

# Very early robot-assisted mobilization of intensive care patients – a scoping review

Amrei C. KLAMT<sup>a</sup>, , Lena SCHMIDBAUER<sup>a</sup>, Angelika WARMBEIN<sup>b</sup>, Ivanka RATHGEBER<sup>b</sup>, Uli FISCHER<sup>b</sup> and Inge EBERL<sup>a</sup>

<sup>a</sup>Catholic University of Eichstätt-Ingolstadt, Kapuzinergasse 2, 85072 Eichstätt, Germany

<sup>b</sup>Hospital of the Ludwig-Maximilians-University (LMU) Munich, Marchioninstr. 15, 81377 Munich, Germany



## Introduction

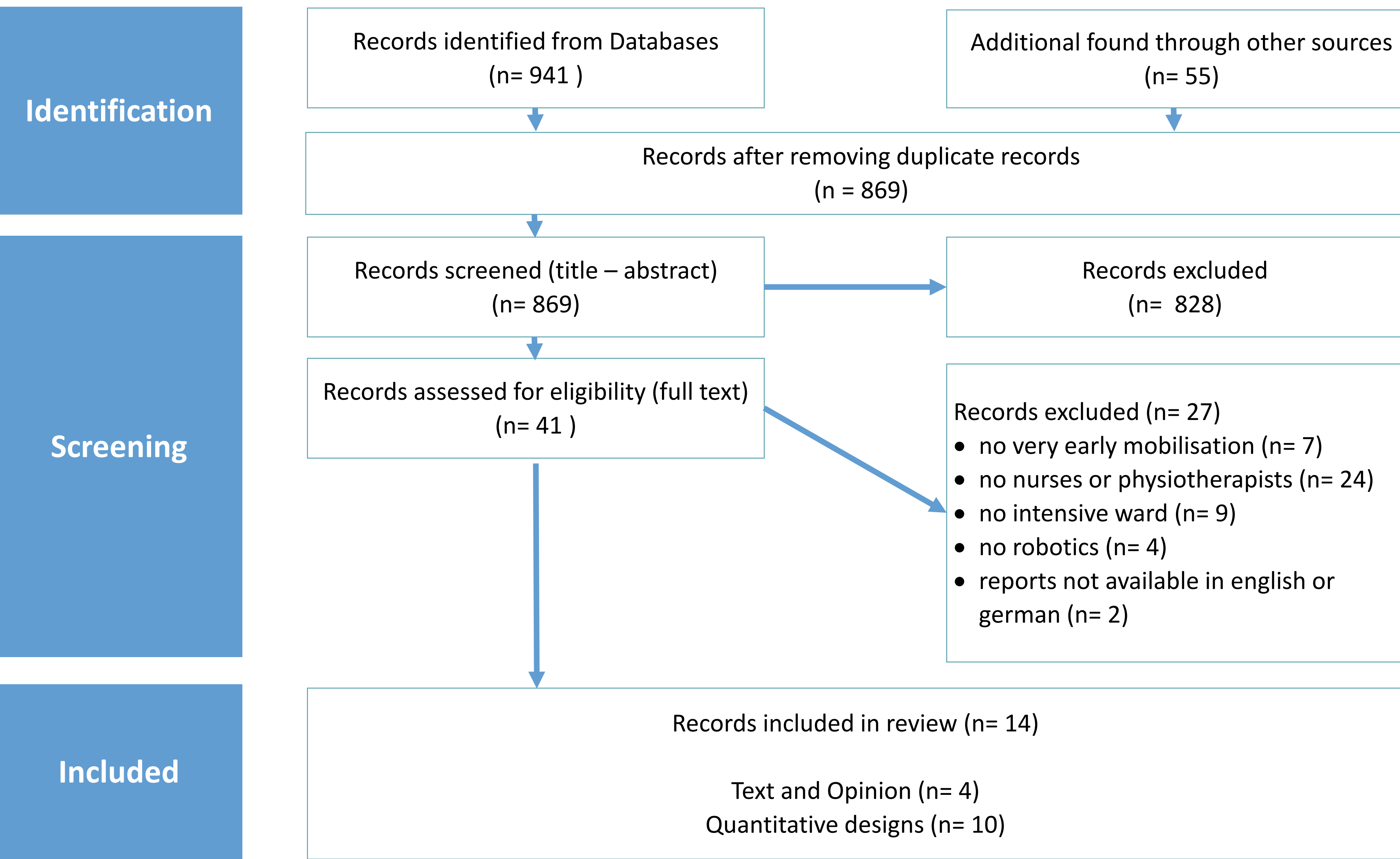
The mobilization of intensive care patients requires high personnel costs [1] and presents, to some extent, a safety risk to all those involved. Studies show that early mobilization can have a positive influence on the healing process and the rehabilitation of critically ill patients [2]. Robotic systems should help to carry out early mobilization using fewer human resources and therefore make it feasible to perform during the everyday work of intensive wards. This scoping review gives an overview of previous research on the early robot-assisted mobilization of intensive care patients.

## Research questions

1. How is early mobilization carried out on intensive wards using robotic systems?
2. What effect does early mobilization carried out using robotic systems have on patient outcomes?

## Methods

A systematic literature search was undertaken in accordance with the PRISMA extension for scoping reviews [3] and the JBI Manual recommendation [4]. A search was conducted from May to July 2020 using defined search strings in the following databases: MEDLINE (via PubMed and Web of Science), CINAHL, Cochrane Library, Embase, IEEE Xplore, Scopus and WTI. An extended search took place using ResearchGate and GoogleScholar. Articles were included in the search that contained rehabilitation robotics, (early) mobilization robotics and transfer robotics, with the aim of application on intensive wards.



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## Results

The 14 final included articles encompass:

Randomised controlled trial (RCT)	5
Texts and opinion	4
Case-control study	2
Case report	1
Quasi-experimental intervention study	1
Cross-sectional study	1

1. To mobilize intensive care patients
  - electronic in-bed cycles, with or without muscle stimulation
  - electronic treadmills or
  - electronic tilt tables are used [6] [7] [8]
2. The implementation of these early mobilization systems has a positive effect on patient outcomes, demonstrated by
  - a decrease in the incidence of the onset of delirium
  - the stability of hemodynamics and respiration and
  - improved bodily function [6] [7] [8]

## Discussion

The use of electronic treadmills or tilt tables, always require the patient to be transferred to the therapeutic equipment. This and the implementation of new robotic or technical devices inevitably carry a safety risk for those involved [8]. The implementation can be very difficult and associated with some hurdles, such as lack of motivation [9]. This can lead to technical interventions not being used or even being implemented at all.

## Conclusions

The findings show that further research into the use of robotic systems in early mobilization is required. In particular, the systems currently in use have not yet led to optimal savings in human resources. It is also clear that robotic systems can usefully supplement but not replace conventional early mobilization.

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