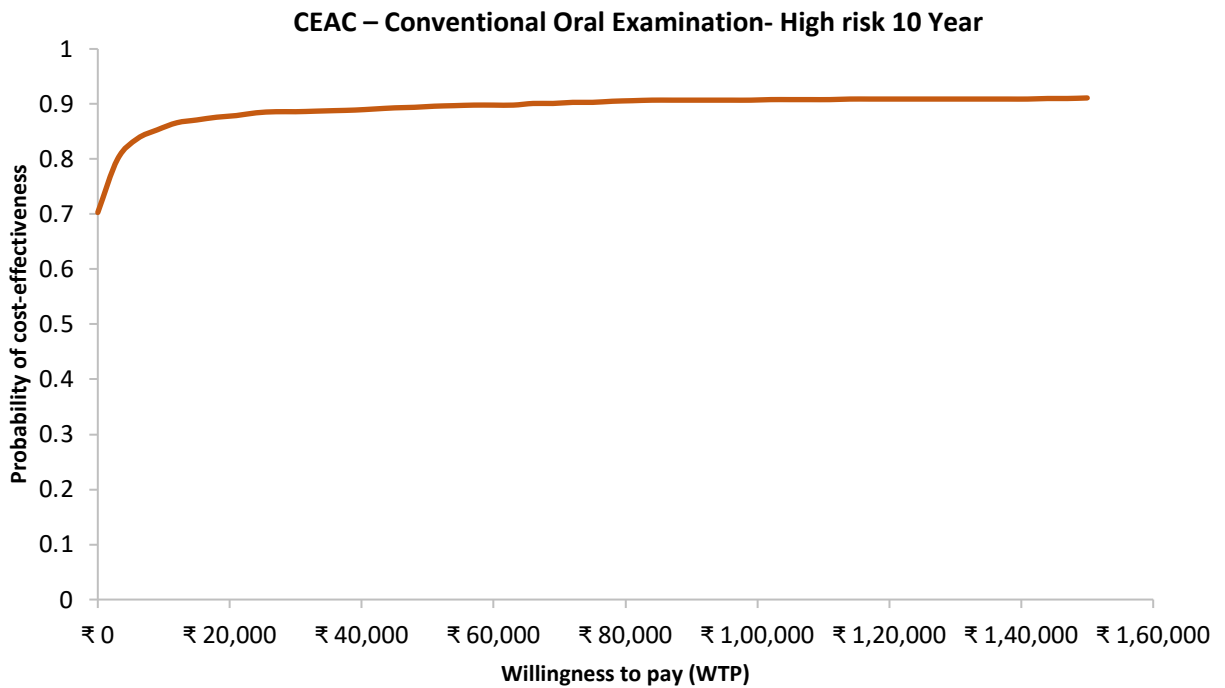


Figure 4 Cost-effectiveness acceptability curve (CEAC)



Conclusions

- Conventional oral examination by trained frontline health workers had high sensitivity and specificity for oral cancer screening.
- High-risk oral cancer screening (tobacco &/or alcohol users) was more cost-effective than the mass-screening strategy.
- High-risk oral screening of population above 30 years of age using conventional oral examination at 10-years intervals was the most cost-saving strategy for the Indian population.

References

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