Quantifying needs-based supply of physicians: A systematic review and critical assessment of international studies

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What do we mean when we talk about *need* for healthcare?

Definition objective need for healthcare

Objective need (Acheson 1978)

Humanitarian theory
- Disturbed wellbeing
- Level of ill health

Realistic theory
- Treatable morbidity
- Capacity to benefit

How can we measure *need* for healthcare?

How can we translate *need* into needs-based supply to ensure equitable access to healthcare?

Aims of the study

- To review conceptual foundations for translating the population need for healthcare into an operational quantity

- To propose a set of criteria to guide estimations of needs-based provider requirements

- To apply these criteria to a systematic review of quantitative analyses of physician planning

Criteria for estimating needs-based supply I

1. Conceptual basis

- Selection and justification of needs indicators (Criterion 1.1)
  - Theoretical rational & empirical validation

- Relationship between supply and need (Criterion 1.2)
  - Influence of supply on need, potential unmet need/undersupply and overuse/oversupply

2. Data basis

- External validity (Criterion 2.1)
  - Representativeness

- Internal validity (Criterion 2.2)
  - Accuracy of indicators

- Timeliness and availability (Criterion 2.3)
  - Survey period

Criteria for estimating needs-based supply II

3. Modelling and translation into physician capacity

- Transformation into provider requirements (Criterion 3.1)
  - Methodology

- Model development and validation (Criterion 3.2)
  - Type of model & validation

- Level of Analysis (Criterion 3.3)

4. Incorporation of future trends and developments

- Projection variables (Criterion 4.1)
  - Variable selection

- Planning horizon (Criterion 4.2)
  - Length & validation

Methods

<u>Systematic literature search</u>

- Hierarchical search strategy

- Manual target searches

- Two reviewers

<u>Databases</u>
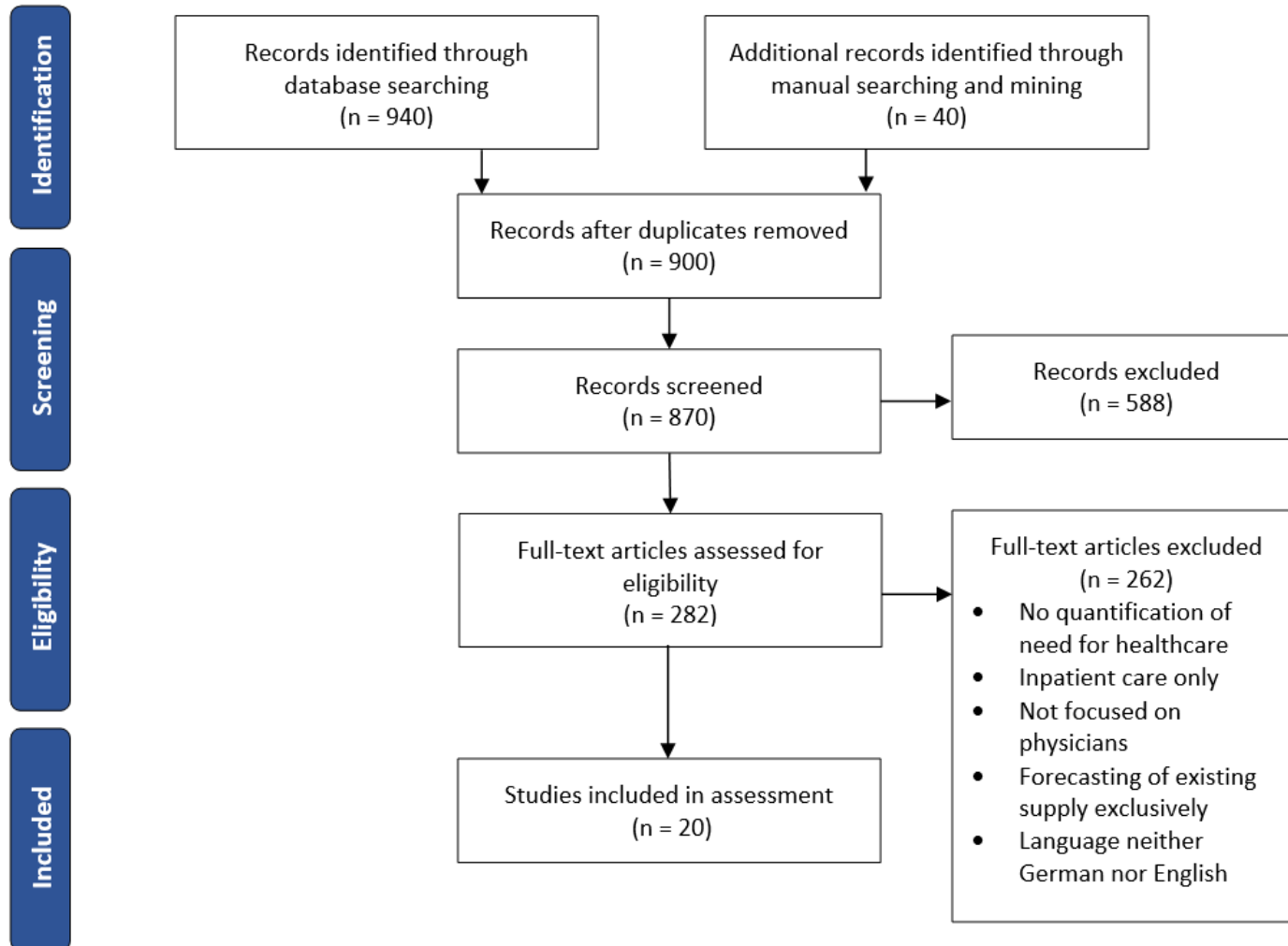
- Web of Science Core Collection

- PubMed

- ScienceDirect

<u>Inclusion criteria</u>

- Empirical, quantitative studies

- Timeframe: until 2017

- Languages: English and German

PRISMA flowchart

Results I

Year of publication

- 1995-1999 (n = 4)

- 2005-2009 (n = 1)

- 2010-2014 (n = 8)

- 2015-2017 (n = 7)

Countries of origin

- Asia (n =1)
  - Singapore

- Australia (n = 1)

- Europe (n = 9)
  - Germany
  - UK
  - Spain

- Northern America (n = 9)
  - Canada
  - USA

Results II

1. Conceptual framework	Findings
1.1 Selection and justification of needs indicators • Theoretical rationale • Empirical validation	**Theoretical rationale for the indicators** • n = 26 **Empirical validation of indicators** • n = 6
1.2 Relationship between supply and need • Potential influence • Potential unmet need or lack of physicians • Potential overuse or oversupply	**Discuss potential influence of supply on need** • n = 8 **Discuss potential unmet need or lack of physicians** • n = 6 **Discuss potential overuse or oversupply** • n = 0
2. Data basis	**Findings**
2.1 External validity • Representativeness	**Representativeness** • Population data: n = 4 • Representative sample: n = 2 • Convenience samples: n = 3 • Mixed data (NA): n = 17
2.2 Internal validity • Accuracy of indicators	**Discuss accuracy of indicators** • n = 11
2.3 Timeliness and availability • Survey period	**Survey/recording periods (in years)** • Ranges between 1-17 years

Results III

3. Modelling and translation into physician capacity	Findings
3.1 Transformation into provider requirements • Methodology	**Methodology to translate need into physician capacity** • FTE: n = 18 • Physician-to-population ratio adjustment: n = 8
3.2 Model development and validation • Type of model • Validation (0/1)	**Type of model** • Regression-based: n = 5 • Simulations: n = 8 • Extrapolations: n = 13 **Validation of the model** • n = 21
3.3 Level of Analysis • Aggregated data (0/1) • Individual data (0/1)	**Model based on (partially) aggregated data** • n = 23 **Model based on individual data** • n = 3
4. Incorporation of future trends and developments	**Findings**
4.1 Projection variables • Description of variables	**Variables for projection models** • Demographics: n= 13 • Utilization: n = 7 • Supply: n = 3 • Morbidity: n = 3 • Insurance status: n = 2 • Health behavior: n = 1
4.2 Planning horizon • Length • Validation of length (0/1)	**Length of need projections** • Ranges between 10-31 years **Validation of length** • n = 0

Discussion

- To consider influence of supply and utilisation variables on the quantification of need for healthcare more intensely

- To promote data availability and transparency to improve internal and external validity

- To advance methods to translate provider requirements into fulltime equivalents

- To assess and incorporate future trends in morbidity when projecting needs-based supply

Conclusion

- Quantifying population need for healthcare and translating it into provider capacities remains a complex challenge.

- None of the existing studies fully meets all criteria.

- Our criteria serve as transparent guidance to estimate needs-based supply.

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Thank you for your attention!

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