EE237

The Budget Impact of Introducing Automated Hematoxylin and Eosin Staining for Cancer Diagnosis in China

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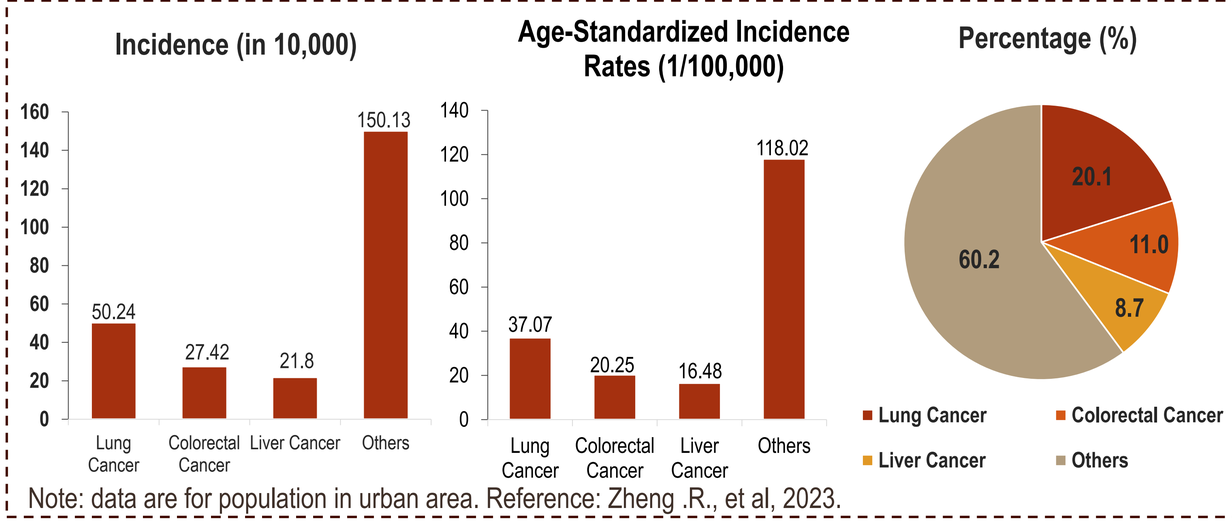
BACKGROUND

- Metastatic cancers have become major diseases that seriously threaten the health of the Chinese population. They rank first among the causes of death, accounting for 24% of all residents' deaths in China in 2019.[1] Among all metastatic cancers, lung cancer, colorectal cancer, and liver cancer have the highest incidences.[1]



Note: data are for population in urban area. Reference: Zheng .R., et al, 2023.

- Hematoxylin and Eosin (H&E) staining is considered as gold standard in cancer diagnosis for more than 100 years. It is also used for post surgery diagnosis.

OBJECTIVE

- To estimate the economic impact of introducing automated H&E staining as the gold standard in cancer diagnosis from China Healthcare Security's (CHS) perspective

METHODS

Overview:

- A budget impact model was developed to assess the difference in total healthcare costs and per patient per year (PPPY) costs before and after implementing automated H&E staining for cancer diagnosis, specifically lung, liver, and rectal cancer, within a hypothetical population of 200,000 patients in a province of China.
- The model considered:
  - Testing fees (automated and manual H&E staining)
  - Supportive care and hospitalization costs before cancer diagnosis
  - Healthcare costs due to delays in cancer staging
- All costs were estimated in 2023 Chinese Yuan.

Model Inputs:

- Model inputs were obtained from published sources or expert opinions:
  - Incidence of cancer
  - Percentage of metastatic cancer
  - Percentage of surgery
  - Rate of cancer progression
  - Handling time
  - Retest rate of each test
- In the base case, the market share of automated H&E staining was assumed to be 50%.

Table 1. Model Inputs[1-6]

Parameters	Model Inputs	Reference
Testing fees	¥30 per test per patient	Expert opinions
Supportive care and delay cost in cancer staging	Supportive care: ¥150 (patient/day) Delays in cancer staging: ¥500 (patient/day)	Zhang, X., et al 2021[2] Expert opinions
Hospitalization cost	¥3,416 (patient/day)	Zhang, X., et al 2021[2]
Incidence of cancer	20%	Expert opinions
Percentage of metastatic cancer	Lung Cancer: 50.52% Colorectal Cancer: 27.56% Liver Cancer:21.92%	Zheng, R., et al 2023[1]
Percentage of surgery	37%	Zhang, X., et al 2021[2]
Rate of cancer progression	Lung Cancer: 57.0% Colorectal Cancer: 47.0% Liver Cancer:17.2%	Gao, G. and Deng, L., 2018[3] Xu, R., et al 2020[4] Cao, M.D., et al 2022[5]
Handling time	Manual: 7 ds (outpatient) and 1.5 ds (inpatient) Automated: 5 ds (outpatient) and 1 d (inpatient)	Expert opinions
Retest rate of each test	Manual: 2.3% Automated: 0.5%	Cahill, A. and Pearson, J., 2012[6] Expert opinions

RESULTS

- In the base case, the inclusion of automated H&E staining resulted in a decrease of ¥30 million in total budget (Figure 1) and ¥759 PPPY from CHS's perspective (Figure 2).
- This budget reduction was primarily attributed to shorter handling time, lower retest rate, decreased probability of cancer progression, and reduced supportive care and hospitalization costs due to shorter waiting time for cancer diagnosis.
- The results were most sensitive to the handling time of tests.

Figure 1. Budget Impact Results – Total Healthcare Costs per Year

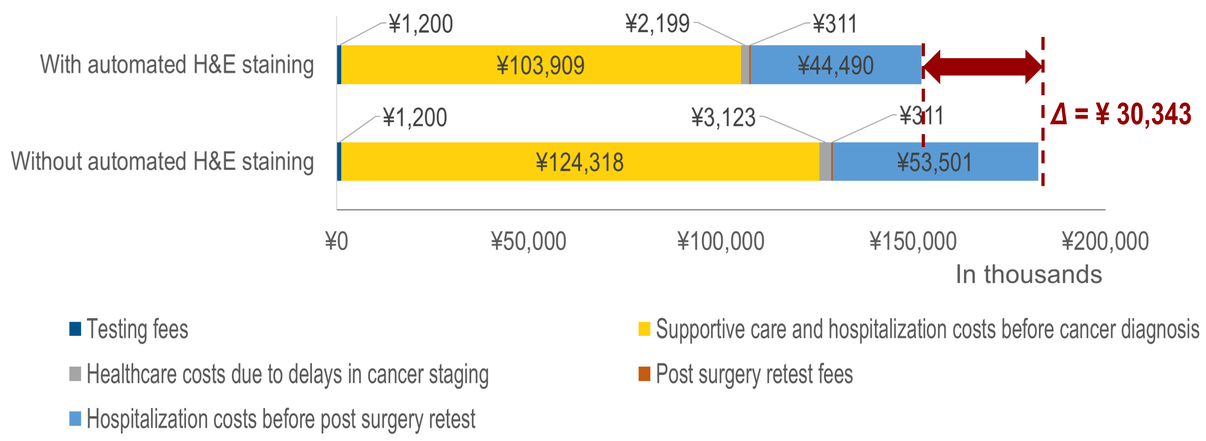
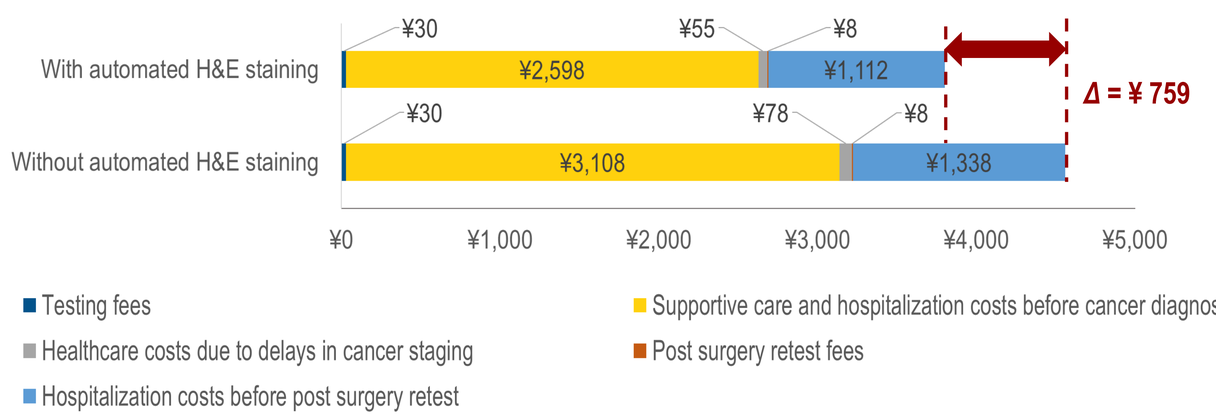


Figure 2. Budget Impact Results – per Patient per Year (PPPY) Costs



CONCLUSIONS

- The introduction of automated H&E staining for cancer diagnosis provides an effective approach with a decrease in the healthcare budget from CHS's perspective.
- This study demonstrates the potential benefits of implementing automated H&E staining in cancer diagnosis, including improved efficiency, reduced costs, and a shorter waiting time.
- These findings have implications for improved cancer care and resource allocation in China.

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