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Cost-Benefit Analysis Framework for Assessing Surgery Waiting Lists in Data-Scarce Settings: The Case of Egypt

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INTRODUCTION

The growing demand for elective surgeries has created serious challenges for healthcare systems worldwide, as it exceeds their capacity to meet patient needs[1,2]. Additionally, delayed surgeries can result in serious complications, increased mortality, and negative psychological effects on patients[3]. Therefore, interventions are needed to reduce waiting times. However, evaluating the cost-effectiveness of these interventions is challenging, especially in data-limited settings. To address this, We aimed to create a framework to assess the economic value of interventions that can reduce elective surgery waiting time, especially in settings with limited data.

METHODS

We conducted a cost-benefit model to evaluate the differences in costs and health outcomes resulting from the presidential initiative for reducing waiting times in Egypt. The model was set to be comprehensive and flexible for use in any settings facing data scarcity. The steps conducted to develop the model are summarized in figure 1.

Figure 1: Methods summary

The model was conducted from a public payer and societal perspective (base case) with a 3.5% discount rate according to the HTA recommendations in Egypt.

Model inputs include direct and indirect costs, while the model outputs include Quality-Adjusted Life Years (QALY) gain per patient, Incremental Cost Effectiveness Ratio (ICER) and Benefit cost-ratio (BCR).

The following benefits were considered in the model:

- Improvement in quality of life due to earlier surgeries
- Reduction in mortality due to earlier surgeries
- Preventing missing a surgery (for diseases where the surgery is suitable in a certain timeframe only)

The model evaluates the differences in costs and outcomes focusing solely on the difference between scenarios. To quantify all benefits, patients were divided into groups based on the type of benefit. The benefits are illustrated in Figure 2 and figure 3.

Missed surgery averted group

Patients who avoided missing the surgery either because they died or were unable to undergo surgery due to delays (became ineligible)

Mortality averted group

Patients who averted mortality due to early surgery

Reduced waiting time group

Patients who experienced minimal or no delay before surgery

Figure 2: Patient groups included in the model

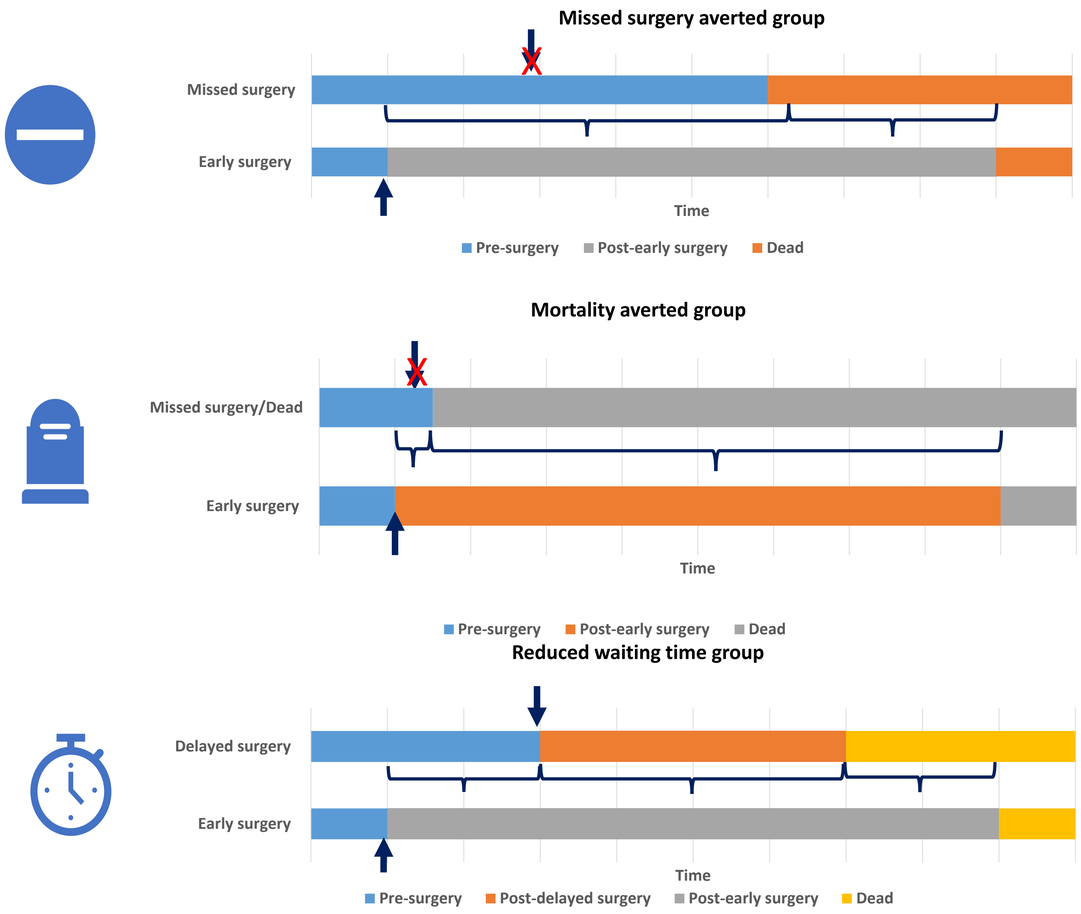

Figure 3: Schematic representation of the model concept

RESULTS

From the societal perspective, the presidential initiative yielded 48,385 QALYs gain for an additional cost of 2.26 billion EGP. The incremental cost-effectiveness (ICER) was 46,795 EGP per QALY, which is cost-effective according to cost-effectiveness threshold of 1 X GDP per capita (56,000 EGP in 2020[4]). The detailed results are shown in table 1.

The benefit-cost ratio shows that on average, for every Egyptian Pound invested in the selected procedures, 1.14 Pounds are gained in return. The highest return was observed with cochlear implant procedures (BCR=6.09). Reducing waiting lists among cardiac catheterization procedures showed the highest QALY gain (19,706 QALYs). The initiative was dominant in the cochlear implant surgery.

Table 1: Model results for the 5 included surgeries at the population level

Surgery	QALY gain per patient*	ICER Societal perspective*	Benefit Cost Ratio*
Open Heart	0.649	**25,729**	**1.51**
Catheterization	0.166	**34,346**	**1.49**
Cochlear	1.703	**Dominant**	**6.09**
Retina	0.060	145,505	0.40
Joints	0.361	60,214	0.94

*All costs and QALYs were discounted at 3.5%

CONCLUSION

The model's design allows it to capture the value of reducing waiting times across different types of surgeries, even in data-scarce settings at both patient and population levels. By avoiding a focus on disease-specific models, this approach ensures versatility. The model can provide efficient answers to inform evidence-based decision-making about reducing waiting times for various surgeries, regardless of the specific context and with limited available data

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