In this systematic review, the patient is the elderly who live in institutionalised care, in the form of care homes or hospitals and the problem is the level of oral hygiene within this cohort of patients. The review will examine the impact of intervention in the form of education and training of carers and healthcare workers on the oral health of the patient. The control group are those who are in institutionalised care but whose carers received no training/education in oral health hygiene. The outcomes will prove or disprove the null hypothesis as below.

With Britain’s ageing population it is important to look to the future and how we can improve the oral health of the elderly living in Nursing homes. It is a well established fact that the oral hygiene of institutionalised elders is poor (Rabbo et al., 2012, Chen et al., 2013 & Wyatt, 2009). It is important to address this issue as increasing numbers of elderly people are remaining dentate; research has shown with this increase the levels of oral hygiene in these dentate residents is deteriorating (Willumsen et al., 2011). In addition to this there is also a greater awareness amongst residents about their dental aesthetics (Finkleman et al., 2010) Poor oral hygiene is increasingly being linked to systemic disease such as aspiration pneumonia (Willumsen et al., 2011). With this it seems imperatives that the UK as an issue introduces methods into nursing homes to improve the oral hygiene of the residents and thus reduce the demand on the National Health Service.

In addition for the need to introduce methods to improve oral hygiene in Nursing homes it must also be established what barriers there are to oral care. Previous research has indicated that such barriers to oral care in care homes included lack of education, lack of equipment and lack of co-operation of residents (Jablonski et al., 2009 & Wardh et al., 2011) This systemic review aims to establish the quality of previous research into the effects of interventions on the oral hygiene of institutionalised elders and barriers that may occur to providing this care.

The aim of this review is to gather information from literature and investigate whether or not Interventions for improving oral health in institutionalised elders has a positive effect on their oral health.

Objectives:

1) To quantitatively compare the oral health, in terms of plaque, caries, ** of elders whose carers have had education and training in oral health care, with those whose carers have not had any intervention.

Null Hypothesis: Intervention in oral health care of institutionalised elderly does not improve their overall oral health and hygiene.

Frenek et. al carried out a randomised control trial to look at the effects an oral education programme had on the oral health of elderly residents. They used 4 markers to determine oral health, denture plaque, denture induced stomatitis, dental plaque and gingivitis. This was measured both before the intervention and 6 months afterwards. They carried out all examinations during the same time period in the day and these examinations were single blinded and the group allocation was only revealed when the results had been collected. The results showed that those patients who were in the nursing homes that participated in the
training programme had their oral health improved, however a more noticeable difference was seen in patients with dentures. Although their study used 22 nursing homes in the randomised control trial, the size of these homes varied from 20 to 40 beds. This may have had an effect on the time staff had to carry out oral hygiene tasks. The study also had unequal proportions of patients in terms of both gender and mobility. There was no long term follow up carried out so it is unclear whether this education programme would have a long term effect or whether re-training at annual intervals would be required due to staff turnover and other factors.

Blinkhorn et. al (2011) looked at the effects both oral hygiene training and an oral hygiene protocol had on the oral health of elderly residents in a ward within a geriatric hospital. A multi-disciplinary team involving a dentist, dietician and nurses devised an oral health training program and the oral hygiene protocol saw a new oral hygiene trolley, similar to a drugs trolley already used in many hospitals, being designed. This allowed for each patient to be given a personalised oral hygiene care plan. Oral health was assessed by measuring plaque scores, gingivital index scores and pocket depths before the intervention and again at 3 and 12 months after the intervention. Their results showed that plaque scores and gingival index scores showed significant improvement within the first 3 months and that denture hygiene was also showed a marked improvement. At 12 months both plaque scores and denture cleanliness did not show any significant difference from those at 3 months but the improvement shown at 3 months had been maintained. The gingival index scores did show further reduction from 3 to 12 months. However these results are limited in being able to come to some conclusions if this type of intervention could be rolled out nationally to improve oral health. The sample size was small at only 28 patients and there was no control group. It would also have been beneficial if they had looked at the effects of the training and the protocol separately to see if both were necessary to show this improvement in oral hygiene or if one played a bigger part than the other. Although this study is limited it did show a very innovative idea, which if further studied could be implemented into daily ward regimes.

Le et al. (2012) looked at the effects oral hygiene education had on elderly patients within long term care facilities. They trained staff using a video format and tested their knowledge before and after the training and then again at the follow up 6 months later. This allowed them to see if the staff retained the information. They measured oral health using the modified plaque index and modified gingival index at baseline and then again at 6 months. A significant improvement was seen in the modified plaque index 6 months after the training but not in the modified gingival index. It was suggested that this may be due to the fact that there was insufficient time between intervention and follow up for the gingiva to have responded to improved oral hygiene. The study also used the minimum sample size required to provide significant results and they only included patients who had natural teeth so this study bears no relevance to a significant proportion of elderly people who are edentulous.

Kullberg et al. focused their attention on the attitudes of staff towards oral healthcare provision within a nursing home in Sweden and looked at the effects oral health education had on the staffs’ attitude towards it, trying to focus on practical solutions and any products that would be suitable for patient use. They involved several teaching methods including individual instruction, small discussion groups and theoretical lectures. The staff in the nursing home had access to trained dental staff throughout the study. Their results showed
that after the training staff felt they had gained more knowledge about oral care and were more confident in delivering oral care to their patients. They also noted that some of the issues perceived by staff before the training had reduced. They also noted that after training majority of patients were using chlorhexidine gluconate 1% gel for 1 week every month and electric toothpastes daily. However as they did not examine the patients it is unclear if this had any effect on the oral health of the elderly residents. This study also had no quantitative data and was just based on staff opinion. This could have been improved by carrying out a questionnaire before and after training to allow for a more accurate analysis of the effects the training had.

Simons et al. looked at the effects an oral training programme within an elderly residential home had on the oral health of elderly residents. Staff in 7 nursing homes were given a 90 minute oral education session involving various teaching methods and were also given further information for them to read at their leisure. They staff were asked to carry out a questionnaire before and 1 week after training to assess their levels of knowledge. It was noted that baseline knowledge of the staff was low. The results of the post-test questionnaire showed the staff’s level of knowledge to have significantly increased. The elderly patients also showed an increase in the number of coronally filled surfaces of teeth at 12 months after the training, but no other significant differences were seen in those that were resident in the nursing homes that had received the training and those who were in the control group. They also looked at the number of staff that were still working in the nursing homes 12 months after training and showed that only 53% of staff who had received the training were still in post. This shows that a constant turnover of staff may also play a role in the oral health of elderly residents as staff who are trained in oral health leave and are replaced by new staff who are expected to carry out their duties but have received no further training.

Petteri et al. completed a longitudinal study of subjects living in nursing homes. The subjects were split into 3 groups; A, B and C. Group A participants had a dental hygienist provide oral hygiene once every 3 weeks, while the nursing staff involved with participants of Group B received training in oral health care, after which they then adopted the task of completing the daily oral hygiene routine of each participant. Group C acted as the control group and, therefore, received no intervention. The service provided to Group A by the hygienists involved brushing the subject’s teeth, cleaning their interdental spaces and removing and cleaning dentures. The nursing staff caring for Group B received training in oral hygiene from dental hygienists, in which they were instructed on the correct usage of electric toothbrushes, interdental brushes/tooth picks and denture hygiene. The nursing staff were then able to assume the daily care of the subjects oral hygiene, which involved daily brushing with an electric toothbrush and toothpaste, cleaning of the interdental areas twice per week, the removal and rinsing of dentures after every meal, brushing the dentures every evening with soap and water, and finally, brushing the dentures which Chlorhexidine gel once per week. The longitudinal study completed by Petteri et al. showed that dental and denture hygiene improved in both groups where the nursing staff received training. The method of collecting data was through a dental examination being performed before intervention occurred and again approximately 11 months later. Poor dental hygiene was classified as: Dental plaque, calculus or food remnants covering more than one third of visible tooth surface, including crown and any visible root.

Cheung et al employed a different method from Petter et al, with respect to the fact that Cheung et al assessed the outcome of intervention from trained elderly peers, while Petteri
et al assessed the outcome of intervention from trained professionals. Cheung et al conducted a quasi-randomised, controlled, interventional trial at two social centres – A and B, whereby the elderly ambassadors gave two one hour talks to the participants, who were then interviewed after the programme to explore their perception of the program. The elderly ambassadors had been trained, prior to giving the talks, by dentists in toothbrushing, flossing and use of interdental brushes. The results from Cheung et al were similar to Petteri et al as they found that intervention from a person trained in oral hygiene measures, will improve the oral hygiene status of the participants. Cheung et al used visible plaque index (VPI) and gingival bleeding index (GBI) to measure the success of their intervention. For both indices, the score ranged from 0.00 to 1.00, with 0.00 highlighting the absence of plaque/gingival bleeding, therefore, the lower the score, the better the standard of oral hygiene. The study was completed using subjects who had at least one real tooth and had given their written, informed consent. However, the elderly ambassadors that were selected did not have to fulfil any criteria and were simply nominated by social workers, and no null hypothesis was set. Another disadvantage of this study was it only involved subjects who had real teeth and excluded the oral hygiene of edentulous patients. Other limitations included small number of control subjects, the fact it measured peers and not the effectiveness of a program delivered by healthcare professionals and the possibility that the effectiveness of the program may not extend beyond 1 month.

A study carried out by Sweeney et al evaluated the effectiveness of a staff training program on the oral health of elderly residents in a nursing home. A baseline oral health assessment was carried out on all participants before any training of staff was completed. The subjects were split into two groups and only group 2 staff received training, therefore group 1 acted as control for the first 9 months. An oral assessment of both groups was completed at 3 months and again at 9 months, at which point training was then provided to the nursing staff of group 1 and a final oral health assessment was completed of all participants 18 months after baseline examination. Overall, it was discovered that daily oral hygiene measures were implemented for almost all subjects after the training, the rate of gingivitis decreased, as did the rate of xerostomia and the number of patients who continuously wore their denture also decreased. Sweeney et al’s study had advantages to our review in the sense it was carried out in Scotland and it was a controlled, intervention study. It also included the patient’s social history in the study, eg smoking and diet history, therefore, giving a more well-rounded view of the causes and treatment of oral disease. However, their intervention showed that not all improvements in oral hygiene were sustainable to the 18 months, however, staff were keen to have laminated daily oral hygiene protocols provided along with the multi-media training resource pack in order to maintain long term education. This study also disproves the null hypothesis as it shows that oral hygiene training has an impact on clinical practice with a measurable improvement in oral health.

Peterson et al’s study concerns the approach of the WHO Global Oral Health program on improving the oral health of older people. The study compares developed and developing countries elderly patient’s oral health problems, such as tooth loss, dental caries experience, periodontal disease rates, xerostomia and oral precancer/cancer. The report shows that the use of professional dental services is low among elderly people, particularly throughout the socio-economically disadvantaged, potentially due to poor access to oral care caused by a shortage of dental manpower. There is also the financial implication linked to dental care which may cause hardship for the elderly population, particularly in retirement. The study
by Peterson et al has shown the positive influence that fluoride has in preventing dental caries in the elderly. The topical application of fluoride along with fluoride mouthwashes are proven to reduce the rate of root surface caries in both active elderly, and those in institutionalised care. It was also found that chlorhexidine rinses reduces gingival inflammation, pocket depth and incidence of denture stomatitis. Peterson et al stated that oral health care programs which provide instructions to both nursing staff and patients does in fact reduce the number of teeth with decay and requiring periodontal treatment, and it also reduces the prevalence of denture stomatitis. It was also shown that modifications to the barriers of dental care, such as finance, by providing a free public health program, does improve their oral health status and quality of life. WHO has recently developed two global strategies for the prevention of chronic disease; Global Strategy on Diet, Physical Activity and Health, and Global Strategy for Chronic Disease Prevention. These strategies were devised in an attempt to strengthen the prevention of disease.

Paper 1: Dental care and treatment needs of the elderly in nursing homes in Saarland: Perceptions of the home Managers
The Aim was to find establish the perceptions and attitudes of nursing home mangers the need and importance of oral health care in nursing homes. This study was a qualitative cross-Sectional study, a questionnaire was sent out to 114 nursing homes. The strengths of this paper where that it indicated barriers to care from the view of managers of nursing homes. Barriers found by this study included lack of interventions, lack of interests of residents, economic factors, staff shortages and lack of facilities.
Limitations of this study were as follows:
- No actual inspections carried out to establish the actual oral health status of residents in nursing homes,
- No hypothesis were made (No Null or alternative hypothesis),
- Only 44 out of 114 Questionnaires therefore the sample size was very small – results are not very representative as cannot extrapolate the data to the wider population.
- This study did not have any statistical analysis made and no data was collected thus this study is subjective and conclusions where speculative.
- Not in our country carried out in USA.

This study highlights that poor oral hygiene in institutionalised elders is not just an issue in the UK.

Paper 2: The Impact of Integration of Dental Services on Oral health in Long-Term Care: Qualitative Analysis
This study aimed to qualitatively analyse how integration of Dental Service in long term care and how it affects the oral health of residents. It was a cross-sectional study looking at both qualitative and quantitive data (qualitative data presented in another paper).
Aspects of this study that where good are as follows:
- Different Variables (Home A had a free-for-service hygienist that treated patients at their request, Home B – had a dentist that once a week that would see patients. At their request and home C – had a full time dental team and all patients were screened).
- Examinations carried out of study percipients and documented with photos.
Open conversations with percipients had guided questions to get the required information.

Limitations of this study were as follows:
- Small sample size only 61 thus results are not representative of the wider population.
- Research carried out in Canada, not representative of the UK.
- There is no Hypothesis.
- Used pain to amylase oral discomfort but pain is subjective so not a constant.

This study states that the research carried out in this paper indicate the need for research into the effectiveness of introducing interventions to improve oral health in people in residential care thus supporting our proposed research project. It also indicates that it is important to use photos to document cases for research purposes which is something we could implement in our proposed study.

Are the barriers to good oral hygiene in nursing homes within the nurses or the patients?

This study aims to establish the oral hygiene of residents in Nursing homes and what the nursing staff perceived as being barriers of care for providing oral hygiene to patients. This study was a Cross-sectional study in the form of questionnaire handed out to Nursing home nurse.

The limitation of this study is not representative of UK as study was carried out in Norway.

The strengths of this study were as follows:
- Large sample size as over 11 different nursing homes thus representative to the population.
- Statistical analysis made. Clinical examination was carried out of Nursing Home patients by Dental hygienist and the dental records of patients where obtained.
- Criteria for Nursing Home selection to ensure they had a representative study of whole are.
- The questionnaires to Nurses where anonymous – thus reducing bias.
- Indexes where used to standardised examinations – mucosal plaque index, standardised.
- Took patients cognitive status into consideration.
- Nursing level e.g. auxiliary/registered was also included in variables along with whether the staffs were experienced in Nursing Home care.

This study indicates that education and inventions are required in nursing homes. In addition this study indicates that inventions need to target everyone involved in patients care and not just nurses.

Paper 4: Effect evaluation of a supervised versus non-supervised implementation of an oral health care guideline in nursing homes: a cluster randomised controlled clinical trial

This study aimed to compare supervised versus non-supervised oral health care in Nursing homes. This clinical trial was a single-masked cluster randomised intervention trial with an institution as the unit of randomisation.

Limitations of this study were that it was carried out in Belgium and that it is not longitudinal only lasted 6 months.

Strengths of this clinical trial were as follows:
• There was control group verse intervention group.
• Statistical analysis where carried out.
• Good sample size. Had inclusion and exclusion criteria for both the patient’s and nursing homes.
• Masked clinically trained professional did the dental examination.
• Used standardised indexes to quantify Oral Hygine.

Effects of an oral Health Assessment education program on nurses’ knowledge and patient care practices in skilled nursing facilities

This study aimed to investigate the effects of giving nurses education on OH intervention for NH residents and the effects this has on the resident’s oral health. This study was an Intervention study.
Good aspects of this study were as follows:
• Education program was comprehensive.
• Medical records where checked of patient’s pre and post intervention.
• Had intervention hypothesis.
• Statistical analysis was carried out.

Weaknesses of this study were as follows:
• Small sample size.
• Polite study.
• No power analysis was done.
• No examination of residents was carried out on patients.
• No null hypothesise.
• Not carried out in the UK

Measuring the Oral Health of Nursing home Elders

This study aims to establish the ability of dental hygienists’ and nursing home nurses to assess Oral health in elderly Nursing Home residents. This study was a descriptive and prospective pilot study.
The good points of this study where as followed:
• Considered Oral Health, cognition and functional abilities of Patients.
• Statistical analysis was carried out.
Weaknesses of this study where as followed:
• Pilot study.
• Small sample size.
• Carried out in the USA not UK.

A 5 Year Follow- up of older adults residing in long-term care facilities: Utilisation of a comprehensive dental program
The aim of this study was to compare nursing residents that received treatment form a comprehensive dental program with those that did not over a 5 year period.
Strengths of this study where:
• Over long period of time.
• Used standardised index to assess patients Oral Health.
• Used dentist to carry out the assessments
• Statistical analysis where carried out.

Weakness of this study where:
• Carried out on Canada not UK.
• Small sample size.

Indices throughout the studies included the Root caries index and Community Periodontal Index used in Sweeney et al. The Visible Plaque Index (VPI) and Gingival Bleeding Index (GBI) were used in Cheung et al.

Although majority of the studies have shown that oral healthcare education significantly improved oral health in the elderly residents, Simons et al (2000) findings have shown that there was no significant difference in the oral hygiene of patients receiving care from staff that have participated in oral health education compared with those who hadn't. The results in these studies are however limited due to small sample sizes and poor study design. It would be useful to carry out a further study which looks at designing an oral hygiene daily protocol for staff to follow which would be used as an adjunct to oral health care training. This would need to be carried out in a larger sample group than the studies described here and would hopefully provide more conclusive evidence that providing staff with oral health care education significantly improves the oral health of elderly residents. If such evidence is found then this would possibly allow for the oral hygiene protocol to be rolled out to NHS care facilities throughout the UK.

References:


G. I. Finkleman, H. P. Lawrence & M. Glogauer, (2012), The Impact of Integration of Dental Services on Oral health in Long-Term Care: Qualitative Analysis, *Gerodontology*, vol. 29, pp. e77-e82


T. Willumsen, L. Karlsen, R. Næss & S. Bjørntvedt, (2012), Are the barriers to good oral hygiene in nursing homes within the nurses or the patients?, *Gerodontology*, vol. 29, pp. e748-e755