TDABC | Time-Driven Activity-Based Costing to Compare the Cost of Administering Bronchodilators By Metered-Dose Inhalers and By Nebulization in the Emergency Department

Authors: Simon Berthelot MD MSc, Dominique Chabot, Tania Marx MD PhD, Jason R. Guertin PhD

INTRODUCTION

- Metered-dose inhalers (MDI) are often preferred to nebulization for acute asthma in the emergency department (ED)
- Why? MDI are supposed to be cheaper
- Comparable efficacy
- Significant ecological footprint of MDI because of Hydrofluroalkane (HFA) propellant

3800 | **The HFA present in MDI is a greenhouse gas with a potential impact on global warming 3800 times greater than CO_2**

39 | **A Cochrane review (Cates 2013) with 39 trials found no difference in clinical outcomes between MDI and nebulization**

OBJECTIVE

To compare the cost of metered-dose inhalers and nebulization for the treatment of acute asthma in the ED by applying a time-driven activity-based costing method (public payer perspective)

TDABC

Scan for detailed methodology

Cost per minute of respiratory therapist multiplied by the duration in minutes of MDI or nebulization
+
Cost of medication
+
Cost of consumables (e.g., spacer, nebulizer)
+
Overhead in proportion to the treatment duration

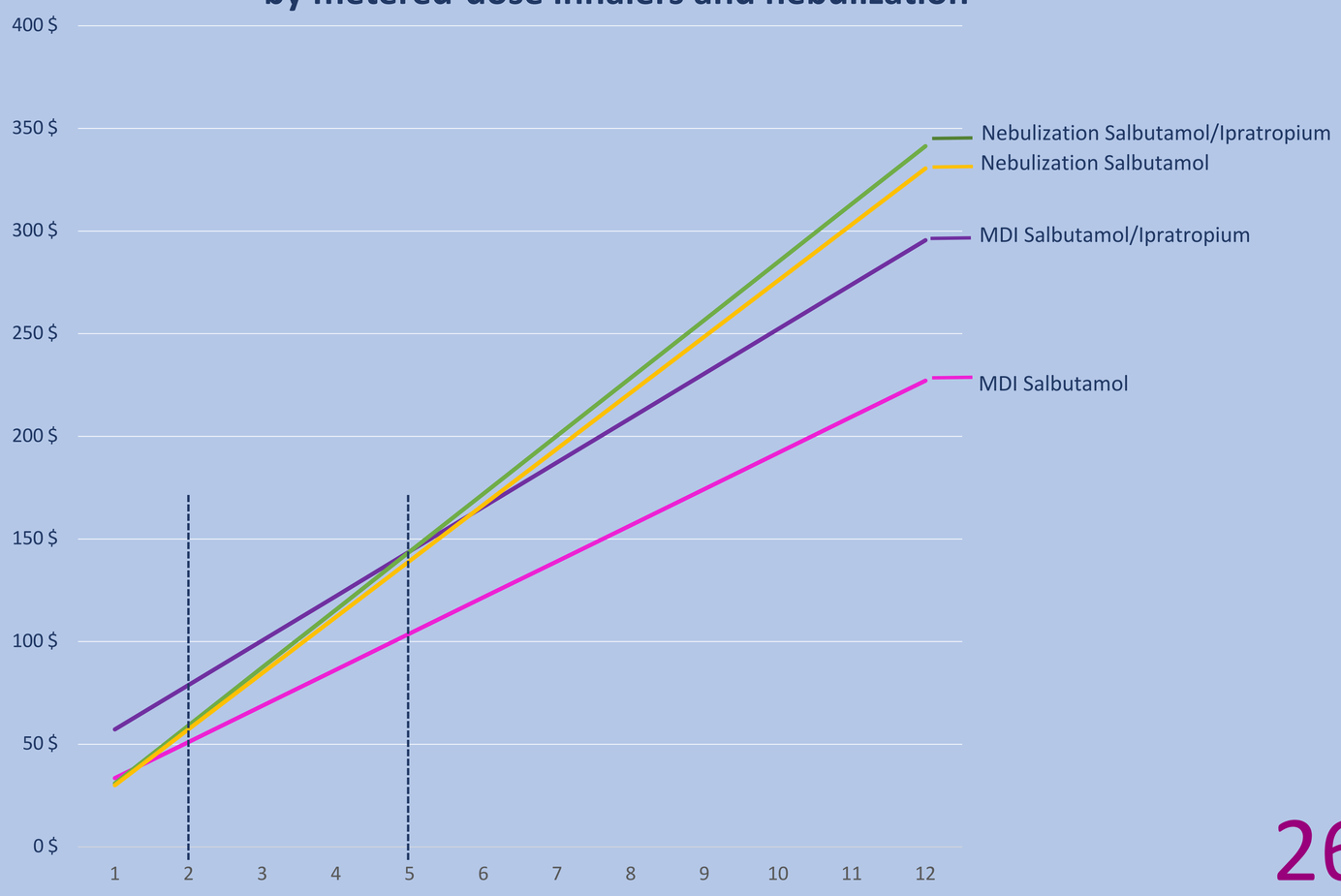
KEY MESSAGE

Salbutamol by metered-dose inhaler is the least expensive alternative treatment for acute asthma in the ED. If the severity of the exacerbation requires it, the combination of Salbutamol and Ipratropium is less expensive by nebulization than by metered-dose inhalers for the first 5 treatments.

STUDY SETTING

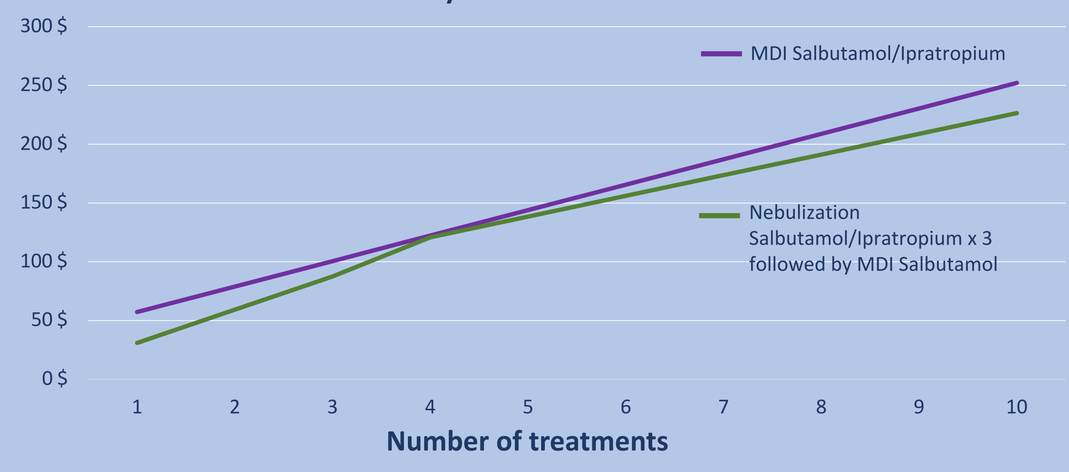
- CHU de Québec-Université Laval, Québec city, Canada
- Academic ED with 80,000 visits per year
- Fiscal year April 2020-March 2021
- 2020 Canadian values ($)
- Treatments compared:
  - MDI: Salbutamol 800μg (8 puffs) +/- Ipratropium 160μg (8 puffs)
  - Nebulization: Salbutamol 5 mg (1 ml) +/- Ipratropium 500μg (2 ml)

Cost (CAD) of consecutive treatments of Salbutamol and Ipratropium by metered-dose inhalers and nebulization



Number of treatments	MDI Salbutamol	MDI Salbutamol/Ipratropium	Nebulization Salbutamol	Nebulization Salbutamol/Ipratropium
1	33.49	57.23	30.01	30.92
2	51.09	78.89	57.33	59.14
5	103.90	143.89	139.28	143.81
10	191.91	252.21	275.87	284.92

Cost (CAD) of consecutive treatments of Salbutamol/Ipratropium by metered-dose inhalers vs. 3 treatments of Salbutamol/Ipratropium by nebulization followed by Salbutamol alone by metered-dose inhaler



Number of treatments	MDI Salbutamol/Ipratropium	Nebulization Salbutamol/Ipratropium for 3 treatments, followed by MDI Salbutamol
1	57.23	30.92
2	78.89	59.14
3	100.56	87.37
4	122.22	120.86
10	252.21	226.46

26,000 | **For every 1000 patients, replacing the combination of Salbutamol/Ipratropium in MDI by the same treatment in nebulization would save $26,000 if one treatment administered, $19,000 if 2 treatments administered, $13,000 if 3 treatments administered**

Scan for references

Email address for correspondence: simon.berthelot@fmed.ulaval.ca

Project funded by the principal investigator's discretionary funds (Berthelot)

CENTRE DE RECHERCHE | CHU de Québec Université Laval

UNIVERSITÉ LAVAL