CLINICAL BOTTOM LINE:
In nursing home residents oral hygiene and swallowing difficulties were identified as two modifiable risk factors that could prevent development of nursing home acquired pneumonia. The study showed that residents do not have to have both poor oral hygiene and swallowing difficulties to be at risk of pneumonia, however over ½ of the residents had one or both risk factors. The study also showed that the risk of pneumonia may be reduced by managing one or both of these risk factors.

Clinical Question:
In patients with dysphagia is there a relationship between oral hygiene and pneumonia?

Citation:

Design/Method:
- Prospective study; all residents underwent a prospective surveillance for 12 months post enrolment in the study, or until an end point was reached (i.e. diagnosis of pneumonia or exclusionary event).

Participants:
- 613 nursing home residents were enrolled in the study.
- They were elderly residents (age, > 65 years).
- They were residents of 5 nursing homes in the New Haven, Connecticut area for more than a month.
- Residents were excluded if they were only housed for short term rehabilitation, if their conditions were terminal, who were fed exclusively by gastrostomy or jejunostomy tube or if they were unwilling to give informed consent.

Experimental Group:
- The 613 nursing home residents formed the experimental group.
- At enrolment information included demographic characteristics, degree of mobility, dependence for ADL’s and coexisting conditions as well as the presence of modifiable risk factors for pneumonia. The data was collected from the medical record and form nursing staff.
- The modifiable risk factors included:
  - inadequate oral care (defined by lack of dental examination)
  - lack of influenza vaccination within 1 year before enrolment
  - active smoking
  - depression
  - Use of sedative medication
  - Use of gastric acid reducing medication
  - Use of an angiotensin-converting enzyme inhibitor
  - Feeding position at angle of less than 90 degrees
  - Difficulty swallowing (defined as cough during swallowing)
- The primary outcome of the study was the development of a radiographically documented pneumonia and more than two of the following clinical features:
  - New or increased cough
  - Sputum production
  - Shortness of breath
  - Abnormal chest examination findings
  - Pleuritic chest pain
  - Worsening functional status
  - Fever
  - Respiratory rate of greater than 25 breaths/min
- All chest radiographs were interpreted by a radiologist and interrater agreement measured.
- Cox proportional hazards model used to determine cause between modifiable risk factors and pneumonia.
Control Group:
No control group

Results:
- 131 residents or 21% were censored because of death and 23 residents or 4% were censored because of discharge from the NH facility without an episode of pneumonia.
- 112 residents or 18% developed radiographically documented pneumonia. Of these, 41% were hospitalised and 21 of the 112 died; 15 of the 21 residents died within a week of diagnosis. An additional 123 residents were hospitalised because of reasons other than pneumonia.
- Inadequate oral care and swallowing difficulty were significantly associated with pneumonia.
- The fraction of cases of pneumonia that could have been prevented if inadequate oral care had not occurred was 0.16 or 16% and the fraction that could have been prevented if swallowing difficulty had not occurred was 0.05 or 5%. Among the subset of the cohort who possessed one or more than one of the two risk factors at baseline. 35% of pneumonia cases could have been prevented if inadequate dental care had not occurred and 38% of pneumonia cases could have been prevented if swallowing difficulty had not occurred.
- Attributable fraction measurements showed that up to 21% of pneumonia cases in the entire cohort would not have occurred if both modifiable risk factors had not occurred.

Comments – Strengths/weaknesses of paper

Strengths:
- Statistical analysis
- The use of 5 community nursing homes: There was no restriction to academically affiliated facilities so that the study population represented characteristics and coexisting illnesses of contemporary NH residents.
- The modifiable risk factors were comprehensively assessed. The pneumonia outcome definition was rigorous and included radiographic evidence.
- Use of intraobserver reliability testing of both modifiable risk factor assessment and pneumonia outcome detection.
- Measures of internal validity used
- Evaluating the fraction of cases of pneumonia that could have been prevented by modifying each risk factor.

Limitations:
- Only using lack of dental examination as the definition of inadequate oral care. Other specific measures may have shown a stronger association with the development of pneumonia (e.g. frequency of gum or tooth brushing, degree of dental caries etc).
- The use of cough during swallow as the definition of swallowing difficulty ignores patients who silently aspirate oropharyngeal contents.
- Only baseline assessment of modifiable risk factors.
- No measures of external validity.

Level of Evidence (NH&MRC): IV

Appraised By: NSW Adult Swallowing EBP Group
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