Clinical and Economic Evaluations of Morphine and Fentanyl with Mechanical Ventilation in Intensive Care Settings. A Systematic Review of Methodological Trends, and Reporting Quality

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Background

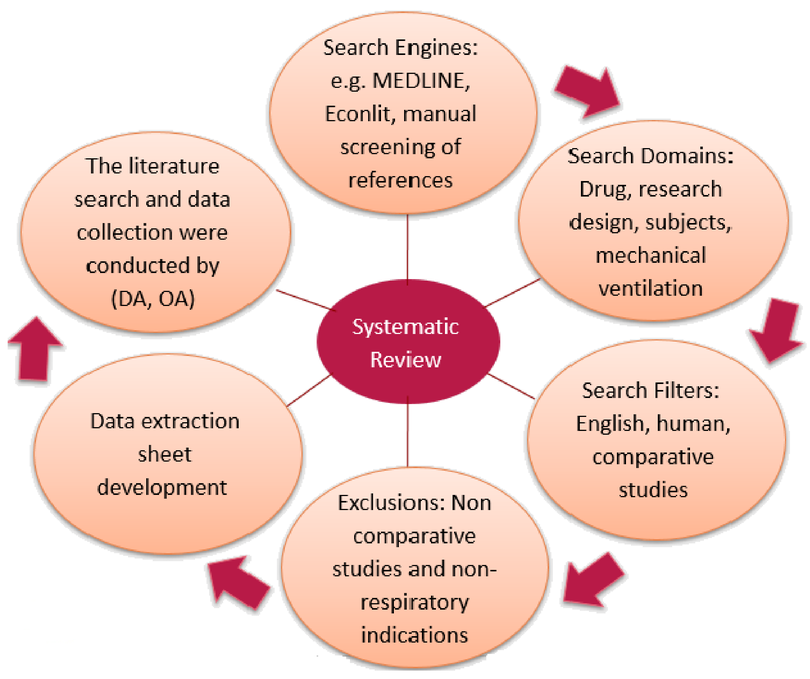
- Patients with respiratory disorders in the intensive care unit (ICU) may require mechanical ventilation (MV)
- Sedatives are required to facilitate the procedure of MV
- Fentanyl and morphine are widely used in ICUs as sedatives
- Research providing a summary of current methodological trends and gaps in the relevant research is needed to guide and improve future research

Objective

- To summarize the characteristics and gaps in the methods and quality of clinical and economic evaluations on the use of fentanyl and morphine in ventilated patients with respiratory disorders

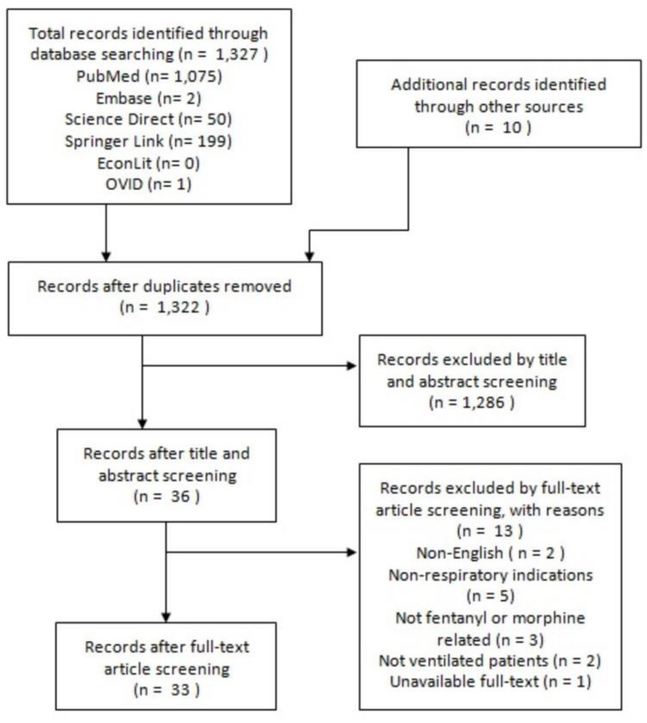
Methods

Figure 1. The step-by-step methods process



Results

Figure 2. Flow diagram of literature search result



Results…*continued*

- Our literature search generated 33 articles
- We reviewed 22, eight, and three studies conducted between 1989 and 2014 in populations of adults, neonates, and pediatrics, respectively
- Only seven studies featured head-to-head comparisons between morphine and fentanyl

Figure 3. Comparative sedatives in literature

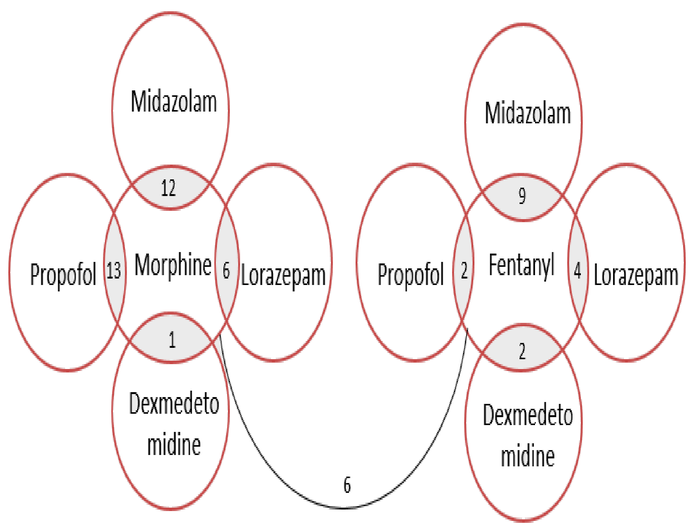


Table 1. Outcome measures

Primary endpoints in adults	• **Optimum sedation (n= 8)** • **Duration of the MV (n= 8)**
Primary endpoints in neonates	• Optimum sedation (n= 6) • Duration of the MV (n= 1) • Neurodevelopmental function (n= 1)
Primary endpoints in pediatric	• Withdrawal symptoms (n= 1) • Level of sedation (n= 1) • The increase in opioid use (n= 1)

- In adults, 17 were randomized controlled trials (RCTs) and 5 were observational studies
- In neonates, 7 were RCTs and 1 was observational study
- In pediatric, 1 was RCT and 2 were observational studies
- Ramsay Sedation, Addenbrooke, Richmond Agitation-Sedation, and Sedation-Agitation scales were in adults
- Premature Infant Pain Profile, Visual Analogue, Neonatal Infant Pain, Neonatal Facial Coding System, and Postoperative Comfort Score were used in neonates
- Ramsay Sedation, Pediatric Intensive Care Unit, and Tracheal suctioning scales were used in pediatrics

Results…*continued*

- None of the RCTs, observational cohorts, and pharmacoeconomics studies met the majority of assessed reporting quality criteria

Table 2. Pharmacoeconomic studies

Number of studies	**(n= 7)**
Types of studies	• Cost-analysis evaluations (n= 3) • Cost-benefit analyses (n= 2) • Cost-effectiveness analysis (n= 1) • Cost-consequence analysis (n= 1)
Perspective	Hospital
Models	• Predictive (n= 2) • Decision analysis (n= 1) • Markov (n= 1)
Sensitivity Analysis	• One-way and two-way probabilistic analyses (n= 1) • Probabilistic analysis (n= 1)

Discussion

- The majority of studies in the review did not define the duration of sedation, which raises concerns about proper time management
- Findings of studies performed with short-term follow-up
- The included study publications are characterized by some gaps and variations in endpoint measures and the methodological strategies used
- In neonates and pediatrics, economic evaluations should more often be incorporated

Conclusion

- The review identified poor reporting quality and high heterogeneity of methods used, potentially limiting the degree to which studies could be interpreted and influence decisions, and findings could be generalized

Acknowledgement

- None

All research members have no conflicts of interest to report

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