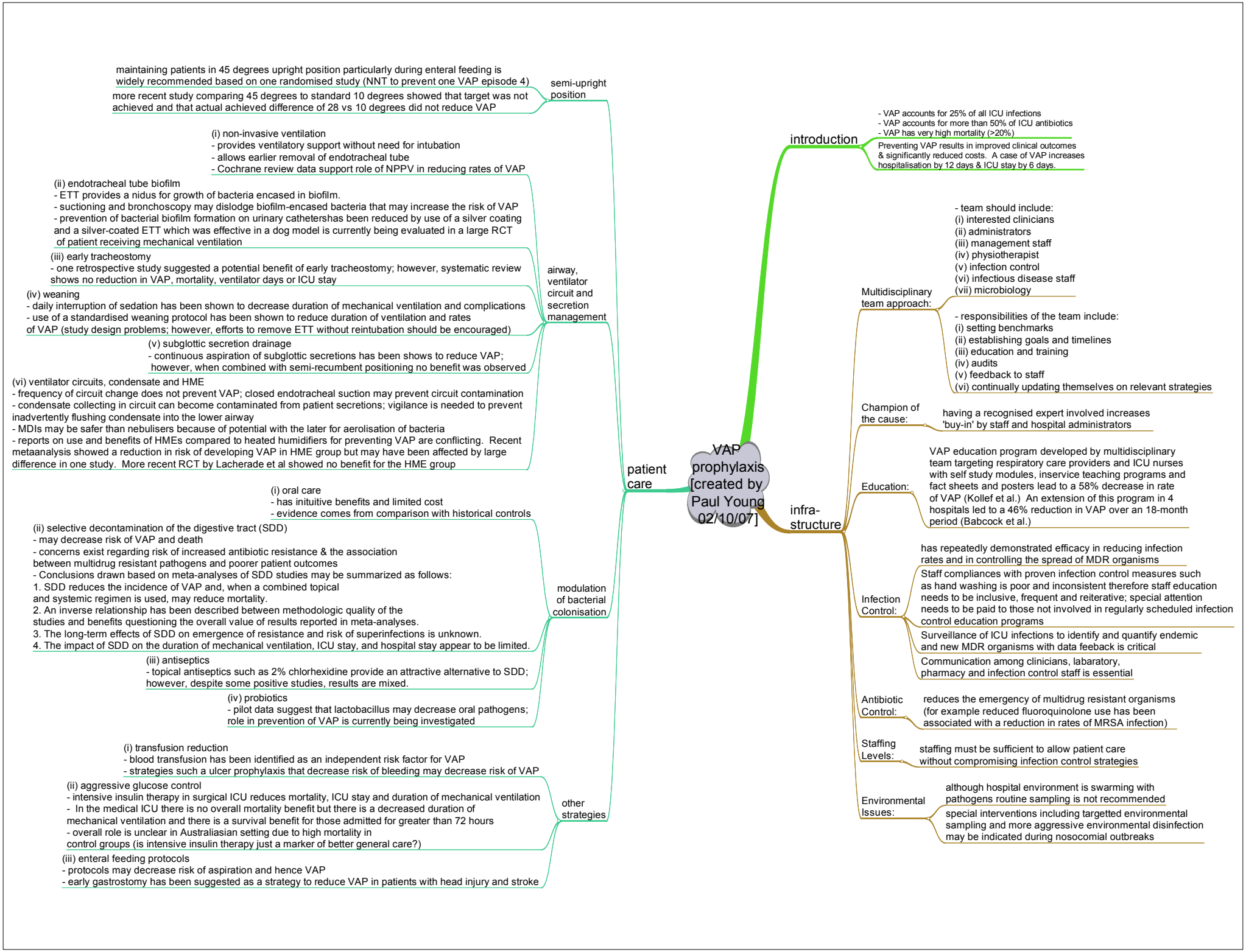
VAP prophylaxis [created by Paul Young 02/10/07]
introduction
- VAP accounts for 25% of all ICU infections
- VAP accounts for more than 50% of ICU antibiotics
- VAP has very high mortality (>20%)
Preventing VAP results in improved clinical outcomes & significantly reduced costs. A case of VAP increases hospitalisation by 12 days & ICU stay by 6 days.
infra-structure
Multidisciplinary team approach:
- team should include:
(i) interested clinicians
(ii) administrators
(iii) management staff
(iv) physiotherapist
(v) infection control
(vi) infectious disease staff
(vii) microbiology
- responsibilities of the team include:
(i) setting benchmarks
(ii) establishing goals and timelines
(iii) education and training
(iv) audits
(v) feedback to staff
(vi) continually updating themselves on relevant strategies
Champion of the cause:
having a recognised expert involved increases 'buy-in' by staff and hospital administrators
Education:
VAP education program developed by multidisciplinary team targeting respiratory care providers and ICU nurses with self study modules, inservice teaching programs and fact sheets and posters lead to a 58% decrease in rate of VAP (Kollef et al.) An extension of this program in 4 hospitals led to a 46% reduction in VAP over an 18-month period (Babcock et al.)
Infection Control:
has repeatedly demonstrated efficacy in reducing infection rates and in controlling the spread of MDR organisms
Staff compliances with proven infection control measures such as hand washing is poor and inconsistent therefore staff education needs to be inclusive, frequent and reiterative; special attention needs to be paid to those not involved in regularly scheduled infection control education programs
Surveillance of ICU infections to identify and quantify endemic and new MDR organisms with data feeback is critical
Communication among clinicians, labaratory, pharmacy and infection control staff is essential
Antibiotic Control:
reduces the emergency of multidrug resistant organisms (for example reduced fluoroquinolone use has been associated with a reduction in rates of MRSA infection)
Staffing Levels:
staffing must be sufficient to allow patient care without compromising infection control strategies
Environmental Issues:
although hospital environment is swarming with pathogens routine sampling is not recommended
special interventions including targetted environmental sampling and more aggressive environmental disinfection may be indicated during nosocomial outbreaks
patient care
semi-upright position
maintaining patients in 45 degrees upright position particularly during enteral feeding is widely recommended based on one randomised study (NNT to prevent one VAP episode 4)
more recent study comparing 45 degrees to standard 10 degrees showed that target was not achieved and that actual achieved difference of 28 vs 10 degrees did not reduce VAP
airway, ventilator circuit and secretion management
(i) non-invasive ventilation
- provides ventilatory support without need for intubation
- allows earlier removal of endotracheal tube
- Cochrane review data support role of NPPV in reducing rates of VAP
(ii) endotracheal tube biofilm
- ETT provides a nidus for growth of bacteria encased in biofilm.
- suctioning and bronchoscopy may dislodge biofilm-encased bacteria that may increase the risk of VAP
- prevention of bacterial biofilm formation on urinary cathetershas been reduced by use of a silver coating and a silver-coated ETT which was effective in a dog model is currently being evaluated in a large RCT of patient receiving mechanical ventilation
(iii) early tracheostomy
- one retrospective study suggested a potential benefit of early tracheostomy; however, systematic review shows no reduction in VAP, mortality, ventilator days or ICU stay
(iv) weaning
- daily interruption of sedation has been shown to decrease duration of mechanical ventilation and complications
- use of a standardised weaning protocol has been shown to reduce duration of ventilation and rates of VAP (study design problems; however, efforts to remove ETT without reintubation should be encouraged)
(v) subglottic secretion drainage
- continuous aspiration of subglottic secretions has been shows to reduce VAP; however, when combined with semi-recumbent positioning no benefit was observed
(vi) ventilator circuits, condensate and HME
- frequency of circuit change does not prevent VAP; closed endotracheal suction may prevent circuit contamination
- condensate collecting in circuit can become contaminated from patient secretions; vigilance is needed to prevent inadvertently flushing condensate into the lower airway
- MDIs may be safer than nebulisers because of potential with the later for aerolisation of bacteria
- reports on use and benefits of HMEs compared to heated humidifiers for preventing VAP are conflicting. Recent metaanalysis showed a reduction in risk of developing VAP in HME group but may have been affected by large difference in one study. More recent RCT by Lacherade et al showed no benefit for the HME group
modulation of bacterial colonisation
(i) oral care
- has inituitive benefits and limited cost
- evidence comes from comparison with historical controls
(ii) selective decontamination of the digestive tract (SDD)
- may decrease risk of VAP and death
- concerns exist regarding risk of increased antibiotic resistance & the association between multidrug resistant pathogens and poorer patient outcomes
- Conclusions drawn based on meta-analyses of SDD studies may be summarized as follows:
1. SDD reduces the incidence of VAP and, when a combined topical and systemic regimen is used, may reduce mortality.
2. An inverse relationship has been described between methodologic quality of the studies and benefits questioning the overall value of results reported in meta-analyses.
3. The long-term effects of SDD on emergence of resistance and risk of superinfections is unknown.
4. The impact of SDD on the duration of mechanical ventilation, ICU stay, and hospital stay appear to be limited.
(iii) antiseptics
- topical antiseptics such as 2% chlorhexidine provide an attractive alternative to SDD; however, despite some positive studies, results are mixed.
(iv) probiotics
- pilot data suggest that lactobacillus may decrease oral pathogens; role in prevention of VAP is currently being investigated
other strategies
(i) transfusion reduction
- blood transfusion has been identified as an independent risk factor for VAP
- strategies such a ulcer prophylaxis that decrease risk of bleeding may decrease risk of VAP
(ii) aggressive glucose control
- intensive insulin therapy in surgical ICU reduces mortality, ICU stay and duration of mechanical ventilation
- In the medical ICU there is no overall mortality benefit but there is a decreased duration of mechanical ventilation and there is a survival benefit for those admitted for greater than 72 hours
- overall role is unclear in Australiasian setting due to high mortality in control groups (is intensive insulin therapy just a marker of better general care?)
(iii) enteral feeding protocols
- protocols may decrease risk of aspiration and hence VAP
- early gastrostomy has been suggested as a strategy to reduce VAP in patients with head injury and stroke