European Geriatric Medicine 6 (2015) 336–340

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

Research paper

Interventions to prevent non-critical care hospital acquired pneumonia – a systematic review

S.M. McAuley [a], R.J.G. Price [a], G. Phillips [b], C.A. Marwick [c], M.E.T. McMurdo [a], M.D. Witham [a,*]

[a] Ageing and Health, Medical Research Institute, University of Dundee, Ninewells Hospital, DD1 9SY Dundee, UK
[b] Department of Microbiology, NHS Tayside, Dundee, UK
[c] Population Health Sciences, University of Dundee, Dundee, UK

ARTICLE INFO

Article history:
Received 5 January 2015
Accepted 28 March 2015
Available online 23 April 2015

Keywords:
Pneumonia
Older
Nosocomial
Systematic review
Randomised controlled trials

ABSTRACT

Background: Hospital-acquired pneumonia is a significant burden to healthcare systems around the world. Although there is a considerable body of evidence on prevention of ventilator associated pneumonia, less is known about strategies to prevent hospital-acquired pneumonia in non-critical care settings.
Objective: To systematically review the randomised controlled trial evidence for prevention of hospital-acquired pneumonia in non-critical care settings.
Methods: We searched EMBASE, CINAHL+, MEDLINE and the Cochrane Library. Seventeen different searches were conducted in parallel through each database. Studies were included if they were randomised controlled trials reporting hospital-acquired pneumonia as an endpoint. Studies were excluded if they were performed in critical care or community settings. All studies published up to the end of December 2014 were considered, with no language restrictions. Data were independently extracted by two authors and the Delphi risk of bias tool was applied to assess trial quality.
Results: Five thousand one hundred and one titles were identified across 17 searches. Only two studies were eligible for inclusion in the final review, one from a search of physical therapy interventions and one from a search of enteral feeding. The heterogeneity of the interventions did not permit meta-analysis. One trial suggested possible benefits to early mobilisation; the other trial suggested no benefit or harm from early enteral feeding via nasogastric tube. Both trials enrolled patients with acute stroke. No trials in non-stroke, non-critical care populations were eligible for inclusion in the review.
Conclusions: There is currently insufficient trial evidence on preventing non-critical care hospital-acquired pneumonia to make recommendations on practice.

1. Introduction

Hospital acquired pneumonia (HAP) is a major source of morbidity and mortality [1–6]. Whilst considerable effort has been made to study and prevent ventilator-acquired pneumonia (VAP) [7], much less is known about hospital-acquired pneumonia outside critical care facilities. The estimated prevalence of non-critical care HAP is uncertain; estimates vary between 1 and 8% of hospital admissions depending on the subgroup of patients studied, with older people being at particular risk. HAP is associated with a mortality rate of up to 70% either as a direct consequence or contributing to other factors. It typically adds 7–9 days onto a hospital admission [8], and hence carries significant financial burden.

The aetiopathogenesis of HAP is thought to be an interaction between microaspiration or macroaspiration of oral flora, impaired defence mechanisms (for example impaired cough reflexes, reduced mucociliary escalator activity, impaired pulmonary immunity) and, at least for some patient populations, changes to oral flora as a result of residence in hospital and exposure to antimicrobial agents [9]. Treatment of hospital acquired pneumonia requires additional antimicrobial therapy, may involve treatment of resistant organisms, and each episode of infection is likely to produce deleterious effects on physical function,

* Corresponding author. Tel.: +13 8238 3086.
E-mail address: m.witham@dundee.ac.uk (M.D. Witham).

http://dx.doi.org/10.1016/j.eurger.2015.03.007
1878-7649/

cardiovascular events, delirium, nutrition and psychological status. It is thus important to find ways to prevent hospital acquired pneumonia outside the critical care environment.

Although interventions to prevent VAP have been well studied, and several effective interventions are known [7], interventions to prevent hospital acquired pneumonia outside critical care units are much less studied, and to date, no systematic review has synthesised the trial evidence in non-critical care settings. In this paper, we report the results of a systematic review of interventions to prevent non-critical care HAP as a starting point for future development of interventions to prevent this condition.

2. Methods

2.1. Scope of review

Following a preliminary literature search, an expert panel consisting of the authors was convened, with representation from geriatric medicine, infectious diseases and microbiology. Candidate interventions were identified and discussed based on observational data, use in critical care settings, biological plausibility and topical interest. A range of pharmacological and non-pharmacological interventions were identified for review, and the review was conducted according to a prespecified protocol based on the PRISMA guidelines [10].

2.2. Inclusion and exclusion criteria

The systematic review sought to include only randomised controlled trials of interventions to reduce HAP in the non-critical care setting. Studies comparing intervention with either placebo or usual care, or comparing two different interventions were included in the analysis. Both parallel group and crossover studies were eligible for inclusion. Studies examining community-acquired pneumonia or pneumonia acquired in non-hospital healthcare facilities (e.g. nursing homes) were excluded, as were those which examined VAP.

2.3. Data sources and search strategies

MEDLINE, CINAHL+ and EMBASE databases were searched; search results up to December 31st 2014were included. The Cochrane library was also checked for original research and systematic reviews on HAP. References of included papers were hand searched to identify other papers of interest. No language restrictions were applied to the searches. The search strategies used are included in Appendix A.

2.4. Interventions

Seventeen interventions were examined in three different groups: group A 'patient based interventions' such as risk assessment and mouthwash; group B 'medications' including sedatives, anti-emetics and pro-kinetics; and group C 'staff interventions and environmental factors' including handwashing, staff education and deep cleaning. The full search strategy is attached in Appendix A.

2.5. Outcomes

The primary outcome we sought to extract was the incidence of HAP. Secondary outcome measures were mortality, length of stay, use of multiple antibiotics and total number of days of antibiotic therapy. Data were also extracted on age, sex, description of intervention, comorbid disease, medication use and a description of the healthcare setting.

Table 1
Search flowcharts.

	Risk assessment	Early Mobilisation & Rehabilitation	Oral hygiene	Spirometry	Enteral feeding	Acid Suppressant Medication	Hypnotics and sedatives	ACE inhibitors	Antibiotic Stewardship	Vaccinations	Prokinetic Medication	Hand washing	Alcohol gel	Barrier nursing	Education Programmes	Personal Protective Equipment	Environmental cleaning
Titles identified	706	61	325	16	291	343	73	7	67	220	507	298	4	1713	394	66	10
Abstracts retrieved	102	4	63	8	46	63	7	2	2	17	4	21	2	193	55	11	6
Full papers retrieved	9	2	10	2	24	27	3	2	1	1	0	2	0	3	0	0	1
Studies included	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0