Chaire pharmaceutique AstraZeneca

en santé respiratoire

Research program 2019-2020

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Research projets

- e-tools
- Non-adherence and treatment intensification in asthma and COPD patients
- Impact of drug insurance plan on drug cost

e-tools

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Background

- In Canada, medication prescribing is the most frequent medical act, and medications represent 16% of all healthcare costs
- Asthma and COPD are prevalent diseases, with patients' adherence ranging between 20 and 52%

Background

- To optimize treatment decisions, physicians need to detect low adherence in clinical practice
- Measuring adherence in clinical practice remains a challenge for physicians
- How to easily and rapidly measure adherence
  - Have access to drug claims data
  - Develop electronic tools (e-tools) based on prescription refills
  - Integrate e-tools in electronic medical records (EMR)

Development of e-tools to improve medication adherence and prescribing in clinical practice

Project 1

Adherence and use of asthma/ COPD medications in clinical practice: a pilot study

PHASE I

- Development of e-tools in collaboration with physicians and patients

PHASE II

- **Feasibility of implementing the e-tools in the OMNIMED EMR for use in clinical practice**

Project 2

Medication Adherence-Based **Risk** prediction Scores (**MEDRISK**)

- **Development of risk prediction models based on medication adherence**
  - **Asthma/COPD exacerbations**
  - **Morbidity**
  - **Mortality**

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Project 1

Adherence and use of asthma/COPD medications in clinical practice: a pilot study

- **Phase 1**

e-MEDRESP

https://www.dropbox.com/s/hh3nirkdlnzbbnm/Tutoriel%20final.mp4?dl=0

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Project 1

Adherence and use of asthma/COPD medications in clinical practice: a pilot study

- **Phase 2**

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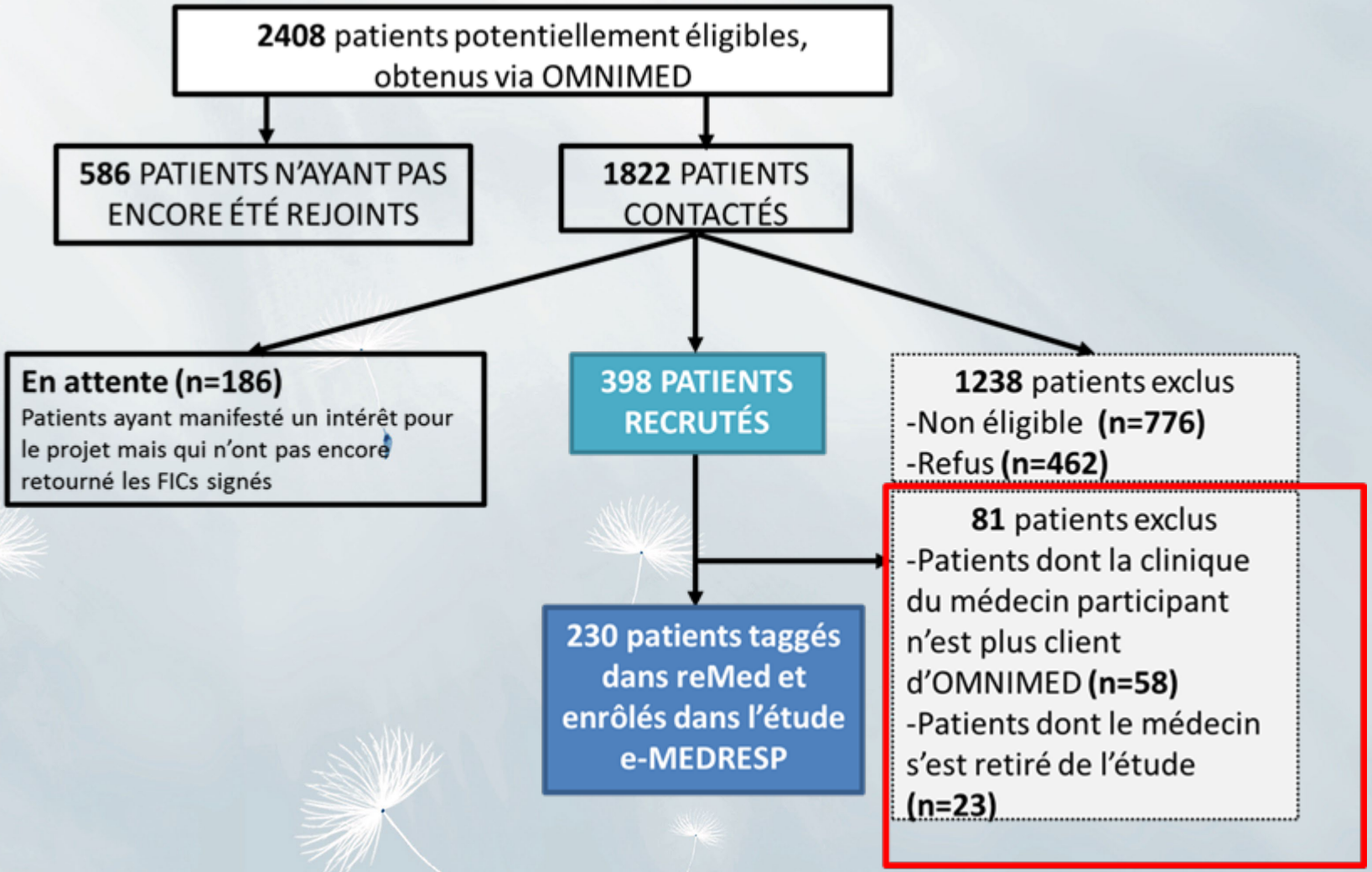
Objectives

- To evaluate the feasibility to integrate e-MEDRESP in the OMNI-MED EMR
- To evaluate use of e-MEDRESP by physicians and patients and their satisfaction
- To explore whether e-MEDRESP can improve patients' adherence and disease control

Methods

- Pre-post e-MEDRESP implantation design
- We recruited family physicians and their patients
- in medical clinics that subscribe with OMNIMED EMR
- Patients' registration in reMed
  - Drug claims database

Recruitment



Methods

Outcomes

- Physician consultation of e-MEDRESP
- Physician sharing e-MEDRESP with patients
- Patient and physician satisfaction with e-MEDRESP and modifications proposed for improvement
- 1 year before and after the implementation of e-MEDRESP
  - Patient's adherence to controller medications
  - Level of asthma and COPD control
- Information will be collected via short questionnaires and reMed

Implementation

- Started in July with 1 clinic

Next steps

- Finalize recruitment of patients
- Continue implementation
- Follow-up with patients and physicians
- Measure of process outcomes
- Measure of adherence and disease control pre-post e-MEDRESP implementation

Project 2

Medication adherence as a predictor of morbidity and mortality **risks** in patients with asthma and COPD **(MEDRISK)**

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Objectives

MEDRISK-Morbidity	To predict patient-specific 5-year risk of all-cause **morbidity** as a function of the level of adherence to all medications taken for chronic use concomitantly, age and sex
MEDRISK-Mortality	• To predict patient-specific 5-year risk of all-cause **mortality** as a function of the level of adherence to all medications taken for chronic use concomitantly, age and sex
MEDRISK-RESP	To predict patient-specific 1-year risk of **asthma/COPD exacerbations**, as a function of the level of adherence to all controller asthma/COPD medications, age and sex

Methods

- Asthma and COPD patients with Public drug Insurance (**ACPI**) cohort
  - Linkage of the Régie de l'assurance maladie du Québec (RAMQ) and MED-ECHO databases
  - Includes all asthma (≥18 yo) and COPD patients (≥45 yo) with public drug insurance identified between 01/01/2002 and 31/12/2015
  - To be covered with RAMQ drug insurance for two years prior to cohort entry
- Cohort entry
  - First ambulatory medical visit when all eligibility criteria have been fulfilled
- 116 868 asthma patients
- 180 346 COPD patients

Methods

- Follow-up from cohort entry until the earliest of the following events:
  - 1 year (for the MEDRISK-RESP)
  - 5 years (for the MEDRISK-Morbidity and MEDRISK-Mortality)
  - Date of death
  - End of RAMQ Drug Insurance coverage
  - March 31, 2016

- Development of the MEDRISKs
  - Inspired by the Framingham Risk Score - Individual risks
  - Based on medication claims data and adherence (PDC), age and sex
  - Use of Super Learner to develop the risk prediction models
  - Use AI
    - Recurrent Neural Networks
    - 3 subsets to train the models
    - 1 to find the best hyperparameters
    - 1 to evaluate model performance

Next steps

- Finalize prediction models for mortality using Recurrent Neural Networks
- Develop prediction models for morbidity and exacerbations using Recurrent Neural Networks
- Finalize the programming of all variables to be used in Super Learner approach
- Develop prediction models for mortality, morbidity and exacerbations with Super Learner
- Compare the results of prediction models obtained with Recurrent Neural Networks and Super Learner

Non-adherence and treatment intensification in asthma and COPD patients

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Introduction

- Asthma and COPD guidelines based on a step-care therapy
  - Increase the dose or add a controller medication if disease is not under control
- Asthma and COPD guidelines recommend measuring adherence before modifying a therapy
- Undetected non-adherence to medications may lead to unnecessary treatment intensification (TI)
- Patients with uncontrolled disease whilw non-adherent to controller medications should not have TI

Objective

- To develop a consensual operational definition of TI that can be applied in healthcare administrative databases
- To estimate the rate of TI in asthma and COPD patients with low level of adherence to controller medications and uncontrolled disease

Methods

- Modified Delphi procedure to develop an operational definition of TI
  - Literature review
  - Experts
    - 4 pulmonologists
    - 2 pharmacists with an expertise in respiratory diseases
    - 2 family physicians
    - 2 researchers specialized in pharmacoepidemiology and the use of administrative databases

Design

- ACPI database
- 2 cohorts
  - Asthma patients on mono or dual-controller therapy
  - COPD patients on mono or dual-controller therapy
- Sequence of events before cohort entry
  - Asthma or COPD diagnosis (based on valid operational definitions)
  - New controller medication prescribed
  - Markers of uncontrolled asthma/COPD
    - Filling of ≥ 2Rx of SABA in 25 days (≥ 4 doses / week)
    - OCS
    - ED visit for asthma/COPD
    - Hospitalization for asthma/COPD
  - Cohort entry = date of first marker of uncontrolled disease after new controller medication
  - Follow-up until death, end of drug insurance, March 2016 or TI

Variables and Analysis

- Outcome: TI
- Rate of TI as a function of level of adherence
- 4 levels of medication adherence: ≥0-25%; 26-50%; 51-75%; 76-100%
- Main statistical test
  - H_0 : Rate of TI = 0 among uncontrolled and non-adherent patients
  - H_A : Rate of TI ≠ 0 among uncontrolled and non-adherent patients
- Poisson regression model

Impact du type d'assurance médicaments (publique/privée) sur le coût des médicaments des Québécois

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Introduction

- Au Québec, le coût d'un médicament comprend 3 composantes
  - le prix de la molécule
  - la marge du grossiste
  - l'honoraire du pharmacien

Objectifs

- Comparer le coût des médicaments entre les plans privés d'assurance médicaments et le Régime public d'assurance médicaments (RPAM)
- Comparer les dépenses des patients en médicaments entre les plans privés d'assurance médicaments et le RPAM

Devis

- Source des données: reMed
  - 42 000 participants
- Patients < 65 ans qui ont acheté au moins un médicament sous ordonnance en pharmacie communautaire entre le 1er janvier 2015 et le 3 juillet 2018
- Strates de médicaments
  - Pharmacie, DIN, quantité, durée, liste RAMQ
  - Rx remboursées au privé appariées à Rx remboursées au RPAM

Analyse

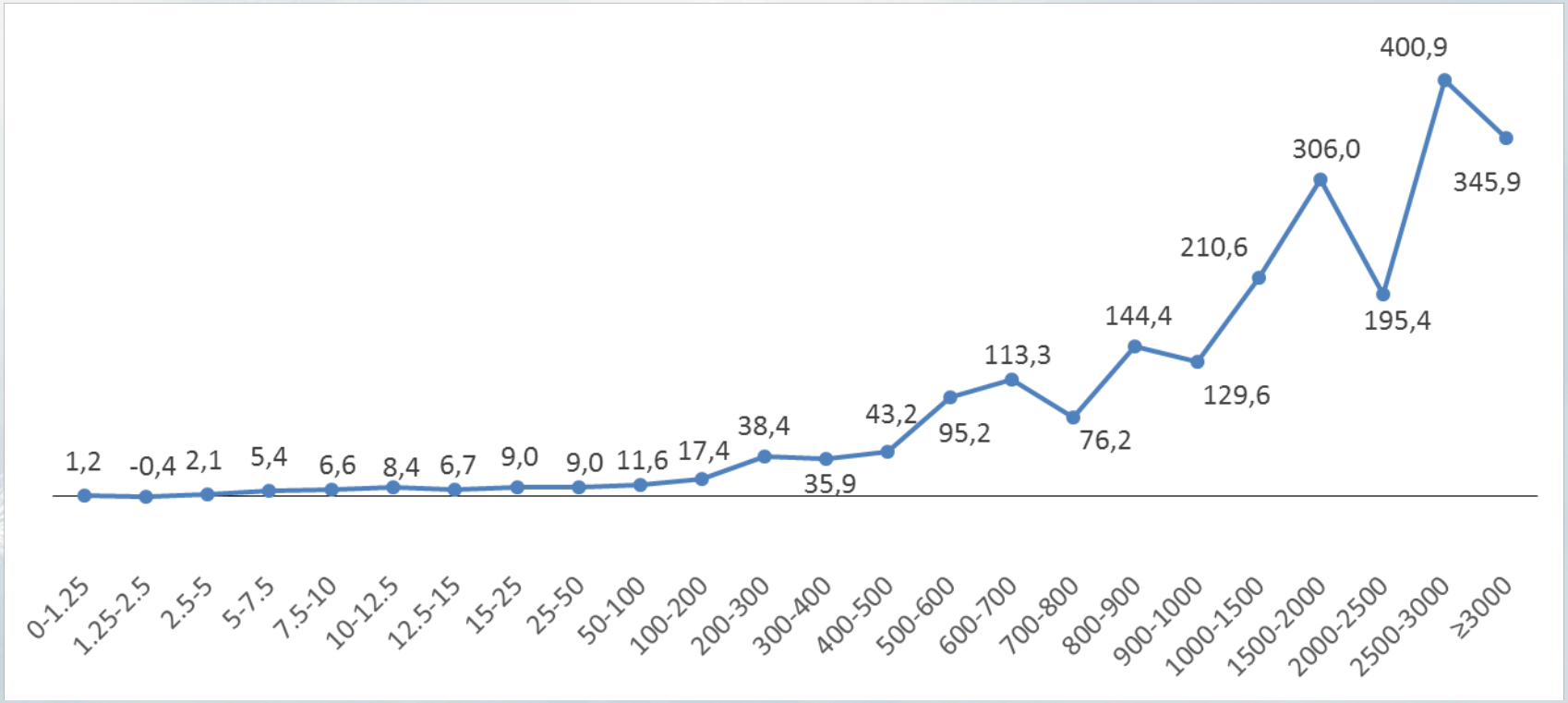
- Comparaison du coût des médicaments et les dépenses faites par les patients entre strates privées et RPAM
- Utilisation d'un modèle de régression linéaire
  - La strate comme unité d'analyse
  - Moyenne du coût entre les strates

Résultats

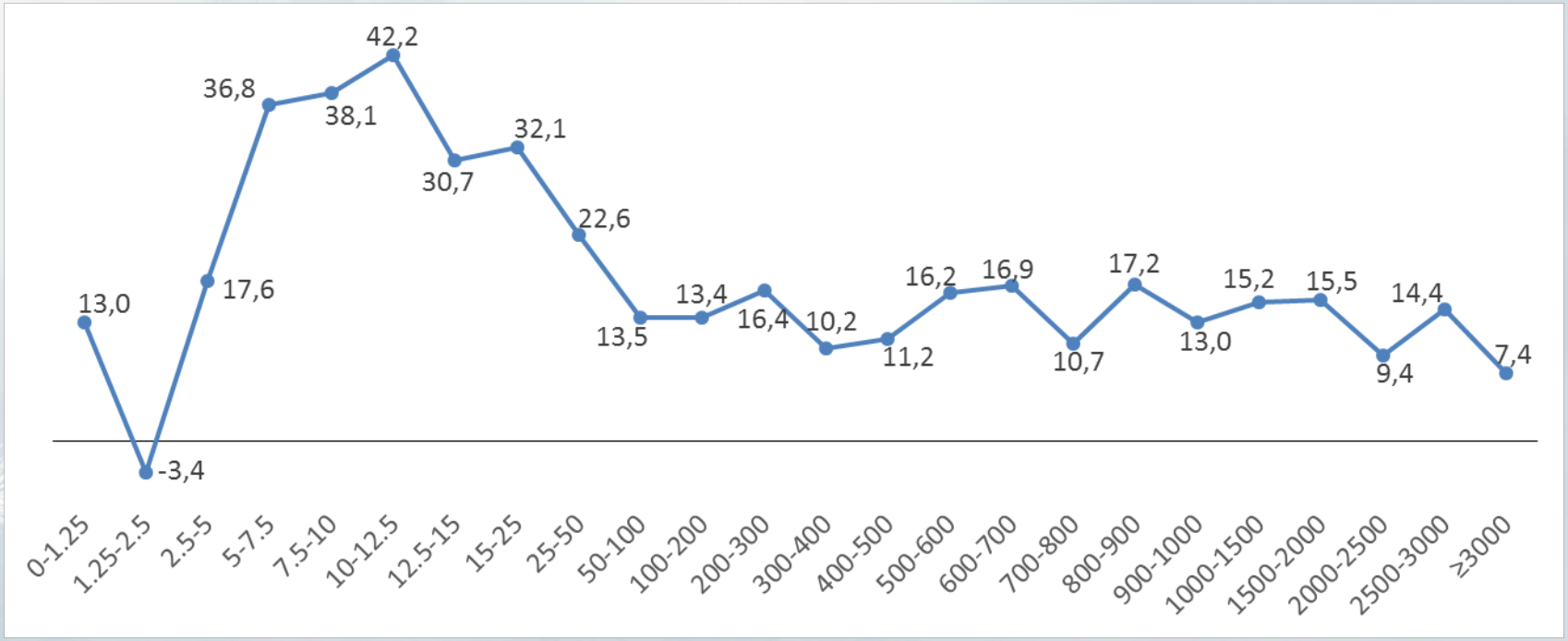
Drug cost and OOP expenses and differences between private drug plans and the PPDIP

	PPDIP ($) Mean (SD)	Private ($) Mean (SD)	Mean difference ($)	Mean difference (%)
All drugs cost	52.99 (393.14)	62.34 (444.89)	9.35	17.6
Generic drugs cost	20.78 (178.08)	26.55 (197.44)	5.77	27.8
Innovator drugs cost	129.66 (563.84)	149.26 (563.84)	19.61	15.1
OOP expenses	7.95 (16.49)	6.94 (28.53)	-1.01	-12.7

Difference in drug cost ($) according to the ingredient cost



Difference in drug cost (%) according to the ingredient cost



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