Saving Money, Improving Outcomes: A Two-year Cost-utility Analysis of Emergency Department Care Models for Managing Persons Presenting with a Musculoskeletal Disorder

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Context

Musculoskeletal disorders are **highly** prevalent[1]

- Major cause of **work** and **productivity losses**[2]
- Estimated to represent between **5.4%** and **12.6%** of a country's **direct healthcare costs**[3]

Second most important reason for consulting a physician, but timely access **remains challenging**[2,4]

- **Limits continuity** of care[5]
- Contributes to emergency department (ED) **overcrowding**[6]

Up to **25% of all ED visits** are for **musculoskeletal disorders**[7]

One solution is to further integrate a variety of health professionals in the ED

Such as **physiotherapists**[8]

…However, the long-term **efficiency** of ED physiotherapy management has **never** been evaluated[9]

Is this new care model efficient when compared to usual care?

Objective

Evaluate the **two-year efficiency** of two ED care models: 1) management by an **emergency physician** alone, and 2) management by an **emergency physician** and a **physiotherapist**.

Methods

- **Cost-utility analysis** (two-year period) using a hybrid mathematical model (decision tree + Markov model)
- **Two perspectives**: Canadian Public Payer and Canadian Society
- <u>Decision tree (0-3 months)</u>
  - Based on data collected during a **randomized clinical trial** (RCT) (n=78, aged 18-80, #NCT04009369)
  - **Health-related quality of life** was measured using the **EQ-5D-5L**. Scores were transformed into:
    - Utility scores - Canadian conversion algorithm (Xie et al., 2016)
    - **Quality-adjusted life years** (QALY) - Area-under-the-curve analyses
  - **Costs** measured using a standardized healthcare resource utilization questionnaire
- <u>Markov model (4-24 months)</u>
  - Modeled using data from the **literature** (scientific + grey)
- **Probabilistic approach** was used to ensure the results' robustness (Monte Carlo simulation, n = 10,000 iterations)
- All costs are in **CAD 2024** values

Scan here for an illustrated version of the **hybrid mathematical model**

Results

Table 1. Baseline characteristics of the RCT participants (n=78)

Characteristics	Usual care EP alone	New care model PT + EP
Number of participants, *n* (%)	38 (48.7)	40 (51.3)
Age (yr), mean (SD)	44.1 (17.3)	36.6 (17.3)
Sex, *n* females (%)	12 (31.6)	22 (55.0)
Other health condition, *yes* (%)	23 (60.5)	26 (65.0)
Localisation of MSKD, *n* (%)		
Upper/lower limb	19 (50.0)	23 (57.5)
Spine	19 (50.0)	17 (42.5)
Family physician, *yes* (%)	30 (78.9)	33 (82.5)
Pain level, 0-10 (SD)	6.7 (2.2)	6.9 (2.0)
Pain interference, 0-10 (SD)	4.4 (1.8)	4.1 (2.3)
Pain catastrophizing, 0-100 (SD)	22.4 (11.8)	18.3 (13.2)

Characteristics were **very similar** between groups

… although participants in the **new care model** were **more likely** to be **female** and **younger**

All analyses were therefore adjusted for age and sex

Table 2. Average total cost and QALY gain per person, per intervention and per perspective

Cost category	Mean cost [a] (95% CI) Public Payer: Usual care EP alone	Public Payer: Intervention EP + PT	Societal: Usual care EP alone	Societal: Intervention EP + PT
Average total cost (CAD 2024)				
Two-year	6,840 (5,097; 10,208)	6,150 (4,775; 8,541)	47,222 (27,638; 98,590)	30,978 (22,193; 49,086)
Average total QALY gain				
Two-year	1.4657 (1.0041; 1.7790)	1.5676 (1.0920; 1.8460)	1.4657 (1.0041; 1.7790)	1.5676 (1.0920; 1.8460)
Two-year ICER	**- 6,770 CAD / QALY [Dominant]**		**- 159,418 CAD / QALY [Dominant]**	

EP + PT care model was found to be **dominant** for both perspectives

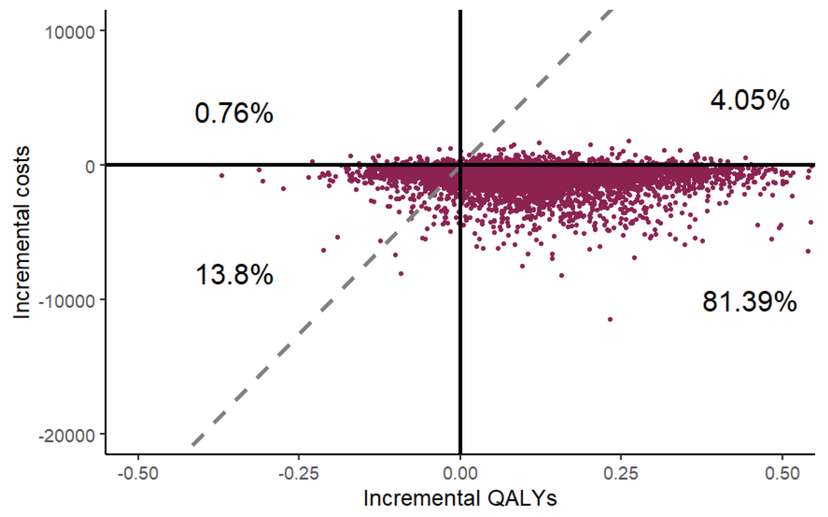

Figure 1. Cost-effectiveness plane – Canadian Public Payer perspective

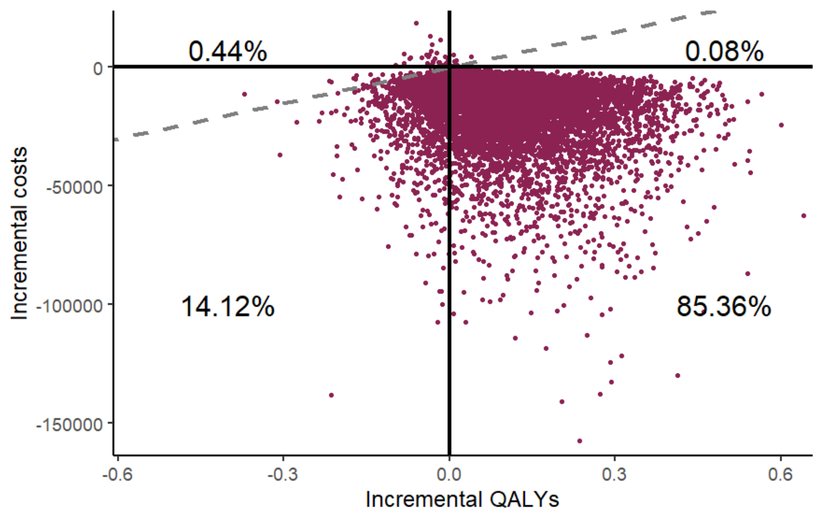

Figure 2. Cost-effectiveness plane – Canadian Society perspective

For both perspectives, the EP + PT care model was identified as being either **cost-effective** or **dominant** in over **80% of iterations**

Discussion + Conclusion

The addition of physiotherapists in the ED may have the potential to **reduce expenses** while **improving health-related quality of life** over two years

Results support the importance of further studying the **impact of alternative ED care models**

A more systematic measurement of care models' efficiency could **promote equity** (value-based healthcare)

<u>Limits:</u> **High variability** in some cost and effectiveness measures, **scarcity of longitudinal data** on the **costs** and **clinical outcomes** associated with musculoskeletal disorders

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