



**EHMA 2024**  
Shaping and managing  
innovative health ecosystems



**UNIVERSITY OF  
BIRMINGHAM**

# **A scoping review on the impact of electronic health records (EHRs) implementation on health service productivity**

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# Aims

- Clarify the discussion on how EHR implementation impacts health service productivity
- Synthesise existing literature relating to EHR implementation and health service productivity
- Provide considerations for managers looking to implement EHRs

# Background

- EHRs are an information technology system storing individual health data in a digitised format.
- EHR implementation is increasing in health services globally due to clinical benefits and the potential to improve productivity. The NHS long-term plan identifies productivity as an essential area for growth<sup>1</sup>.
- Healthcare productivity is the balance between inputs and outputs, falling into two broad categories: labour productivity (output change per worker) and multifactor productivity (output change with fixed inputs).
- Literature finds a ‘productivity paradox of IT’ where investments made into IT cause productivity to decrease.

1. Charlesworth A. Improving productivity – what does The NHS Long Term Plan expect? [Internet]. The Health Foundation. 2013 [cited 2022 Feb 16]. Available from: <https://www.health.org.uk/news-and-comment/blogs/improving-productivity-what-does-the-nhs-long-term-plan-expect>



# Methodology

- **Design:** a scoping review.
- **Eligibility criteria:** studies were included if they were (1) written in the English language, (2) published between 2012 and 2022, (3) described an outcome measure of, or contributing to, productivity.
- **Search strategy:** five databases and five grey literature platforms were screened using key words.
- **Data collection:** the data set was created using a three-stage screening process.
- **Data analysis:** Jesson & Lacey's analysis framework was adapted for the specific aims of the project and used to analyse the articles.

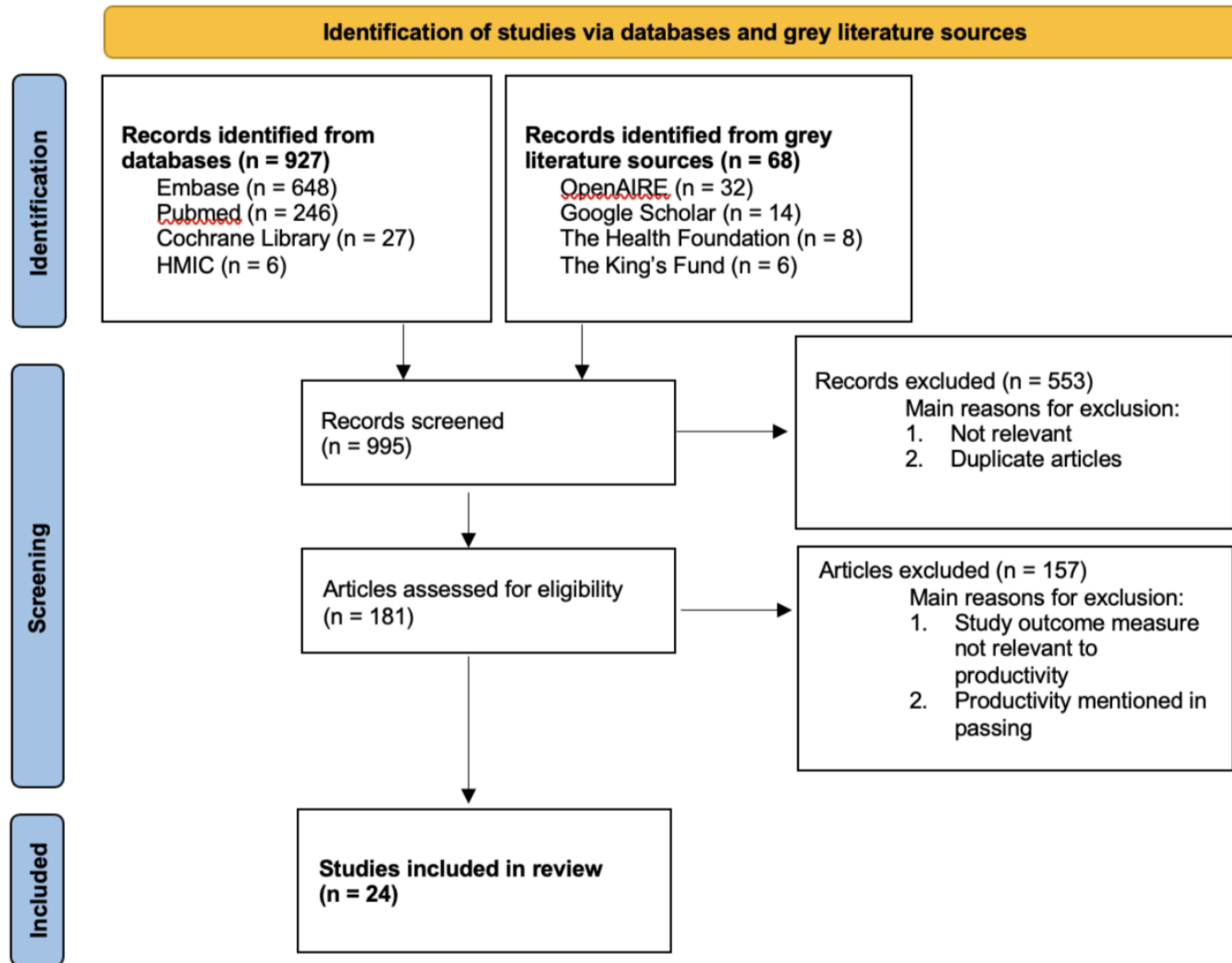


Figure 1 – PRISMA flow diagram indicating literature search



# Results

- 24 studies were included based on inclusion and exclusion criteria.
- Most studies were published in 2018, predominantly originating from the USA and set in tertiary care centres.
- Outcome measures were broadly categorized into five productivity factors: (1) workload, (2) time, (3) user perception, (4) efficiency and (5) financial impact.

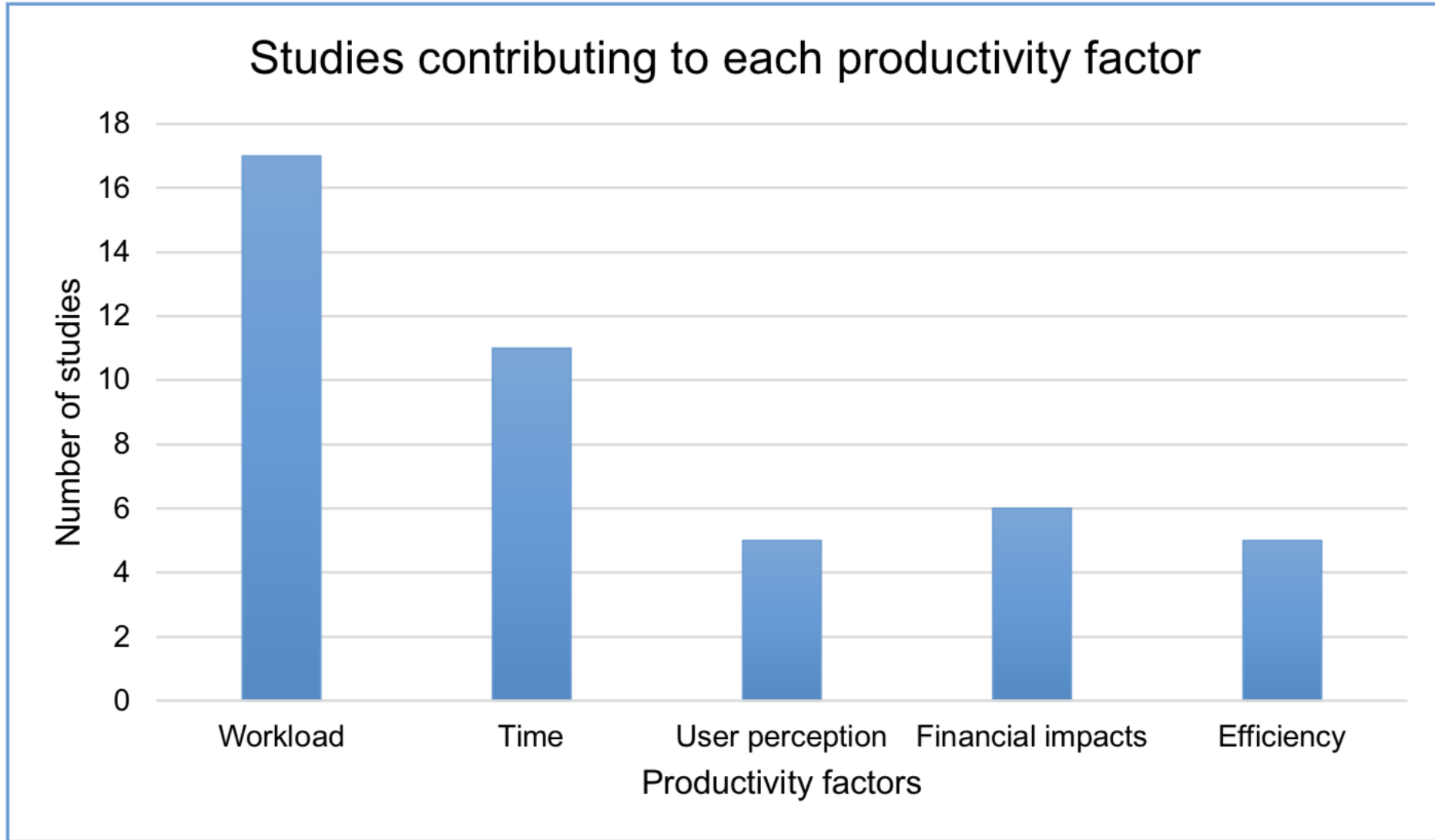


Figure 2 – Number of studies contributing to each productivity factor.

# Key Findings: Labour Productivity

## **Workload:**

- Mostly, workload decreases were found suggesting productivity loss: fewer patients were seen hence output was removed.

## **Time:**

- An excess amount of time was spent in documentation when using EHRs, which limits the number of patients seen in a set time. Patient length of stay increased after EHR implementation indicating a reduction in patient throughput and a decrease in productivity.

## **User perception:**

- Users reported mixed opinions of productivity impacts associated with EHRs. Many found automation of high-volume tasks and increased access to patient data beneficial. Others conveyed difficulties navigating the system. A common theme was the need for learning time and workflow adjustments.



# Key Findings: Multifactor Productivity

## **Efficiency:**

- Efficiency increased with EHR implementation, translating into an increase in productivity.

## **Financial impact:**

- Implementation costs were significant which was not met with significant gains, suggesting a productivity loss, and were a barrier to EHR adoption.



# Discussion

- Analysis revealed a loss of labour productivity and a mixed impact on multifactor productivity.
- The findings were influenced by the productivity paradox: short-term studies found decreased productivity, whereas long-term studies found no change. Some studies reported recovery of productivity after staff had acclimatised to EHR system.
- Strategies to solve the paradox include leadership engagement, human capital, and system integration.

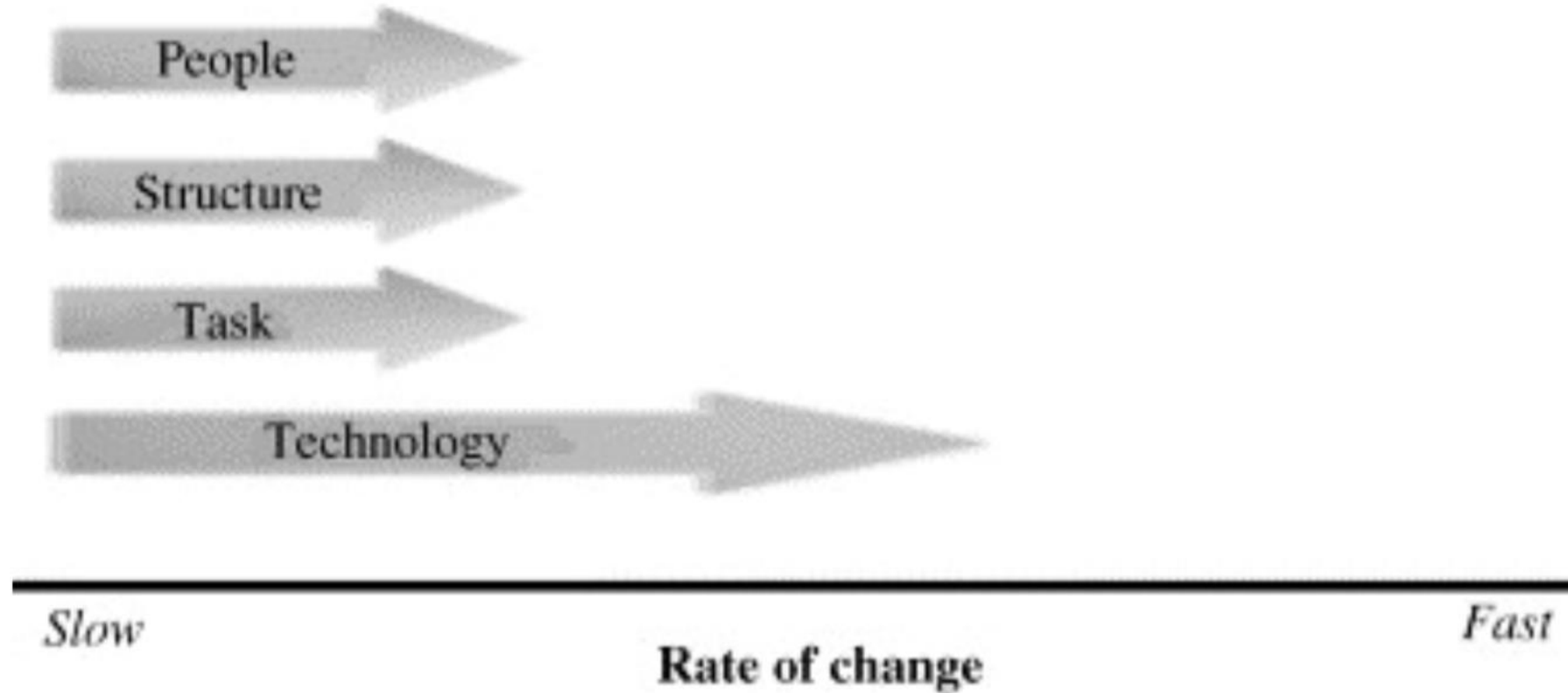


Figure 3 – differential rates of change across Leavitt's four organisational factors.<sup>2</sup>

| <b>Causal factor</b>                     | <b>Leavitt's organisational factor</b> | <b>Explanation</b>  |
|--|--|---|
| Lags due to learning and adjustment      | Task                                   | EHR implementation changes data documentation and access from a paper-based system to an electronic system. Learning and adjustment periods exist to adapt to the new task. Productivity decreases may be experienced during this period. |
| Lack of strategic planning               | Structure                              | Specific teams or departments dedicated to implementing EHR systems will benefit from successful implementation.  |
| Failure to overcome resistance to change | People                                 | The attitudes held towards EHR implementation by staff influence the success of implementation. Where staff are motivated and engaged in change, performance with EHRs is higher.   |

Table 1 – Causal factors of the paradox in relation to Leavitt's model of organisational change.

| <b>Organisational strategy</b> | <b>Leavitt's organisational factor</b> | <b>Explanation</b>  |
|--------------------------------|--|---|
| Leadership engagement          | Structure                              | Managers should implement organisational structures dedicated to EHR implementation, such as subcommittees and engagement initiatives.                            |
| Human capital                  | People                                 | Developing IT skills and experience of the implementation team and clinicians using EHRs is crucial to successful EHR implementation.                             |
| Systems integration            | Task                                   | Integrated systems between the administration and hospital departments improve information access and can assist with tasks of providing high-quality healthcare. |

Table 2 – Holmgren's organisational strategies<sup>3</sup> applied to Leavitt's model of organisational change.

3. Holmgren AJ, Phelan J, Jha AK, Adler-Milstein J. Hospital organizational strategies associated with advanced EHR adoption. Health Services Research. 2022 Apr;57(2):259-69.



# Limitations

- The lack of consensus regarding productivity management and variation in outcome measures limits the extent to which individual studies can be compared and weakens any conclusions drawn.
- Scoping review design risks missing relevant and valuable studies, due to eligibility parameters.
- The lack of critical appraisal of the data set limits the implications of this review's findings because of a potential inclusion of low-quality studies.



# Conclusion

- Although current literature is heterogenous, EHR implementation is likely associated with a loss of health service productivity, particularly in the short term.
- Managers should consider the influence of the 'productivity paradox of IT' and the importance of strategies to minimise it.
- More research is required to assess the long-term impacts of EHR implementation on productivity.

Thank you.  
Any questions?

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