Oral Hygiene in Acute Care

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This project was conducted during modified operations during COVID-19.

BACKGROUND

- Non-ventilator hospital acquired pneumonia (NV-HAP) is the most common healthcare associated infection with incidence ranging from 1.6-3.67 cases per 1,000 admissions (Magill et al., 2014 & Sopena et al., 2014)
- 45% of healthy adults aspirate while sleeping (Azarpazhooh & Leake , 2006 & Quinn et al., 2014)
- There is no standardized oral hygiene in acute care settings for patients who are not ventilated.
- Most NV-HAP occur outside of ICU setting (Baker & Quinn, 2018)
- Nursing care that includes oral hygiene can reduce incidence of NV-HAP that occurs through aspiration, decreasing length of stay & mortality

PICO(T) QUESTION

- For acute care, non-ventilated patients (P) does standardized oral hygiene (I) compared to no standard for oral hygiene (C) reduce the incidence of non-ventilator healthcare acquired pneumonia (O) during inpatient hospital stay (T)?

Evidence Retrieved

Research Evidence				
Non-experimental	Quasi-experimental	Experimental	Systematic Reviews	Meta-analysis/ Meta-synthesis
4 (Low)	3 (high; good; low)		4 (low; good x2; high)	1 (high)
Non-Research Evidence				
Expert Opinion	Organizational (QI/financial data)	Clinical Practice Guidelines		
3 (good)	2 (good; high)	1 (low)		

- Databases searched: PubMed, CINAHL
- Key words used: oral hygiene, non-ventilator healthcare acquired pneumonia, hospitalized, inpatient

Evidence Summary

- Patients who develop NV-HAP are 8.4 times more likely to die during hospitalization & if they survive are 4.13 times more likely to discharge to a SNF
- mortality rate 18.7%-27.7%
- LOS increased by mean of 26.35 days
- Most cases of NV-HAP reported in acute care setting
- During modified operations with decreased census in acute care cluster, there were still 196 cases of NV-HAP

(Baker & Quinn, 2018 & Sopena et al., 2014)

Risk Factors for NV-HAP

Study	Risk Factors Identified
Dent, 2004	decreased level of consciousness, malnutrition, diabetes, elderly, shock, alcohol use disorder, smoking, immunosuppression, antibiotic or corticosteroid use, poor oral hygiene, elevated gastric pH
Sopena et al., 2014	decreased level of consciousness, malnutrition, chronic lung diseases, chronic renal failure, anemia, previous nosocomial infection, poor oral health, thoracic surgery, hospital admission in previous month, >3 Charlson comorbidity index
Quinn et al., 2014	Malnutrition, altered mental status, low albumin, dependent for ADLs, chronic or poorly managed pain, central nervous system depressants or acid-blocking medications
van der Maarel-Wierink et al., 2012	diabetes, age, dysphagia, severe dementia, Parkinson's Disease, use of antipsychotics & proton pump inhibitors

Evidence Summary Continued

- Oral hygiene interventions reduce the rate of NV-HAP, but are poorly defined

- American Dental Association recommends 2-4 times daily oral hygiene for non-ventilated patients (2019)

- Low-good evidence quality evidence exists for BID, QID, & after meal oral hygiene reducing pneumonia rates (Baker et al., 2019, van der Maarel-Wierink et al., 2012, & Sjogren et al. 2008)

Non-Experimental & Quasi Experimental Study Results

Study	Methods	Findings
Magill et al., 2014	Surveys conducted in 183 hospitals to identify nosocomial infection prevalence	-4.0% of patients found to have nosocomial infections -pneumonia tied for top infection along with surgical site infection (each had 21.8% of total infections)
Sopena et al., 2014	Surveillance system for those with HAP at single hospital (600 beds), matched with control to ascertain HAP incidence & risk factors using multivariate logistic regression analysis	-difference in mortality rate between cases & controls was 4.8% with P <0.01; HAP more likely to DC to SNF (32.8% vs. 2.2%, P <0.01
Baker & Quinn, 2018	Retrospective chart review in 21 US hospitals	-70.8% NV-HAP occurred outside of ICUs -43.1% of cases occurred in med-surg units -only 41.1% of cases had oral hygiene documented in chart in 24 hours prior to NV-HAP diagnosis -4.13x more likely to DC to SNF
Baker et al., 2018	Gap analysis found oral hygiene on non-ventilated patients had no standard, pilot unit ordered oral hygiene supplies (mouthwash, denture care supplies, soft-bristled & suction toothbrushes, lip moisturizer), conducted staff education & quarterly chart reviews, flyers to patients & families *(along with updated oropharyngeal tube care & stress ulcer prophylaxis interventions)*	-reduction in NV-HAP cases (P=0.01) -23% reduction 5 years post-study -incidence rate from 1.91 to 1.37 per 1,000 patient days
Pearson, 1996	-3 experiments, each lasting 6 days performed in 2 subjects' oral cavities (1 week off between experiments) -plaque scoring system used to rate efficacy of toothbrush and oral swab in in gingival crevice & approximal site	-toothbrush effective at removing plaque -foam swab ineffective at plaque removal
Sørensen, 2013	-Gugging Swallowing Screen used for patients post-acute stroke to identify those with moderate-severe dysphagia in stroke unit -patients placed in intervention group received toothbrushing, mouth moisturizing, & BID CHG rinse -2 control groups: retrospective at same hospital & same timeframe at neighboring stroke unit	-pneumonia was diagnosed in 34% of the intervention group, 43% in both control groups

Systematic Review Results

Review	Studies	Results
Van der Maarel-Wierink et al., 2011	A) 3 studies provided oral care directly after meals B) oral hygiene aid provide to intervention group C) weekly professional oral care provided	A) decreases pneumonia (a study found decreased febrile days & mortality from pneumonia) B) less pneumonia mortality intervention than control group C) decreases respiratory pathogens
Azarpazhooh & Leake, 2006	Numerous with heterogenous methodologies	-association between oral health & pneumonia -antimicrobial intervention reduces occurrence of respiratory diseases -oral hygiene proven to reduce pneumonia incidence in long-term care & ICU settings
Sjogren et al., 2008	Numerous with heterogenous methodologies, some randomized control trials	-oral hygiene after meals can reduce pneumonia mortality rates -povidone iodine scrubbing of pharynx prior to surgery reduces NV-HAP rates

Gunsolley Mouth Rinse Data

Review/Analysis	Results
Systematic review of: A) Essential oils B) Cetyl pyridinium chloride (CPC) C) Chlorhexidine (CH)	Mean percent reduction of plaque index: A) 27 B) 15.4 C) 40.4
Meta-Analysis of: A) Essential oils B) Cetyl pyridinium chloride (CPC) C) Chlorhexidine 0.12% (CH) D) Stannous fluoride dentrifice E) Triclosan, 2.0% gantrez copolymer	P value for 6 month anti-gingival effect A) 0.006 B) 0.003 C) 0.000 D) 0.000 E) 0.000

ACTION PLAN

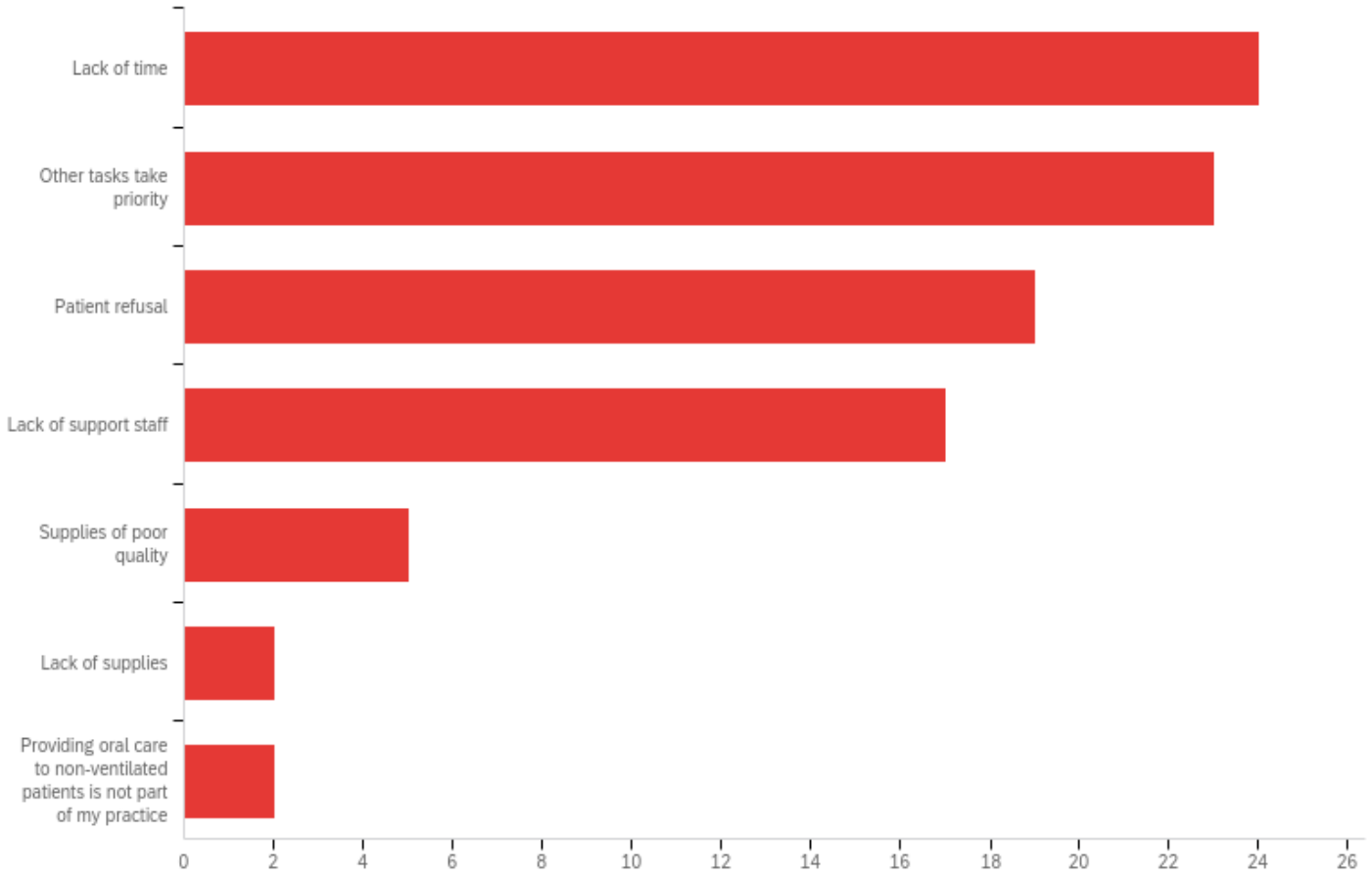
- Rollout on 14C Adult Medicine where many risk factors for development of NV-HAP exist in patient population
- Establish standard of oral hygiene with EPIC charting expectations, educate unit RNs & CNAs on once per shift standard & reasons underlying new standard
- New oral hygiene supplies for unit: mouthwash, suction swabs, independent care kits
- Biweekly audit by Styker sales representative
- Monthly meeting with unit manger
- No set end point, success of intervention & next steps re-evaluated in monthly meeting

PROJECT METRICS

	Metric	Operational Definition	Source of Data	Data Collection Frequency	Feedback Plan (to what stakeholders, & when)
PROCESS	-Oral hygiene: BID brush & antimicrobial swish (swab for patients unable to expectorate)	-RN to provide education to patient on increased risk of pneumonia while inpatient -RN/CNA to provide oral care supplies to independent patients or provide setup/care for bedbound patients -RN/CNA charts if care performed in EPIC	-audit by Stryker sales representative	-biweekly	-biweekly audit data sent to IPOP -findings communicated to unit manager in monthly meeting
OUTCOME	-oral hygiene performed each shift	-oral care intervention charted in EPIC under daily care	-audit by Stryker sales representative	-biweekly	-unit manager in monthly meeting

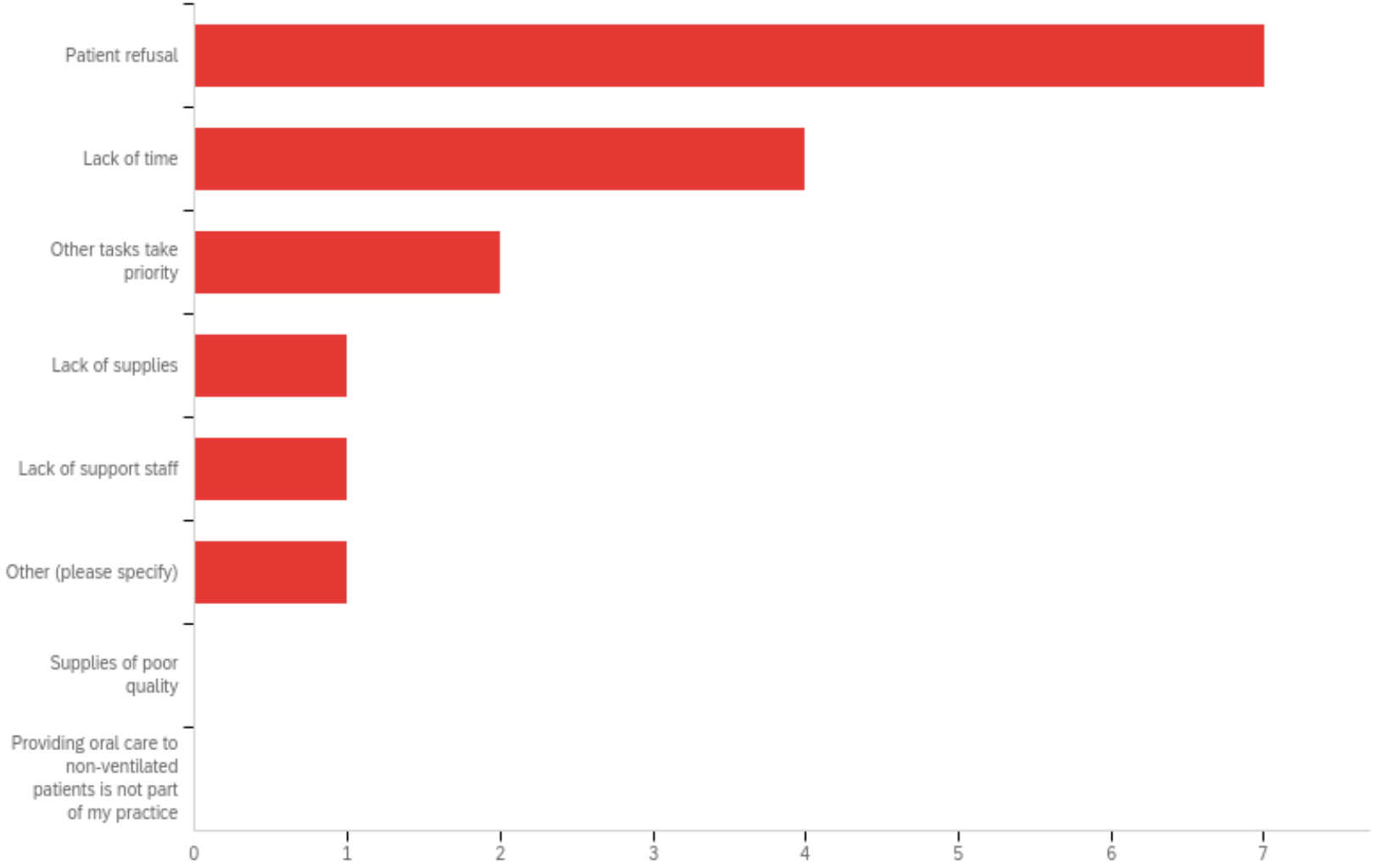
Results

Pre-Intervention Staff Survey



On a TYPICAL shift which of the following are barriers to performing regular oral care with your patients? (select all that apply)

Post-Intervention Staff Survey



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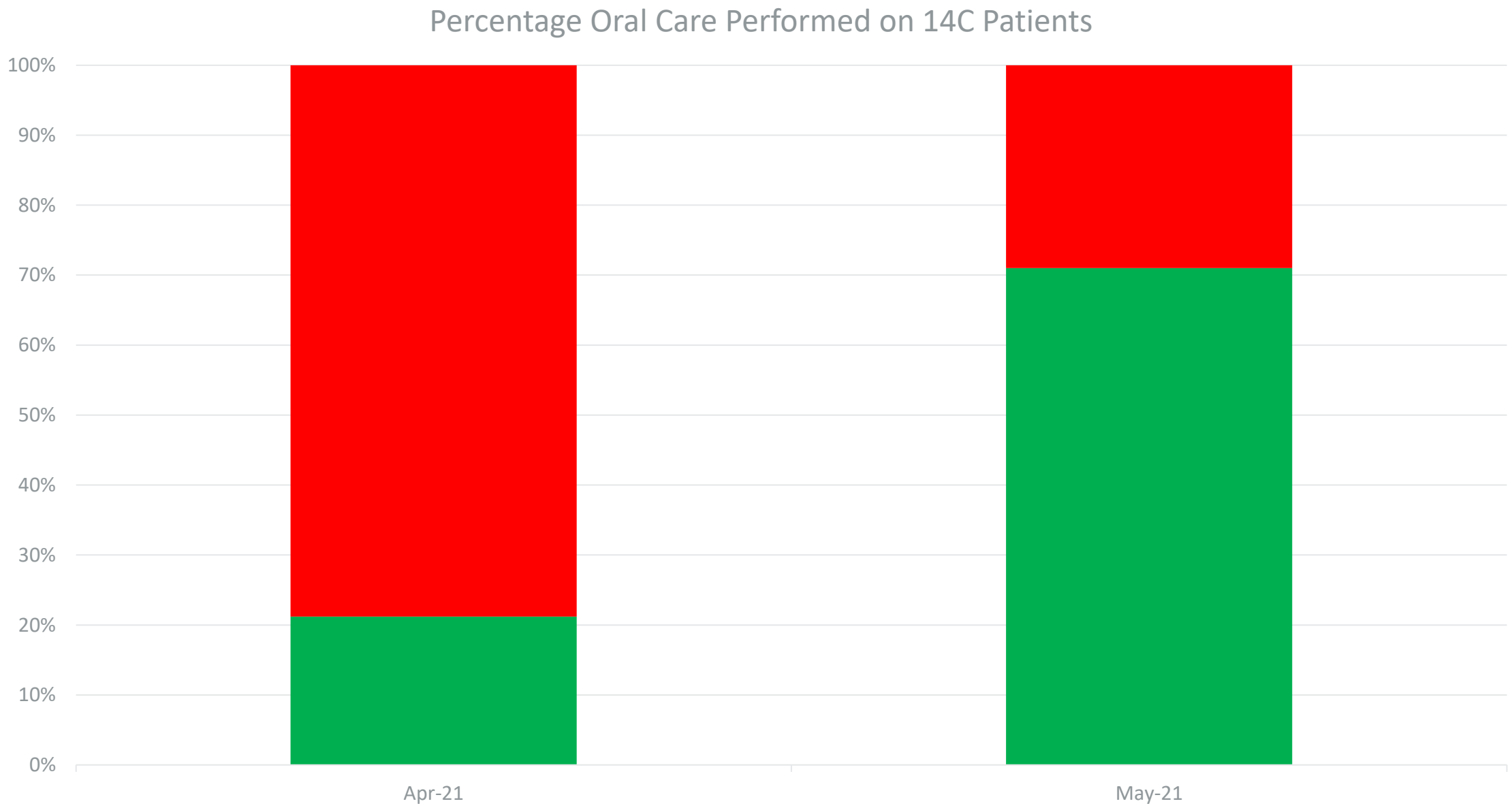
Percentage Oral Care Performed on 14C Patients
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Apr-21
May-21

Return on Investment for 14C

Cost of Change		Benefit of Change		
Supplies (mouthwash):	$321.72		Baseline	
		One-time reduction (supplies, labor, equipment)	$	
		Ongoing reductions (supplies)	$	
Equipment:	$	Increased revenue	$	
Labor costs:	$	Increased length of stay	$207,928	
Other costs:	$	Other	$	
Subtotal	$321.72	Subtotal	$207,928	
OVERALL RETURN ON INVESTMENT		$207,606.28		

* For modified operations during COVID-19, higher number of complications prevented when hospital at full capacity

CHALLENGES

- main challenge to implementation has been acuity of the unit & lack of CNA availability to perform hygiene care
    - During modified operations under COVID-19, 14C medicine unit underwent staffing changes that left CNAs responsible for 13-14 patients (up from 10); therefore this project is RN-driven
    - Buy-in from unit staff impeded by staff burnout & current patient acuity

IMPLICATIONS FOR PRACTICE

- Systemic barriers (no institutional oral hygiene standard, lack of CNA support, high acuity of patients, having to gather oral hygiene supplies) exist to oral hygiene being regularly performed for all patients

- On a unit level, regular education & tracking should be performed & incentives might be beneficial when buy-in is challenge

- Systemically, easily grouped hygiene supplies/kits & adequate nursing staff are imperative to success

- This best practice is applicable across all acute care, institutionally & globally

CONCLUSION

- Toothbrushing & rinsing mouth with antimicrobial solution are critical components of proper oral hygiene & pneumonia prevention when inpatient

- Oral hygiene has long been known to reduce pneumonia rates, but many barriers exist to performing as standard of care

- Feasibility of intervention drives recommendation of BID oral hygiene for this project

QUESTIONS & DISCUSSION

REFERENCES

- American Dental Association Protocol. via Quinn, B., Giuliano, K.K, & Baker, D. (2020). Non-ventilator health care-associated pneumonia (NV-HAP): best practices for prevention of NV-HAP. *American Journal of Infection Control, 48*(1), A23-A27. DOI: https://doi.org/10.1016/j.ajic.2020.03.006
- Azarpazhooh, A. & Leake, J.L. (2006). Systematic review of the association between respiratory diseases and oral health. *Journal Periodontology, 77*(9), 1465-82. DOI: 10.1902/jop.2006.060010
- Baker, D., Quinn, B., Ewan, V., & Giuliano, K. (2018). Long-term reduction of nonventilator hospital-acquired pneumonia. *Journal of Nursing Care Quality, 34*(3), 223-229. DOI: 10.1097/NCQ.0000000000000359
- Baker, D. & Quinn, B. (2018) Hospital acquired pneumonia prevention initiative-2: incidence of nonventilator hospital-acquired pneumonia in the United States. *American Journal of Infection Control, 46*(1), 2-7. DOI: 10.1016/j.ajic.2017.08.036
- Dent, M.R. (2004). Hospital-acquired pneumonia: the "gift" that keeps on taking. *Nursing, 34*(2), 48-51. DOI: 10.1097/00152193-200402000-00047
- Gunsolley, J.C. (2006). A meta-analysis of six-month studies of antiplaque and antigingivitis agents. *Journal of the American dental Association 137*(12), 1649-1657. DOI: 10.14219/jada.archive.2006.0110
- Gunsolley, J.C. (2010). Clinical efficacy of antimicrobial mouthrinses. *Journal of Dentistry 38*(S1), S6-S10.
- Magill, S.S., Edwards, J.R., Bamberg, W., Beldavs, Z.G., Dumyati, G., Kainer, M.A., Lynfield, R., Maloney, M., McAllister-Hollod, L., Nadle, J., Ray, S., Thompson, D.L., Wilson, L.E., & Fridkin, S.K. (2014).Multistate point-prevalence survey od healthcare-associated infections. *New England Journal of Medicine, 370*(13), 1198-208. DOI: 10.1056/NEJMoa1306801
- Pearson, L.S. (1996). A comparison of the ability of foam swabs and toothbrushes to remove dental plaque: implications for nursing practice. *Journal Advanced Nursing, 23*(1), 62-69. DOI: 10.1111/j.1365-2648.1996.tb03136
- Sjogren, P., Nilsson, E., Forsell, M., Johansson, O., & Hoogstraate, J. (2008) A systematic review of the preventive effect of oral hygiene on pneumonia and respiratory tract infection in elderly people in hospitals an nursing homes: effect estimates and methodological quality of randomized controlled trials**.** *Journal of American Geriatrics Society, 56*(11):2124-30. DOI: 10.1111/j.1532-5415.2008.01926.x
- Sopena, N., Heras, E., Casas, I., Bechini, J., Guasch, I., Pedro-Botet, M.L., Roure, S., & Sabria, M. (2014). Risk factors for hospital-acquired pneumonia outside the intensive care unit: a case control study. *American Journa of Infection Control, 42*(10), 38-42. DOI: https://doi.org/10.1016/j.ajic.2013.06.021
- Sørensen, R.T., Rasmussen, R.S., Overgaard, K., Lerche, A., Johansen, A.M., & Lindhardt, T. (2013). Dysphagia screening and intensified oral hygiene reduce pneumonia after stroke. *Journal Neuroscience Nursing, 45*(3) 139-46. DOI: 10.1097/JNN.0b013e31828a412c
- van der Maarel-Wierink, C.D., Vanobbergen, J.N.O., Bronkhorst, E.M., Shols, J.M.G.A., & de Baat, C. (2012). Oral health care and aspiration pneumonia in frail older people: a systematic literature review. *Gerodontology 30*(1), 3-9. DOI: 10.1111/j.1741-2358.2012.00637.x