Physician Information
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Canadian Institute for Health Information
Physician information – NPDB

Physician payments

- FFS claims
- Shadow claims
- Contracts
- Salary
- Capitation

Service utilization

- Physician unique id
- Fiscal period
- Payment
- Services
- Fee code
- Patient age group
- Patient sex
National Grouping System Categories

CONSULTATIONS
- major consultation

MAJOR SURGERY
- rhinoplasty

DIAGNOSTIC & THERAPEUTIC PROCEDURES
- colonoscopy

MAJOR ASSESSMENT
- office assessment

OBSTETRICAL SERVICES
- caesarean section
Current FTE Indicator

FTE Value

\[ FTE = \frac{\text{Pay}}{\text{lower bm}} \]

\[ FTE = 1 \]

\[ FTE = 1 + \ln \left( \frac{\text{Pay}}{\text{upper bm}} \right) \]
What about Alternative Payments?

**ADVISORY GROUP**
- Ministries of Health
- Health Canada
- AFMC
- CFPC
- RCPSC
- CMA
- MERG

**EXTERNAL EXPERTS**
- ICES
- Medical Associations
- Provincial Experts

**CIHI**
- Physician Information
Physician Scope of Practice
A statistical approach to profiling practice patterns

Canadian Institute for Health Information
What is Scope of Practice?

Daily clinical activities that describe the health care being delivered

• Consultations
• Assessments
• Surgical Procedures
• Therapeutic Procedures
• Diagnostic Procedures
• Etc.
NGS Categories
Describing Physician Activities

- Physician Specialty
- Precise description of skills and credentials
- Complete listing of clinical activities i.e. fee codes
- National Grouping System (NGS) categories
Practice Areas
The Idea

Reorganize NGS categories into homogenous groupings called practice areas

Measure participation within each practice area

Participation patterns define unique practice patterns for each physician
The Practice Areas

Consultations
- Major Consultations
- Other Consultations

Psychotherapy
- Individual Psychotherapy
- Group Psychotherapy
- Counseling

Obstetrical Services
- Services at Time of Delivery
- Vaginal Delivery
- Caesarean Section
- Therapeutic Abortions
- Other Obstetrics

Assessments
- Office
- Hospital Inpatient Newborn
- Hospital Inpatient Other
- Hospital Outpatient
- Hospital Unspecified
- Unspecified

Musculoskeletal Surgery
- Fractures
- Arthroplasty – Hip
- Arthroplasty – Knee
- Other Musculoskeletal

Etc...
Scope of Practice Categories
Basic assumption: physicians within a given specialty represent a group of like-behaving individuals the majority of who practise in similar ways.

Assigning a Scope of Practice – The Setup

- Choose a specialty, $s$
- Let $PA_i$ denote the $i$th practice area
- For each physician let $p_i$ represent their total payments for $PA_i$
- We’ll associate a scope of practice category $\Pi_s$ to each specialty
Assigning a Scope of Practice – the Math I

For each physician we define their participation rate sequence as follows:

\[ R = (R_1, \ldots, R_{25}) \]

where

\[ R_i = \frac{p_i}{P} \]

and \( P = \sum_i p_i \).

Each \( R_i \) is a relative measure of participation within the practice area \( PA_i \).
Assigning a Scope of Practice – the Math II

- Does Dr. WHO have a typical practice pattern for his specialty?
- Need to define what is the most typical participation rate sequence for the specialty
- In other words we want to define the most representative pie chart

For each specialty group $s$, we define the payment signature of $s$, denoted $t_s = (t_{1,s}, \ldots, t_{25,s})$ as follows:

$$t_{i,s} = m_{i,s} + \frac{(1-\sum_i m_{i,s})}{25}$$

where $m_{i,s} = \text{median}\{R_{i,1}, \ldots, R_{i,N}\}$ and where $R_{i,j}$ denotes the participation rate value in the $i^{th}$ practice area for the $j^{th}$ physician in specialty group $s$. The resulting point is the orthogonal projection of the median onto the hyperplane.
Assigning a Scope of Practice – the Assignment

• Let $R = (R_1, \cdots, R_{25})$ denote the participation rate sequence for Dr. WHO

• We say that their scope of practice is most similar to the specialty group $s$ when

$$\min_{l \in \text{spec}} \{d(R, t_l)\} = d(R, t_s)$$

where $d(R, t_l) = \sqrt{\sum_i (R_i - t_{i,l})^2}$ is the Euclidean distance between the tuples.
Examples
**Scope of Practice as a Pie Chart – the Payment Signature**

**Family Medicine**

- **Visits**: 71%
- **Consultations**: 1%
- **Basic Procedural**: 1%
- **Major Assessments**: 10%
- **Minor Surgery**: 1%
- **Other Diagnostic**: 2%
- **Psychotherapy**: 3%
Scope of Practice as a Pie Chart – the Payment Signature

Anaesthesia

- anesthesis 92%
- consultations 4%
- visits 1%

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Scope of Practice as a Pie Chart – the Payment Signature

Consultations 23%

Digestive System 21%

General Surgery

Other diagnostic visits 3%

Breast and Skin Surgery 3%

Respiratory and Cardiovascular Surgery 1%

Urogenital Surgery 3%

Minor Surgery 2%

Major Assessments 3%

Endoscopy 15%

Minor Surgery 2%
Scope of Practice as a Pie Chart – the Payment Signature

CVT Surgery

- Respiratory and cardiovascular surgery: 57%
- Consultations: 10%
- Digestive system surgery: 1%
- Major assessments: 2%
- Other diagnostic: 2%
- Surgical assistance: 2%
- Visits: 6%
Scope of Practice as a Pie Chart – the Payment Signature

**Pediatrics**
- Consultations: 27%
- Major assessments: 31%
- Visits: 22%
- Psychotherapy: 2%

**Geriatrics**
- Consultations: 37%
- Major assessments: 24%
- Visits: 30%
- Psychotherapy: 2%
Identifying Scope of Practice

**Anaesthesia**
- consultations 4%
- visits 1%
- anesthesia 92%

**Dr. WHO**
- visits 2%
- anaesthesia 96%

**it’s a match!**

... but

<table>
<thead>
<tr>
<th>NPDB Specialty</th>
<th>Family Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Payments</td>
<td>$405,000</td>
</tr>
</tbody>
</table>
Next Steps

• Work at refining the practice areas
• Explore other options for defining the centroid of a scope of practice cluster
• Analyze the dissimilarity between clusters
• Develop a clinical description of the scope of practice categories
• Incorporate Alternative Payments
Questions?