



Forecasting for unplanned care: a literature review

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Outline

- Forecasting for unplanned care & research purpose
- Search methodology and General characteristics
- Framework for unplanned care forecasting
- Main findings
- Research gaps



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**What will you do when you are in an
emergency situation?**

Emergency Department (A&E)



EMERGENCY

AMBULANCE



NHS

Yorkshire
Ambulance Service
NHS Trust

AMBULANCE

AMBULANCE

YJII DTZ

A woman with long brown hair tied back, wearing a dark uniform with "AMBULANCE CONTROL" on the sleeve, is shown in profile. She is wearing a headset and glasses, and appears to be working at a computer in a control room. The background is blurred, showing other people and computer monitors.

Emergency phone call

What is unplanned care?

- Urgent care must be available 24 hours a day, with no difference in quality or accessibility between working and non-working hours.
- They should be prepared to commence appropriate treatment immediately upon receiving patients in an emergency scenario.

Why forecasting is important in unplanned care?

- **Saving life**
- **Saving time**
- **Saving money**

Why this review is necessary?

- Previous literature review is rather wide when classification forecasting method.
- Researchers needs an overview of forecasting trend within the entire unplanned care system.
- Practitioners require a guideline when choosing a rigorous forecasting process within the unplanned care system.



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What search methodology did we use to conduct this review?

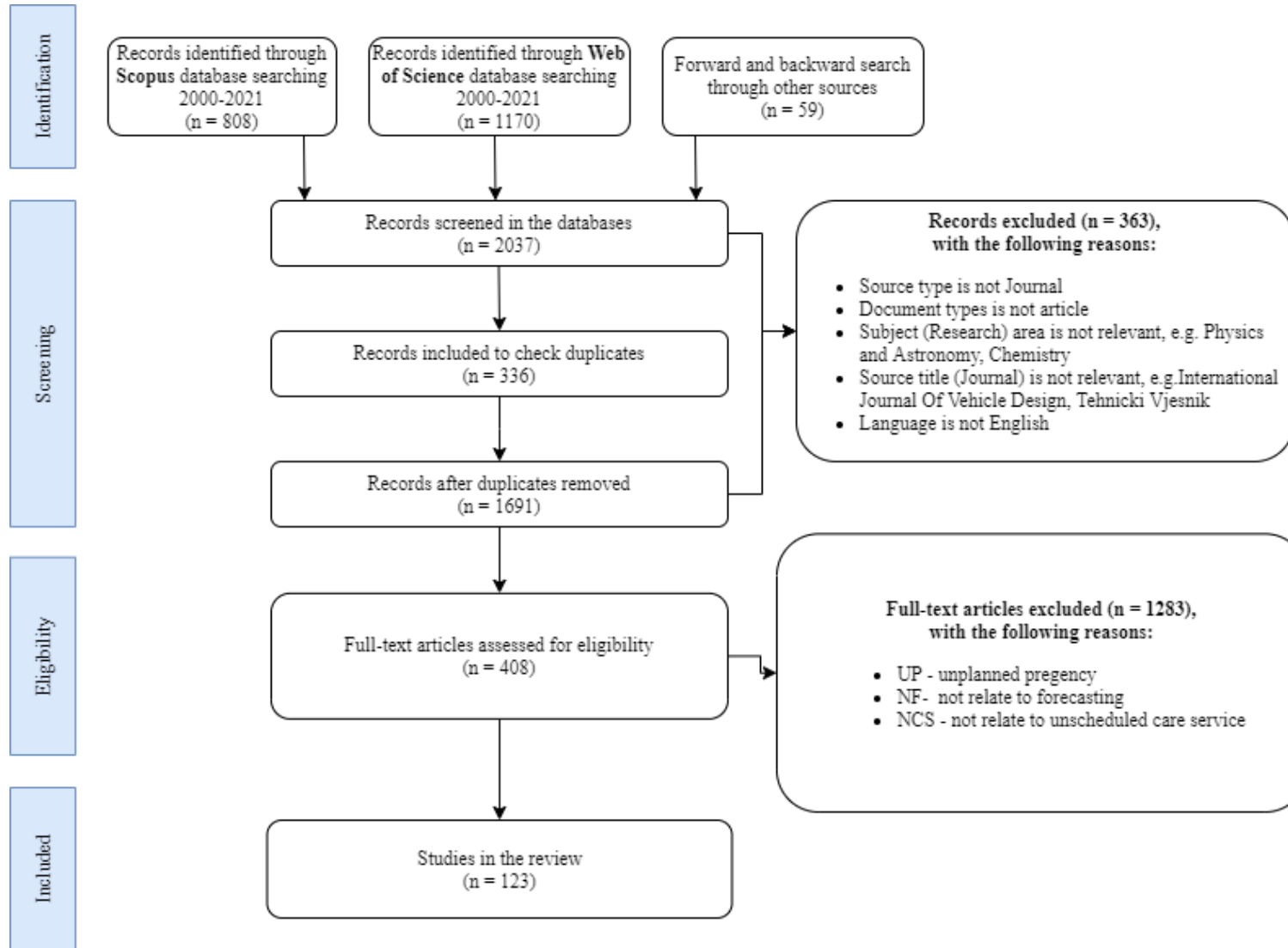
- **Key words used for searching**

["health " OR "health care" OR "social care"] AND ["unscheduled" OR "unplanned"] AND ["forecast" OR "predict"]*

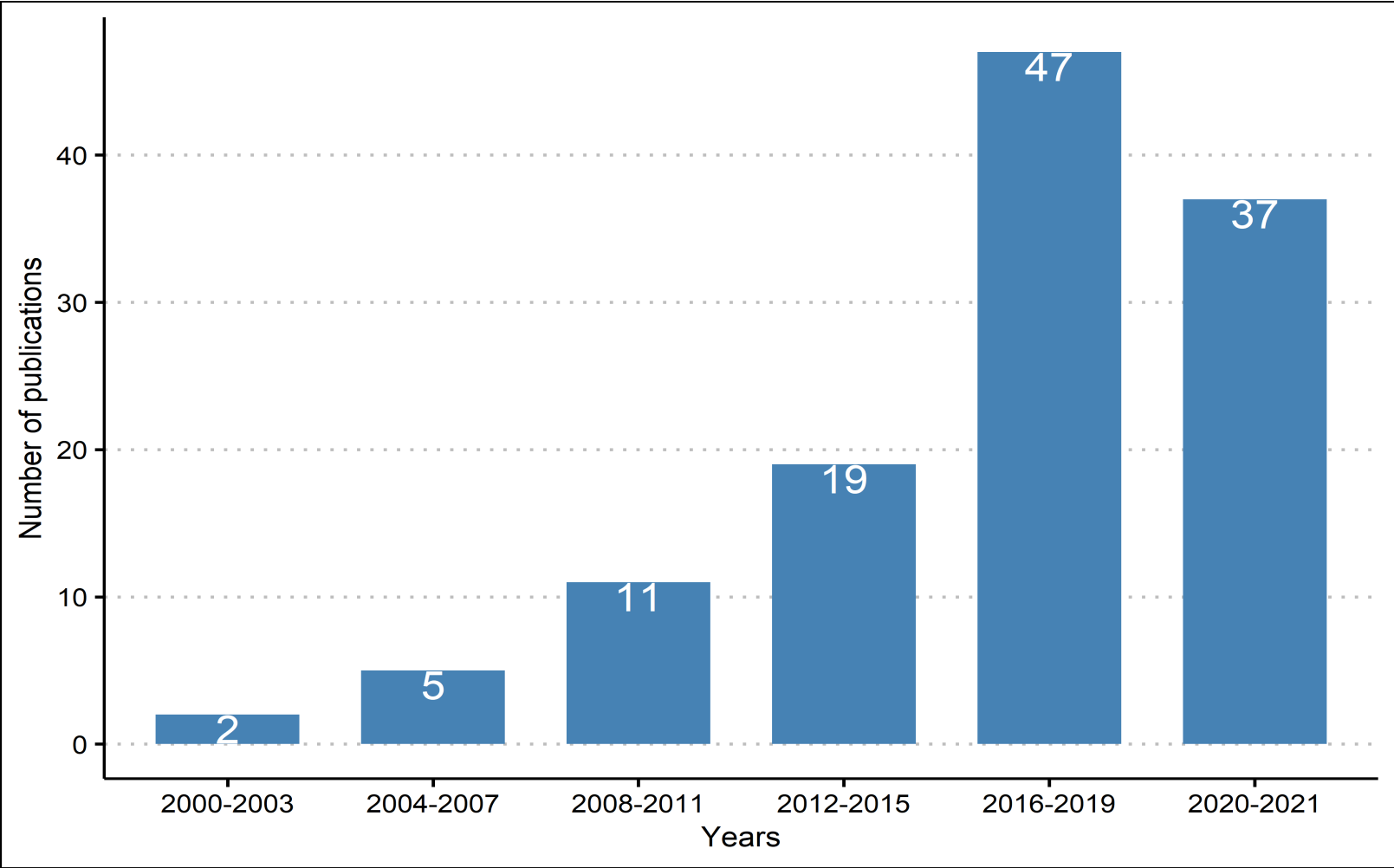
- **Databases**

Scopus and Web-of-science

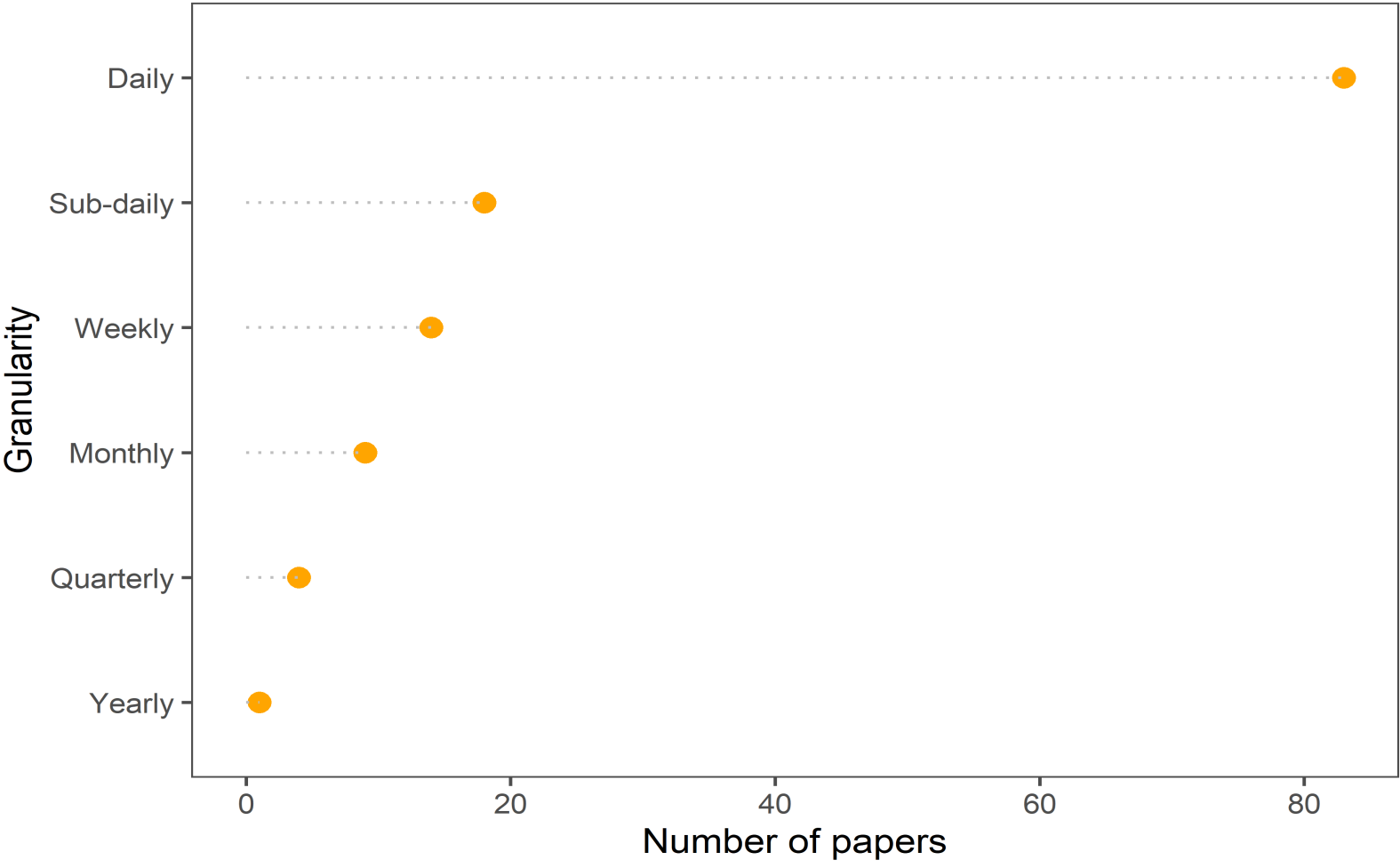
Review stage



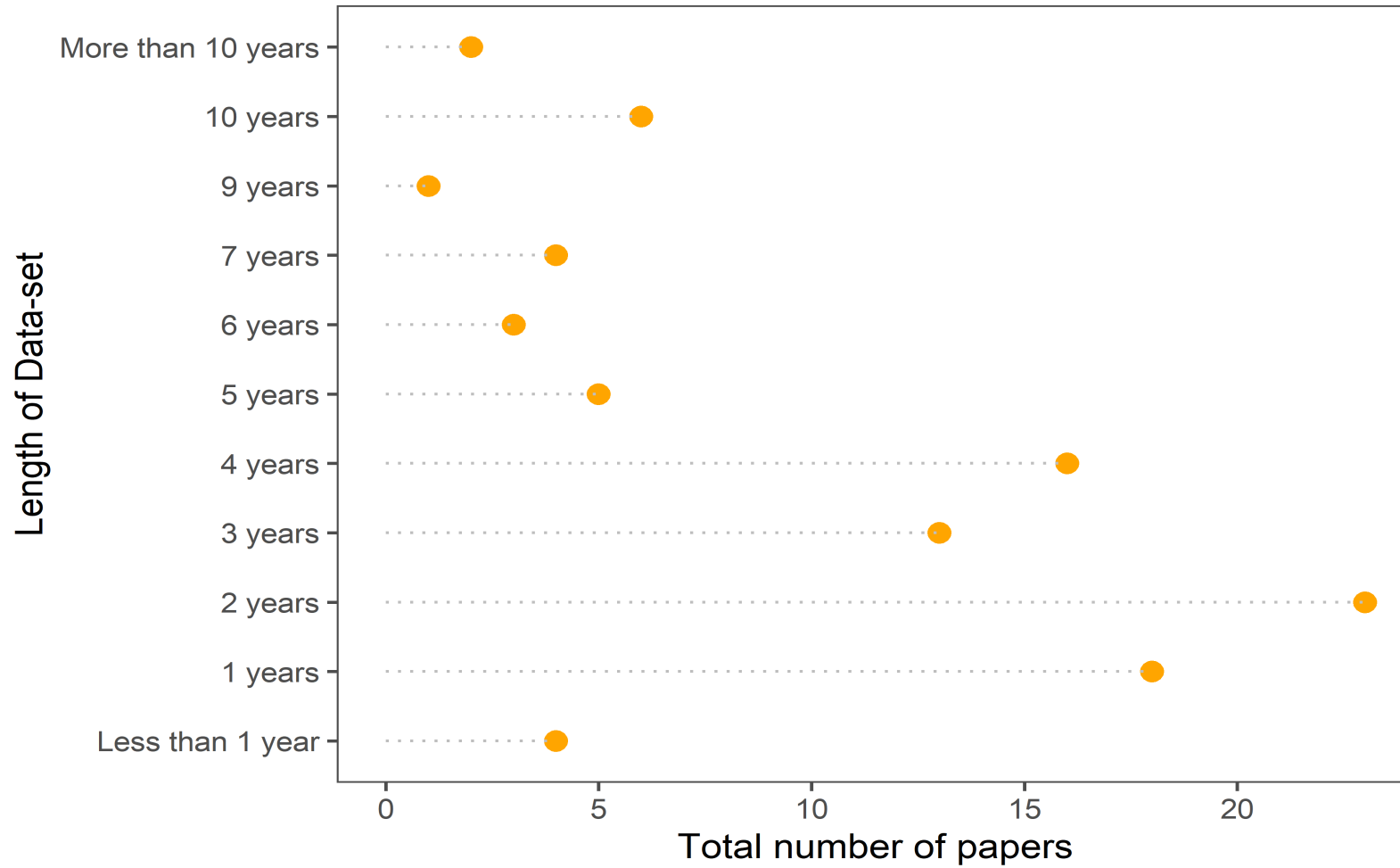
Publication trend related to unplanned care



Data time granularity

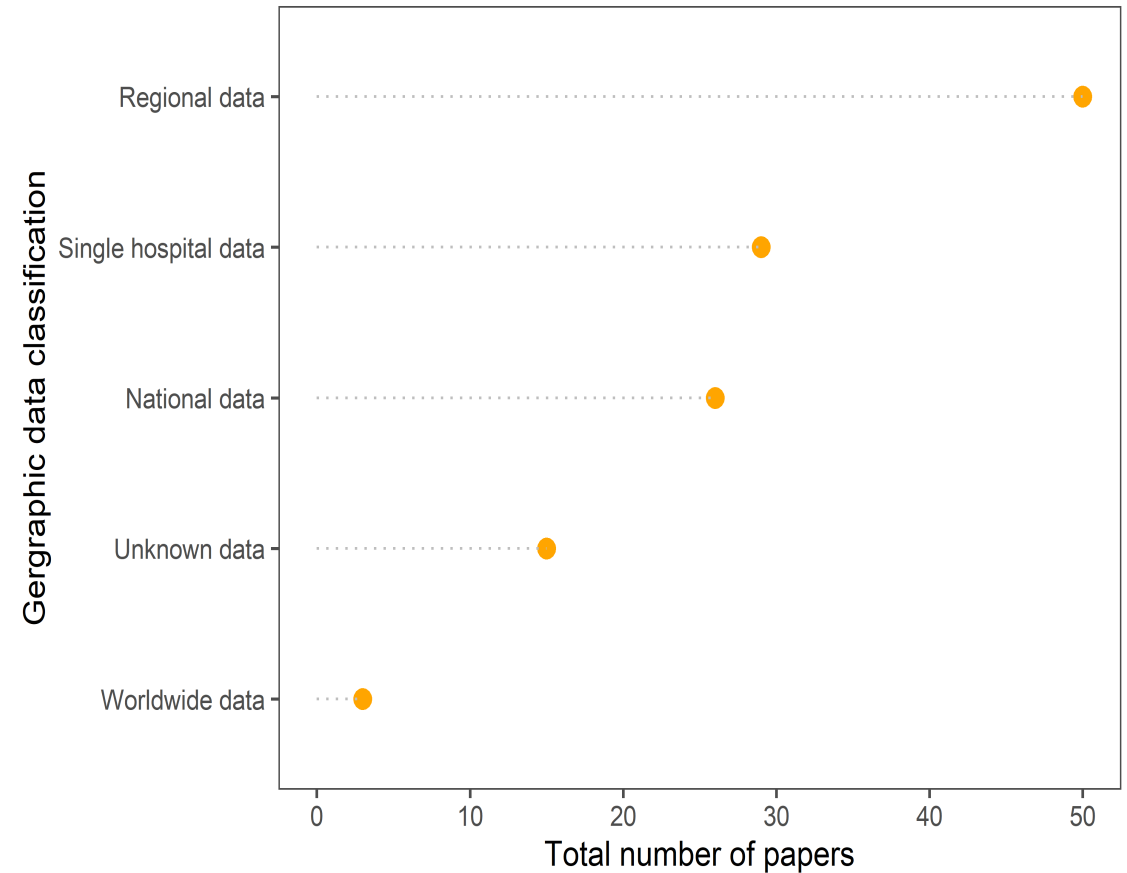


Length of data-set



Geographical data classification

- Single hospital data
- Regional data: Data from multiple hospitals in the same region
- National data: Multiple hospitals for one country
- Worldwide data: Multiple hospitals from multiple countries
- Unknown data

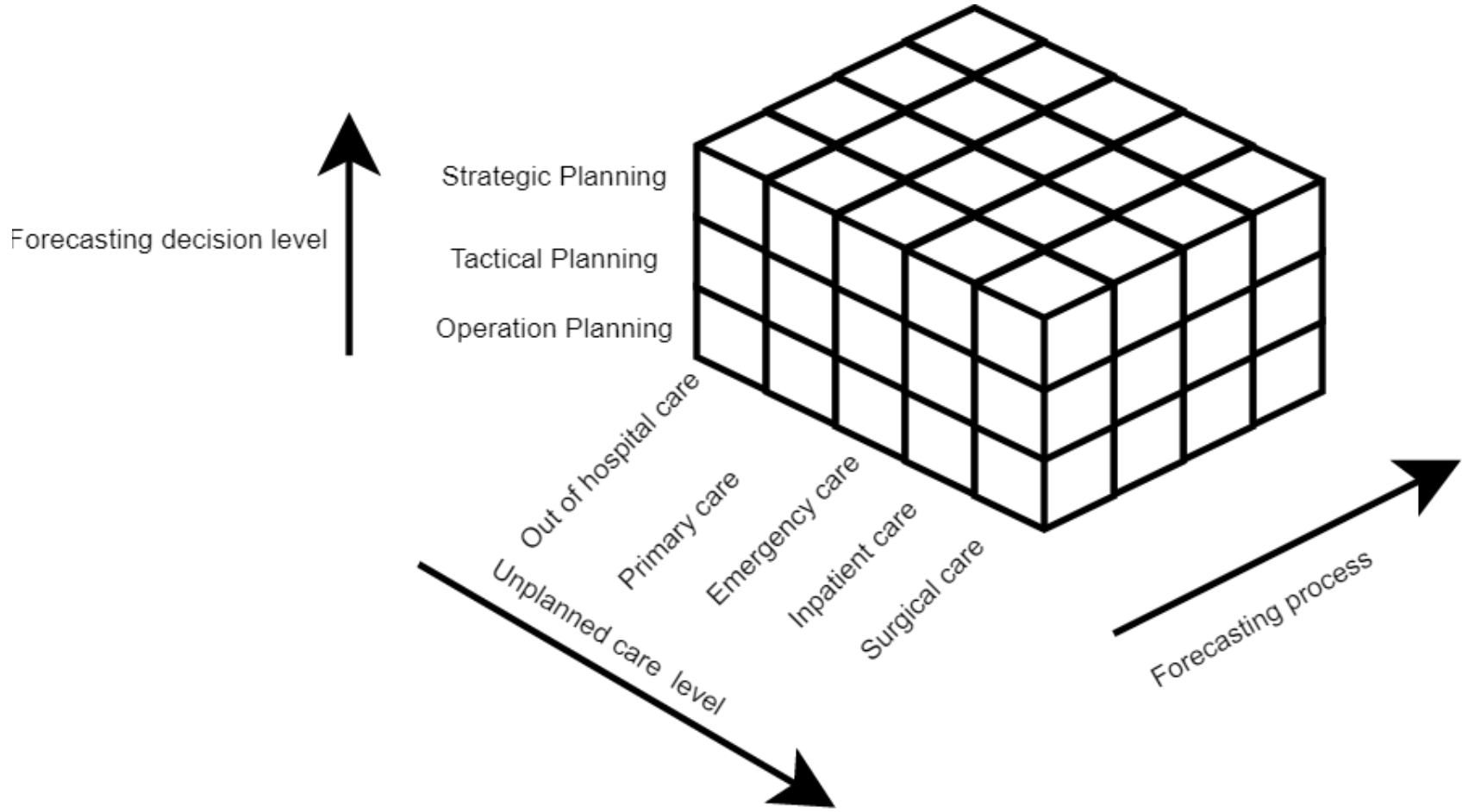




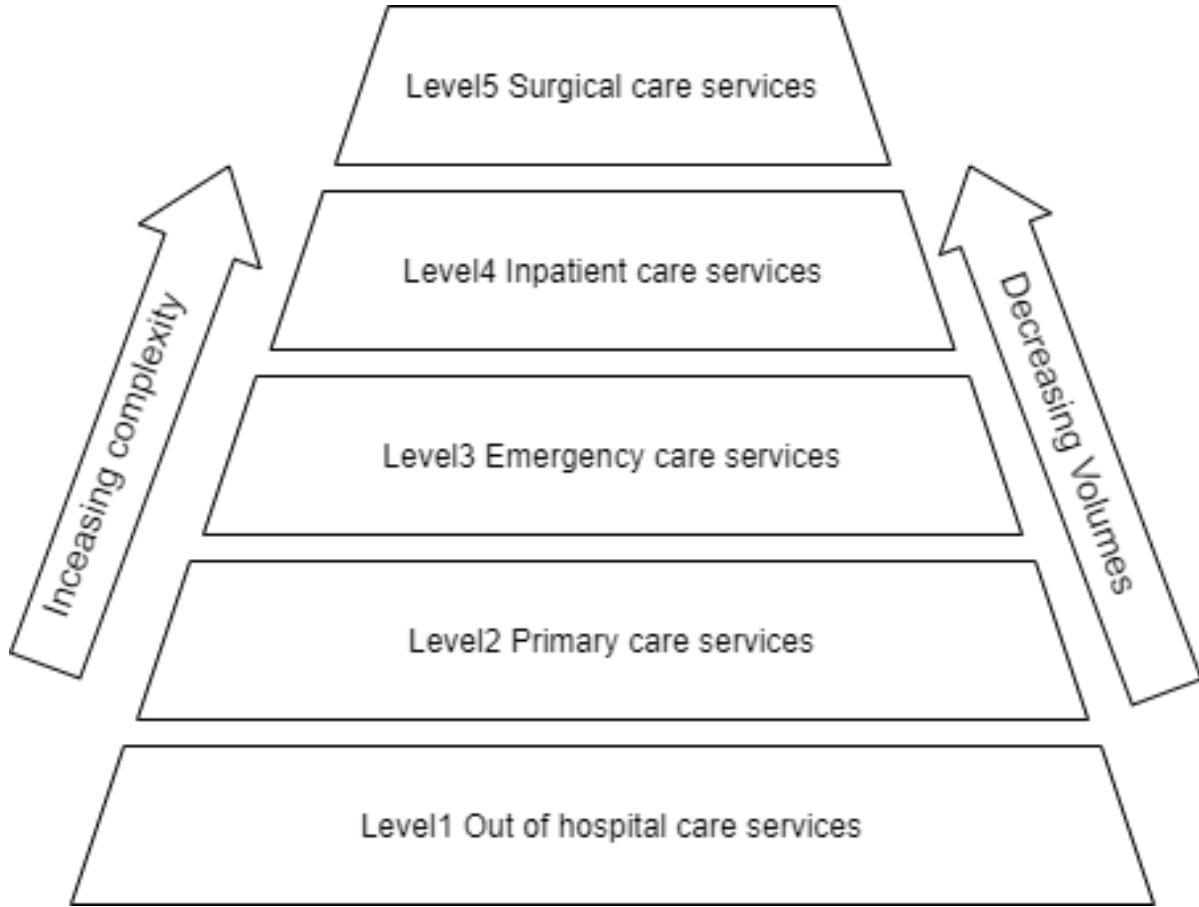
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Framework for unplanned care forecasting



Unplanned care system



Framework taxonomy

Unplanned care level

- Out of hospital care: Emergency call services etc.
- Primary care: General practitioners(GP) etc.
- Emergency care: Emergency rooms, ambulances etc.
- Inpatient care: Hospital admission, general nursing wards etc.
- Surgical care: Operating theatres, intensive care units (ICU) etc.

Forecasting decision level

- Short-term operational planning
- Medium-term tactical planning
- Long-term strategic planning

Forecasting models

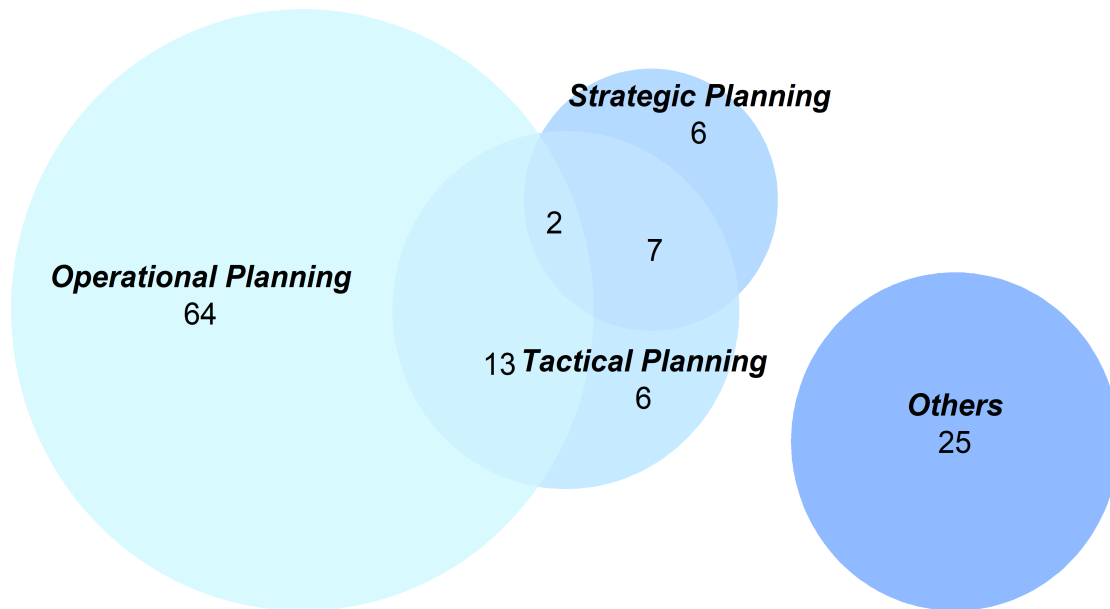
- Statistical and econometric models
- Variable selection algorithms
- Data-driven forecasting models
- Other forecasting models



Outline

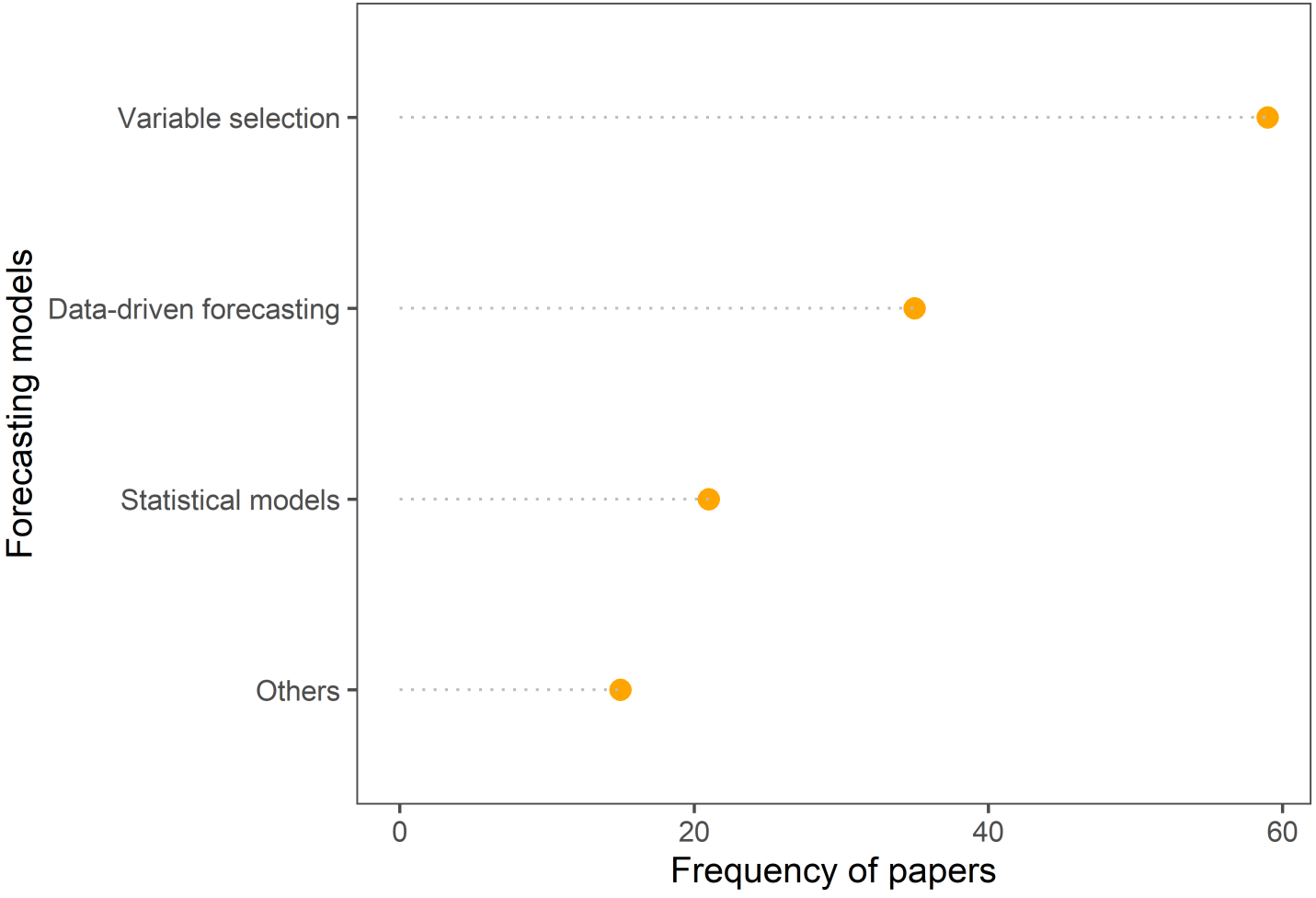
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Are there any paper considering multiple decision levels?

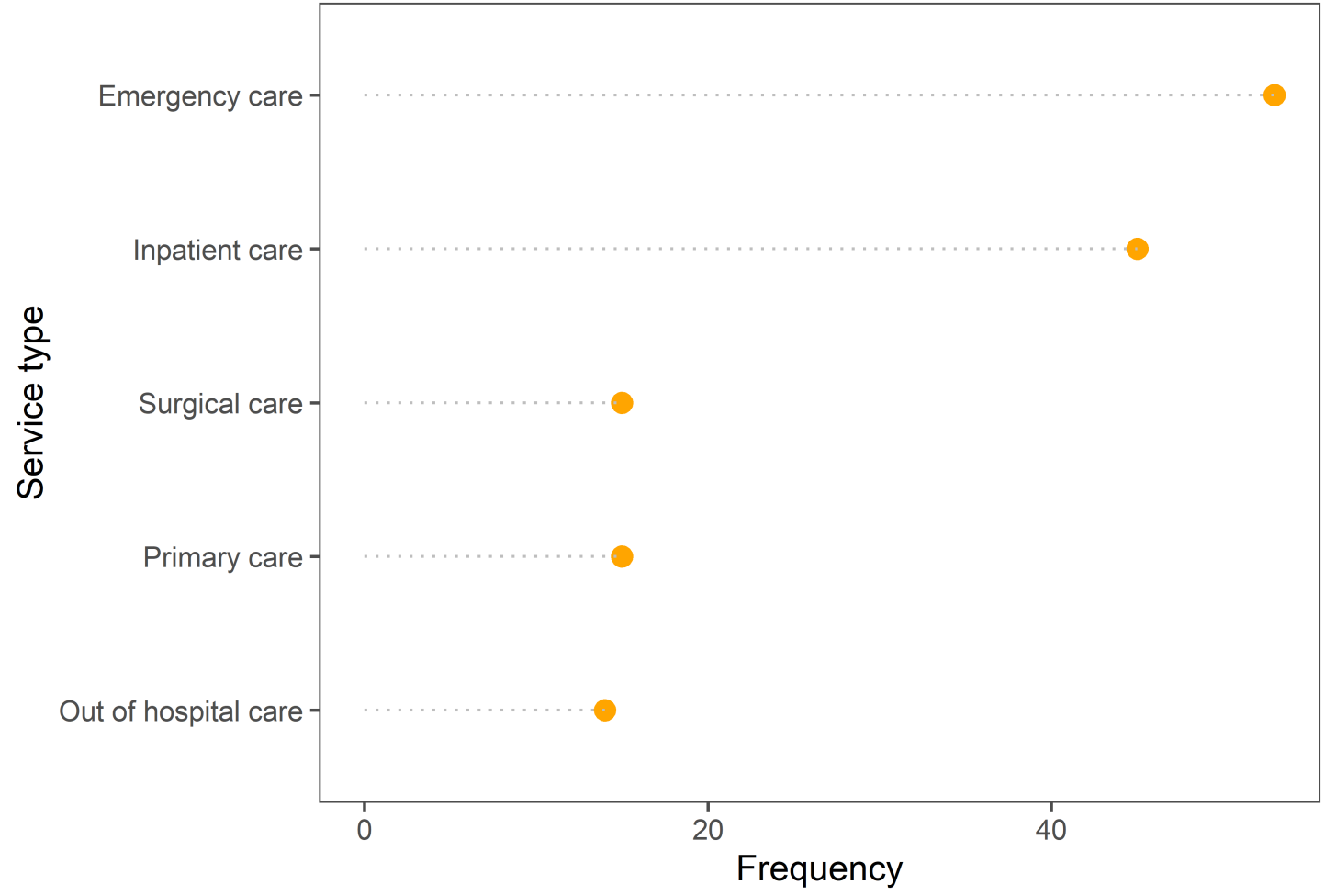


Forecasting methods in unplanned care services can be used across **multiple decision levels**, from daily to yearly decisions.

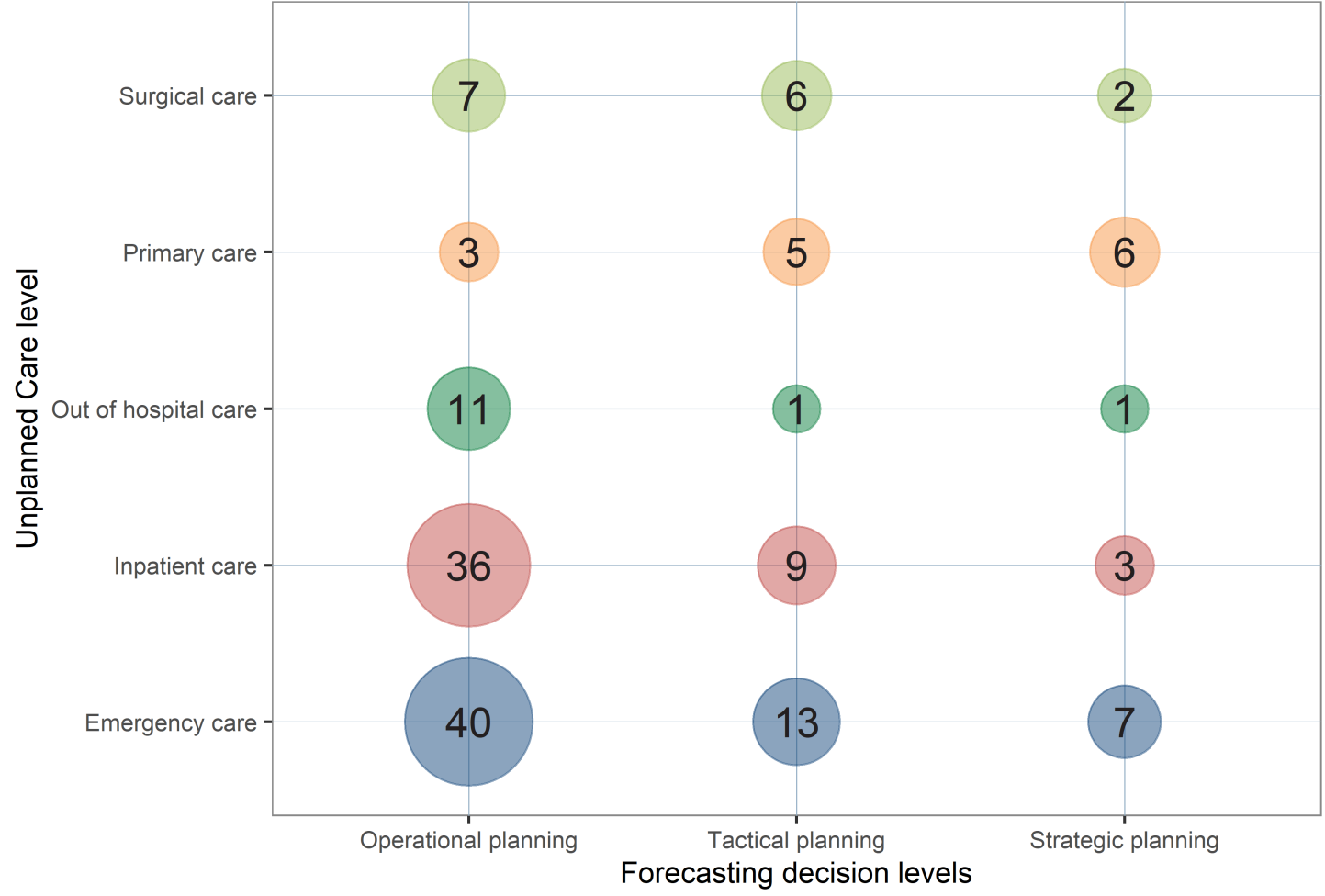
Number of model comparison



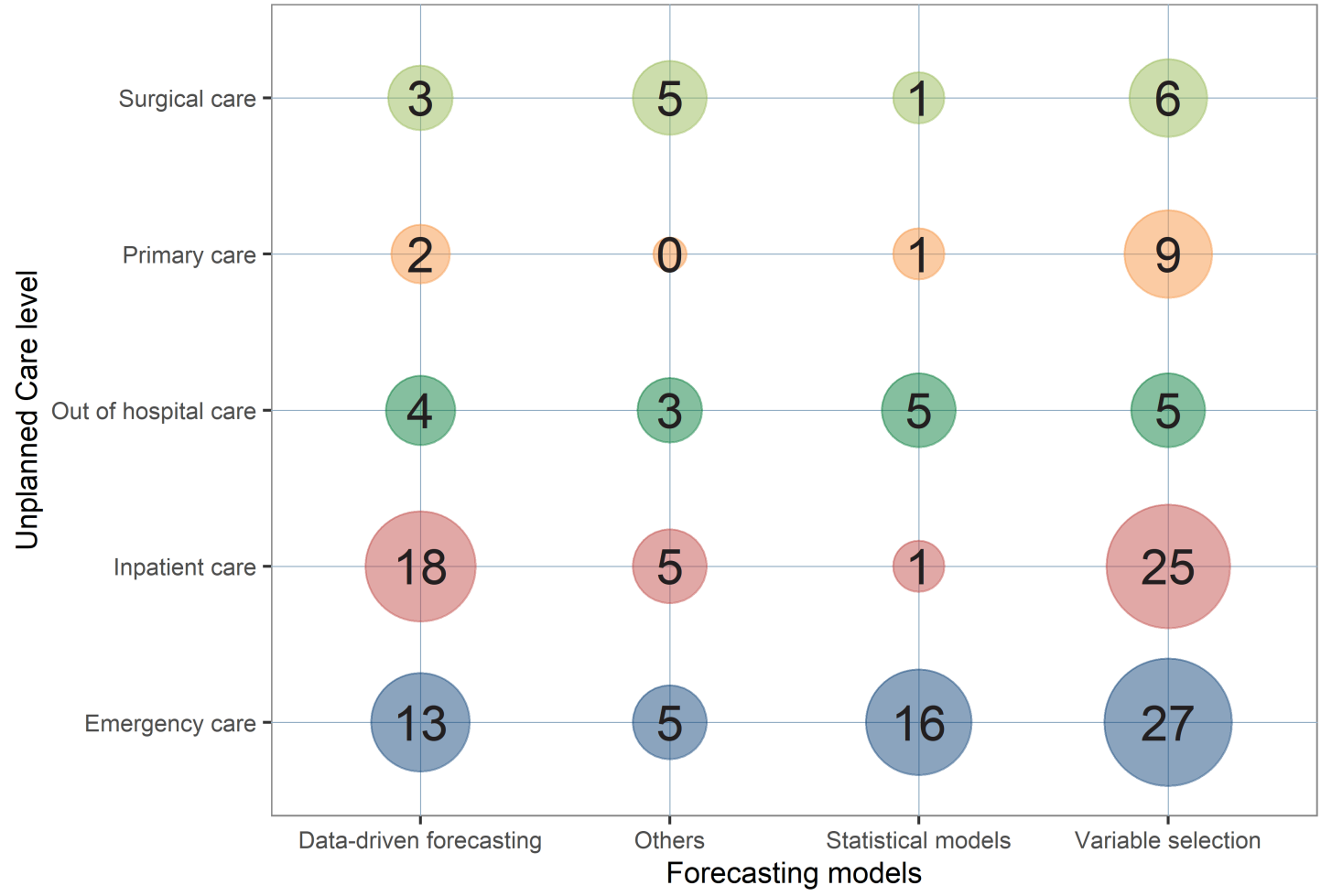
How many papers are there in each unplanned care level?



Forecasting decisions applied in each unplanned care level

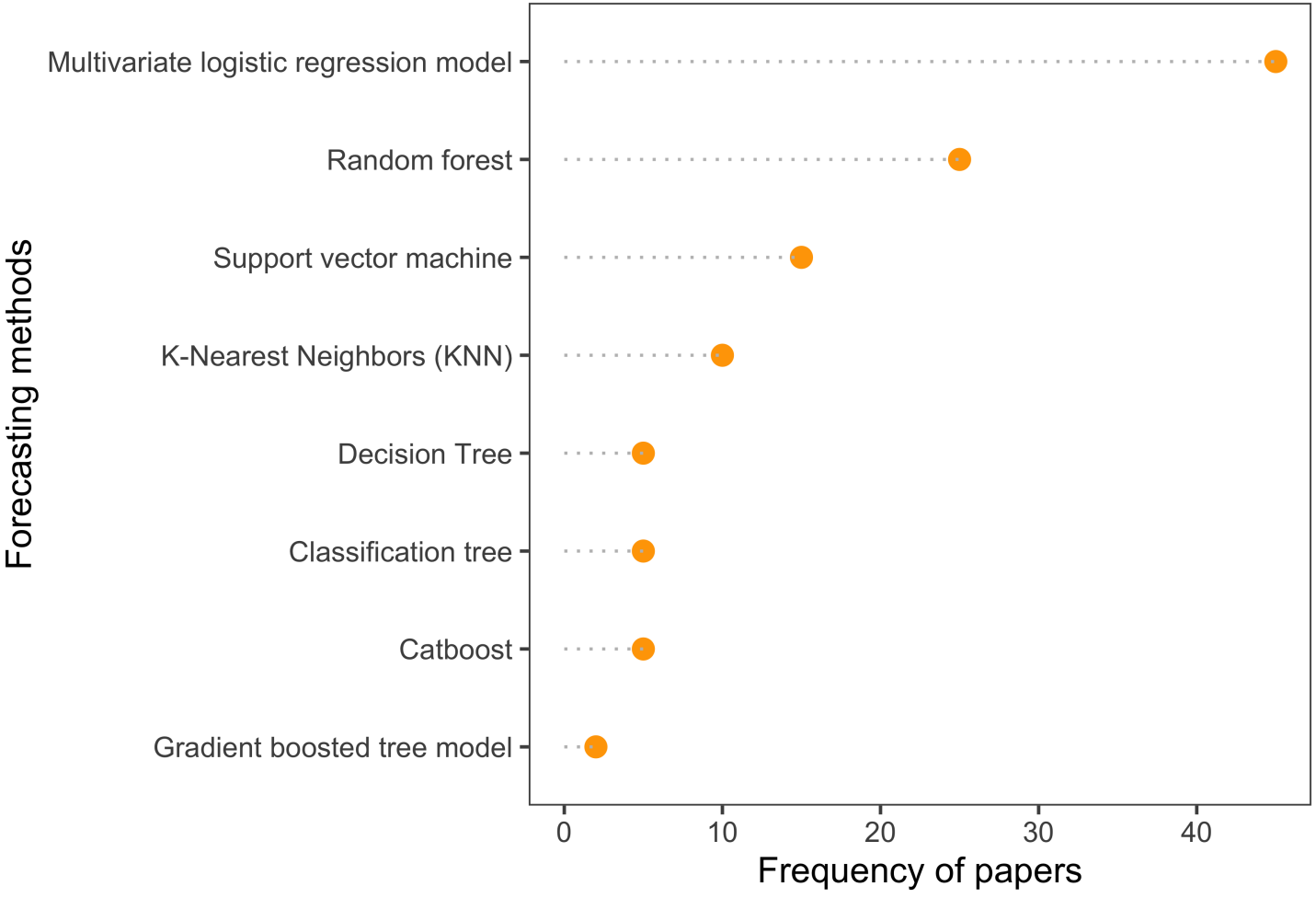


Forecasting models applied in unplanned care level

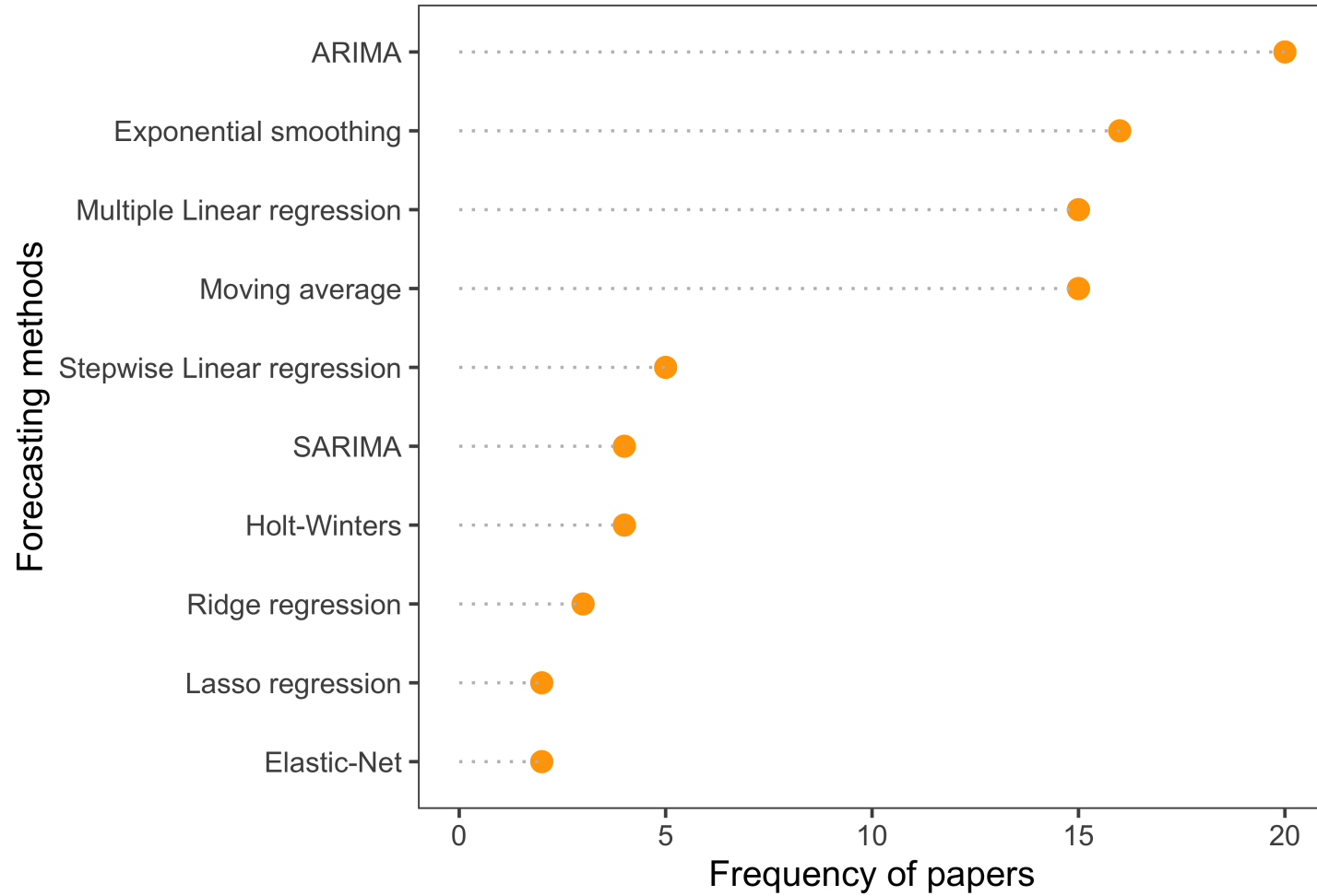


Forecasting method used in unplanned care

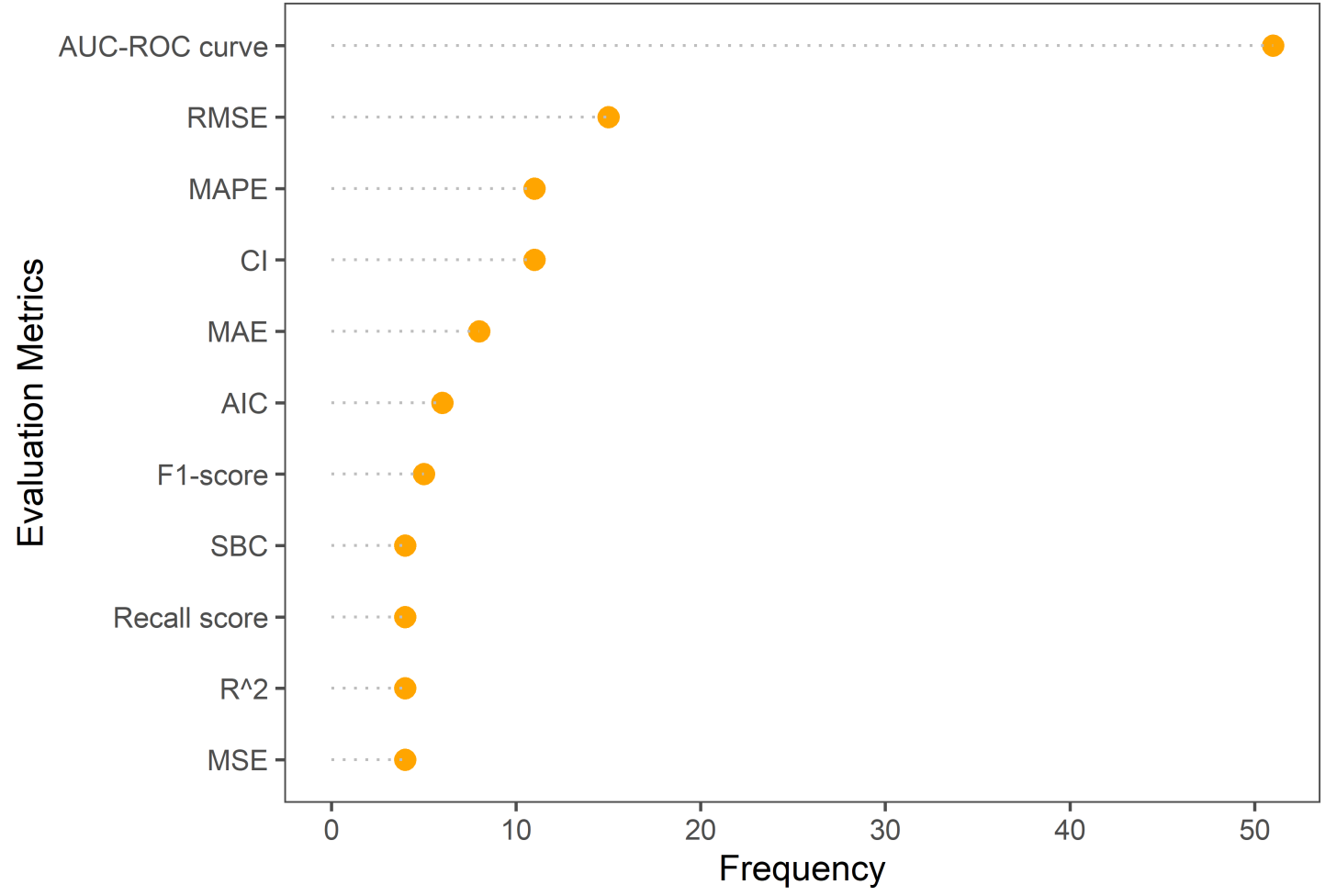
Forecasting models used for classification



Forecasting models used for Regression

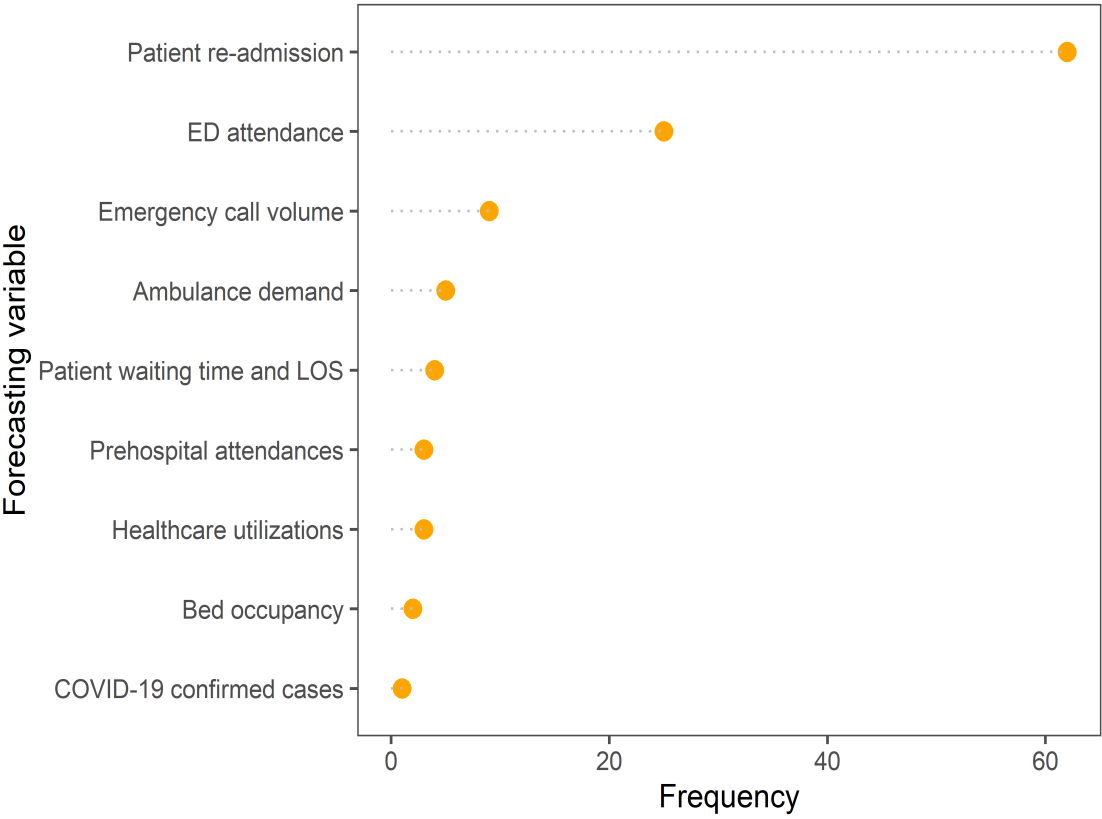


How many evaluation metrics have been used?

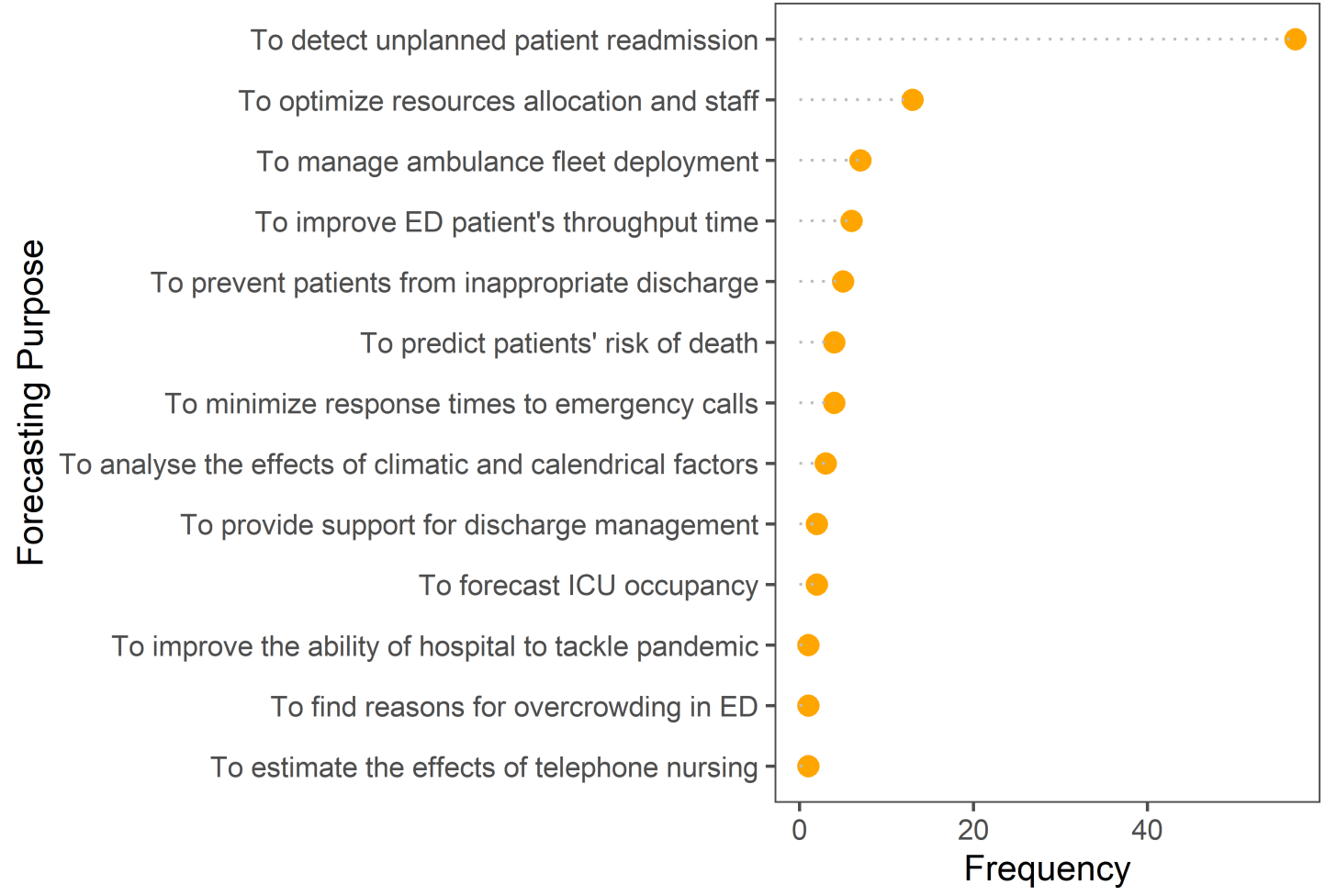


Forecasting variables

Forecasting variables refer to the forecasting output of the forecasting model.



Purpose of forecasting





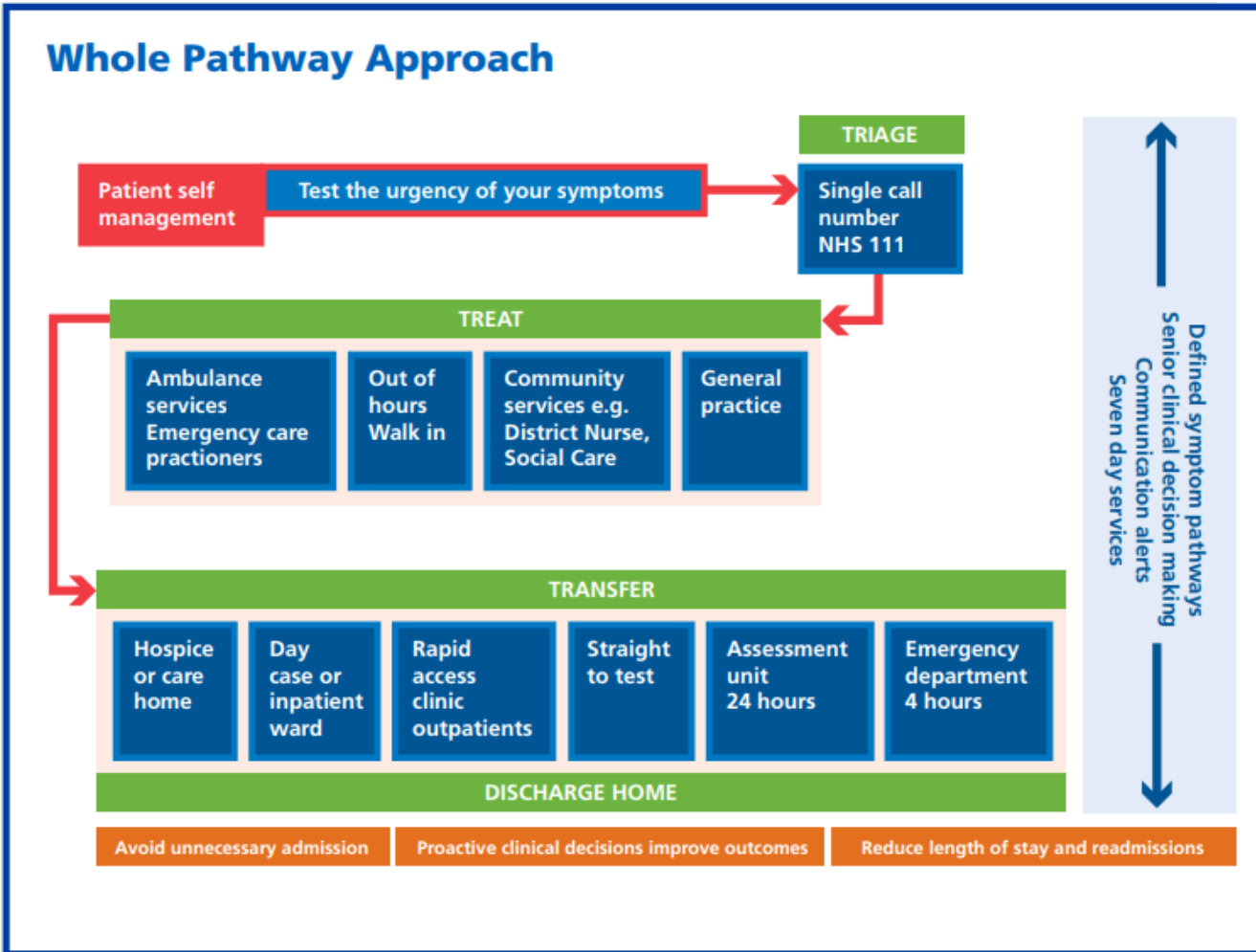
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Research gaps

1. Adopting hybrid models
2. Applying forecasting methods in lower level of unplanned care services are less considered.
3. Despite the importance of judgments and people's expertise and knowledge context in the area of healthcare, very few articles consider judgmental forecasting approaches.
4. Multiple forecasting decision levels are not considered.
5. There is less cooperation between unplanned care levels.

Enhance cooperation between unplanned care services



source: <https://www.england.nhs.uk/improvement-hub/publication/making-connections-with-the-challenges-of-unscheduled-care/>



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