



# Transparency v. Accessibility in Decision-Analytic Models

Presented by:

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# Objectives

- Debate the difference between transparency and accessibility
- Discuss the benefits of a model-accessibility platform
- Become familiar with an ongoing initiative for facilitating model accessibility



## Disclosures and Acknowledgments

- No actual or perceived conflict of interest
- The projects are funded by the Canada Foundation for Innovation and British Columbia's Academic Health Sciences Network

SECTION

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# 1

## Transparency v. Accessibility



## Thought Experiment

- You are an employer looking for a modeler for a large HTA project
  - Your evaluation criteria:
    - Asking for high-resolution MRI of brain so that you can evaluate neural functionality at the synaptic level
- OR
  - A detailed interview with the candidate for their modeling (and other) skills

For complex systems:



# An example: Evaluation Platform in COPD

## Development and Validation of the Evaluation Platform in COPD (EPIC): A Population-Based Outcomes Model of COPD for Canada

Mohsen Sadatsafavi\*, Shahzad Ghanbarian\*, Amin Adibi\*, Kate Johnson, J. Mark FitzGerald, William Flanagan, Stirling Bryan, and Don Sin, for the Canadian Respiratory Research Network

Medical Decision Making  
1-16  
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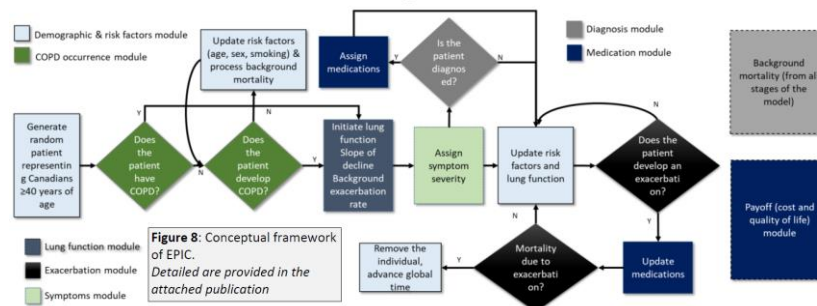
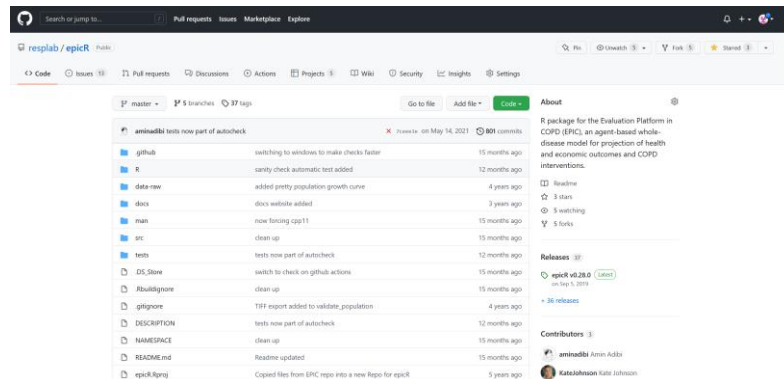


Figure 8: Conceptual framework of EPIC.  
Detailed are provided in the attached publication

```
1 // --mode: C++; c-indent-level: 4; c-basic-offset: 4; indent-tabs-mode: nil; --
2
3 #include <rcpparmadillo.h>
4 // [[Rcpp::depends(RcppArmadillo)]]
5 using namespace Rcpp;
6
7 //
8 // Layout:
9 // 1. Basic
10 // 2. Settings
11 // 3. Model
12 // 4. Input
13 // 5. Output
14 // 6. Agent
15 // 7. Event
16 // 8. Mode
17 //
18
19 #define OUTPUT_EX_SMOKE 1
20 #define OUTPUT_EX_COMORBIDITY 4
21 #define OUTPUT_EX_LUNG_FUNCTION 8
22 #define OUTPUT_EX_COPD 16
23 #define OUTPUT_EX_EXACERBATION 32
24 #define OUTPUT_EX_QSYMPTOMS 64
25 #define OUTPUT_EX_MORTALITY 128
26 #define OUTPUT_EX_MEDICATION 256
27 #define OUTPUT_EX_POPULATION 512
28
29 #define OUTPUT_EX_65535
30
31 #define MAX_AGE 111
32
33 #define MAX_AGE 111
34
35 #define MAX_AGE 111
36
37
```

~3,900 lines of C++ code; ~3,900 lines of R code



## Accessibility / Transparency: Three Shades Of Grey



### Directories

- York's Centre for Review and Dissemination
- Tuft's CEA Registry



### Open-source repositories

- OSM Clearinghouse (Tufts Medical Center)
- Open-Source Value Platform (Innovation and Value Initiative)
- Mt Hood Diabetes Challenge



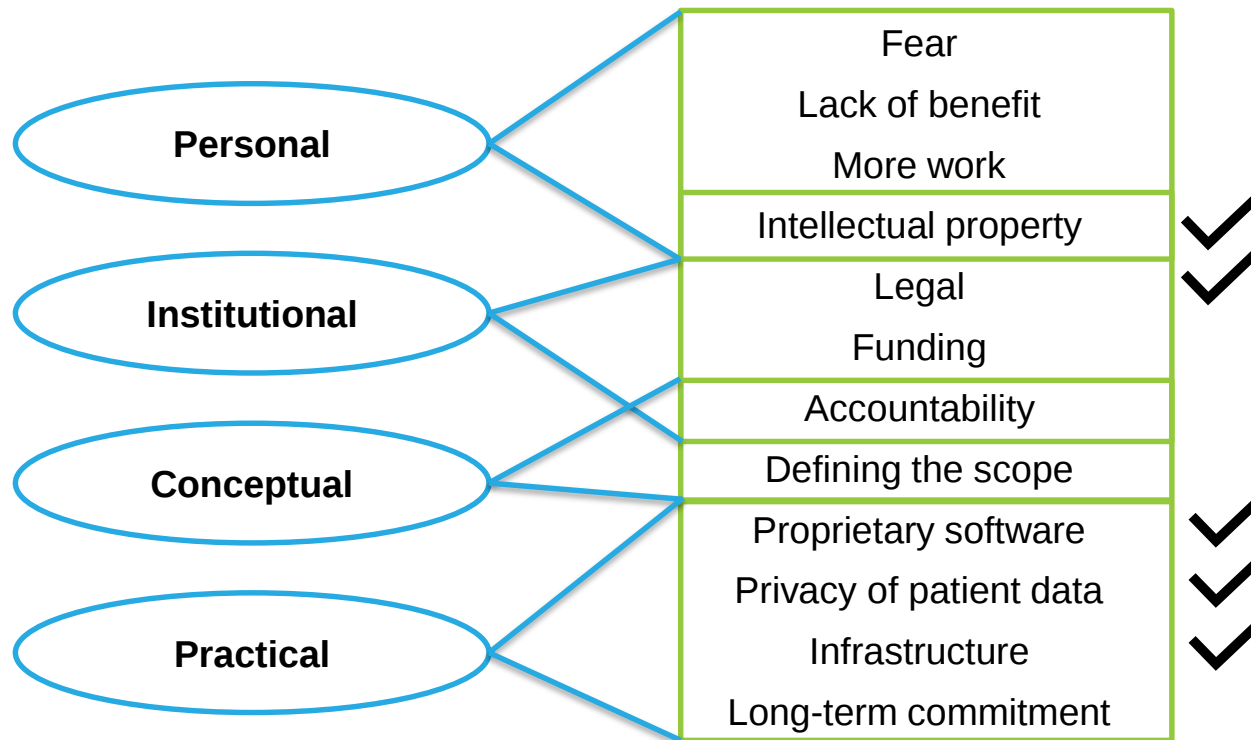
### Open Access Modeling (Cloud-based accessibility platforms)



## Benefits of an Open Access Model

| Benefit                                       | How?                                                                           |
|-----------------------------------------------|--------------------------------------------------------------------------------|
| <b>Reproducible Sciences</b>                  | <b>Reviewers can directly interrogate the model</b>                            |
| <b>Uptake of the model</b>                    | <b>Stakeholders and Knowledge Users are not limited to one results table</b>   |
| Security / Intellectual property is preserved | Sensitive components of the model are hidden if needed (e.g., patient data)    |
| No need for propriety software                | Any client software can 'talk' to any model, no matter the language / platform |
| Computation times                             | Complex models can have access to scalable resources                           |
| Tracking usage                                | Users are given access tokens                                                  |
| Rapid update cycle                            | Updates are immediately available                                              |

# Barriers



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# 2

## Programmable Interface for Statistical & Simulation Models (PRISM)



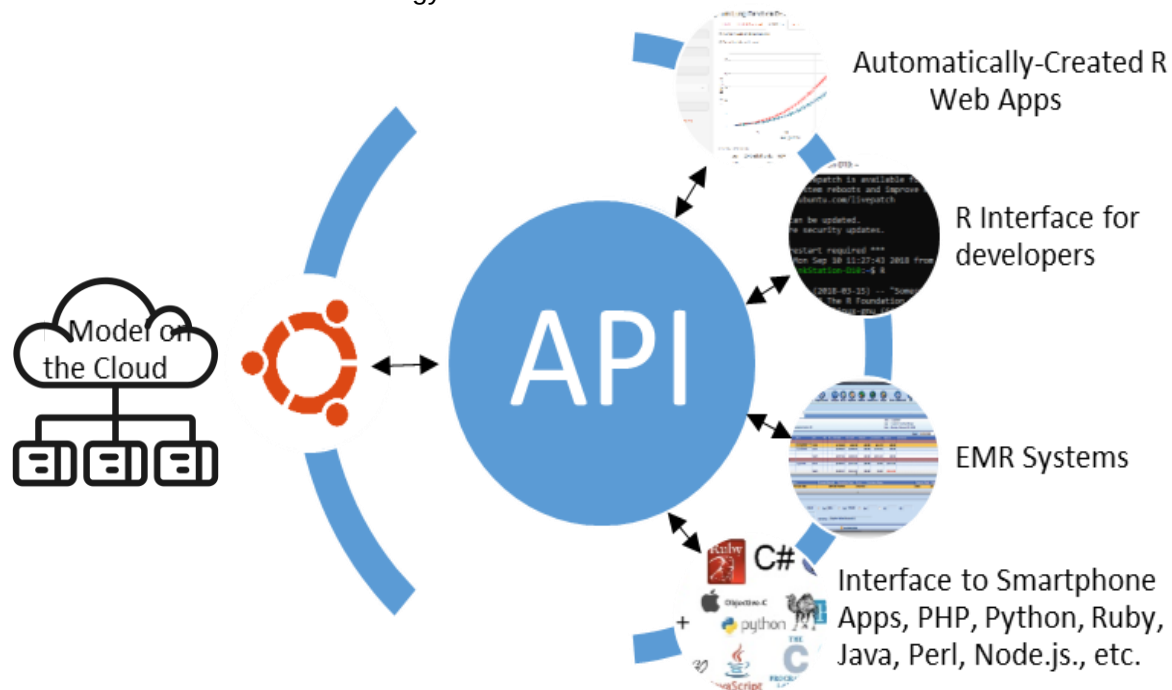
## The Peer Models Network

<https://www.peermodelsnetwork.com/>

- Online network of people with an interest in healthcare and the role of modelling in healthcare and policy decisions.
- - scientists, modellers, clinicians, policy-makers, patients, and members of public
- Provides a platform for patients and the public to view and give feedback on models that aim to inform healthcare delivery.
  - The goal of the PMN is to ensure that patients and the public have a strong voice in healthcare decisions.

# Programmable Interface for Statistical & Simulation Models (PRISM)

RESTful API + JSON + Docker technology



# Programmable Interface for Statistical & Simulation Models

## 9 EPIC

### (PRISM)

| Field          | Value                                                                        |
|----------------|------------------------------------------------------------------------------|
| Model Name     | Evaluation Platform in COPD (EPIC)                                           |
| Modelling Team | <a href="#">RESP</a>                                                         |
| Publication    | <a href="#">doi:10.1177%2F0272989X18824098</a>                               |
| Outcome        | Patient-level outcomes, as well as mortality, prevalence, QALYs, costs, etc. |
| Video          | <a href="#">The EPIC Model in 2 Minutes</a>                                  |
| Interviews     | <a href="#">Mohsen Sadatsafavi on the EPIC Model</a>                         |
| R Package      | <a href="#">epicR</a>                                                        |
| Excel Sheet    | <a href="#">PC Version</a>                                                   |
| API User Guide | <a href="#">Link</a>                                                         |

# How does it look on the client side?



[Link to a short video](#)

Connect to Model

Run

## Summary of Outcome

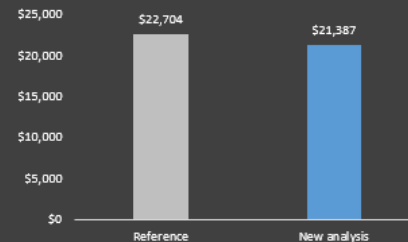
|                                              |             |
|----------------------------------------------|-------------|
| Total number of agents simulated             | 80357       |
| Total person-years simulated                 | 1095846.213 |
| Total number of deaths during the simulation | 18451       |
| Total number of COPD patients                | 11968       |
| Total pack years                             | 976572.7903 |
| Total costs (2015\$)                         | 255961437.3 |
| Total QALYs                                  | 674427.7212 |

| Cost and Utility  | Reference | New Analysis |
|-------------------|-----------|--------------|
| Cost per patient  | \$22,704  | \$21,387     |
| QALYs per patient | 8.4       | 8.4          |

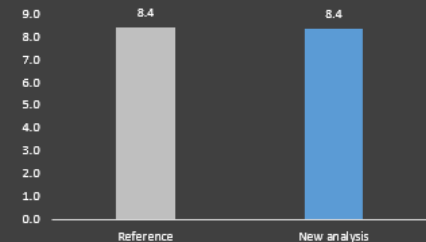
## Number of Simulated Patients Plot

|                 | Reference   | New analysis |
|-----------------|-------------|--------------|
| Reference N     | 160,712     | 80,357       |
| Proportion died | 0.220388023 | 0.229612853  |
| COPD prevalence | 19.0%       | 14.9%        |

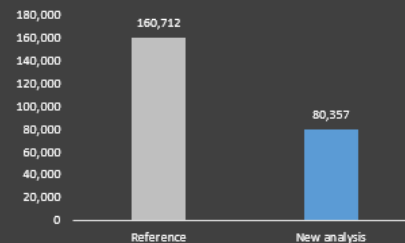
Costs per patient



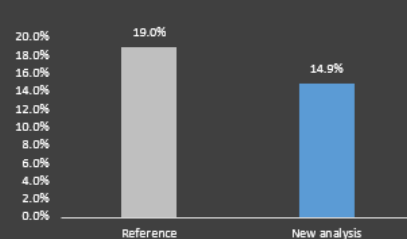
QALYs per patient



Number of simulated patients



COPD Prevalence



## Conclusions

- Sharing the code is important, but with complex models, probably not enough
  - Proprietary software
  - Dependencies
  - Computation times
  - Intellectual property
- A parallel effort towards model accessibility initiative is timely and feasible

# Thank you!

Submit questions to “Host” via the chat box.



Email: [msafavi@mail.ubc.ca](mailto:msafavi@mail.ubc.ca)

Peer Models Network: <https://www.peermodelsnetwork.com/>

PRISM 'living' paper: <https://arxiv.org/abs/2202.08358>