TITLE PAGE

The impact of a geriatric assessment and optimisation-based preoperative clinic on the management of older patients receiving dental treatment under general anaesthetic or conscious sedation: a service evaluation.

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PROKARE REPORT

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ABSTRACT

Objectives: To review patient characteristics, recommendations made and treatment outcomes of frail/older patients referred to a specialist multidisciplinary geriatric assessment and optimisation-based preoperative clinic (PROKARE), prior to patients receiving dental treatment under general anaesthesia (GA) or conscious sedation (CS).

Background: Although the use of preoperative comprehensive geriatric assessment to improve pre/peri and postoperative mortality has been reported for many surgical domains, its use prior to dental surgery has not been reported previously.

Methods: Data were collected retrospectively from the dental notes of 52 patients referred from the Special Care Dental (SCD) Department to the PROKARE service for optimisation prior to dental treatment under GA/CS using a case note study approach. Data extracted included patient demographic characteristics, medical history, clinical management and the treatment outcomes for each patient. The data extracted was analysed with descriptive statistics.

Results: Key reasons for referral were caries management, retained roots and poor co-operation. Multiple co-morbidities were noted among the patients referred, with 14 (27%) having four or more co-morbidities. The PROKARE assessment identified issues such as: treatment could be carried out under CS instead of GA; consent; and the need for medication change and/or further medical investigations. As per recommendations from PROKARE, 39 patients (75%) received dental treatment while five (10%) did not receive treatment, and a further eight (15%) died prior to treatment.

Conclusion: Geriatric assessment and optimisation-based preoperative clinics in the dental management of frail, elderly patients having treatment under GA or CS techniques is valuable, but further research and assessment of current service provision is needed to increase the evidence base.

KEYWORDS: Dental, Geriatric, Assessment, Optimisation

INTRODUCTION

The UK's population is ageing, with a higher risk of frailty and subsequent poorer health.[1] There are currently nearly 12 million people aged 65 and over in the United Kingdom and predictions by the Office of National Statistics (ONS)[2] indicate that, in 50 years' time, there is likely to be an additional 8.6 million added to this group, this additional number is roughly the size of the current population of London. Since the middle of the 20th century, there has been a progressive rise in the number of people who retain their natural teeth into old age.[3] The reasons for this are multifactorial but in part are due to the combined effects of geography, economics, aesthetics and the development of dental care systems.[4] Although positive, this means there is a greater need for daily support, dental treatment and restorative work and more care for unrestored teeth.[5] This can become increasingly challenging as we age. For example, maintaining high levels of oral care may be difficult for an individual who has greater frailty due to a long-term health condition, impaired dexterity or dementia, and who may be resistant to care.[6] Dry mouth is also likely to raise caries risk.[6] In addition, accessing dental care may be problematic due to issues such as difficulty in transportation to dental appointments, financial barriers, compromised ability to sit in the dental chair for long periods and, for adults who lack the capacity to consent, the ability to co-operate for care. [7, 8] Thus, the need for general anaesthetic (GA) or conscious sedation (CS) to facilitate care must be considered by dentists as a means to resolve dental pain and infection in this group.

By itself, high chronological age is not a contra-indication for surgery under CS or GA. However, the higher prevalence of multimorbitidity,[9] age-related physiological

deterioration, and elements of geriatric syndrome (such as cognitive impairment, postoperative delirium and frailty[10,11]) among older people means that there is a greater risk of mortality and morbidity post-operatively than for younger people[12] (although the risk of developing delirium is greater when using GA than with CS). A preoperative assessment is essential to predict post-operative complications and mitigate their development during the preoperative period.[8] 'Optimisation' has become a key word in anaesthetics and is the concept of surgical outcomes being improved through preoperative interventions.[13] Failure to optimise patients preoperatively can lead to patients inappropriately declining surgery, cancellations, poor postoperative outcomes, and longer hospital stay (LOS).[8] Liaising with anaesthetic colleagues is routine practice among specialists managing this patient group, and it is advised for all patients who are undergoing dental treatment under GA.[14] It may also be considered for those having CS should the assessing clinician deem it necessary. Geriatric or multidisciplinary input, however, is less frequently sought, and its impact on elective dental procedures has yet to be evaluated.

The PROKARE surgical liaison service at King's College Hospital (KCH)-a tertiary teaching hospital based in London is a geriatrician-led multidisciplinary service that provides advice on medical management, rehabilitation and discharge planning for older patients under the care of surgical specialities. Elective patients are assessed preoperatively and any medical, psychosocial and functional needs are identified with a clearly defined plan for management and follow-up advised to ensure that the patient is optimised prior to and following surgery. This includes predicting postoperative complications (such as postoperative delirium) and the actions that should be undertaken to prevent their onset or mitigate them. The involvement of geriatricians as part of patient treatment planning has been found to reduce

medical complications, delirium, pressure sores, delayed mobilisation and LOS (4.5 days) among elective orthopaedic patients,[7] along with post-operative complications and LOS among urology patients.[15]

The assessment undertaken by the PROKARE team follows an established, structured approach in the form of the comprehensive geriatric assessment (CGA). The CGA comprises of a number of main domains: physical, functional, social and environmental assessment; psychological components; and medication review. Within each element more specific areas may be explored that are relevant for the patient; for example, these can be mobility, continence, nutrition, memory, cognition and ability to perform activities of daily living, along with further investigations such as blood assays or an echocardiogram.[16, 17] The CGA then leads to a comprehensive plan to address issues that are of concern to that individual and, when relevant, their family and carers.[13]

Since 2016, the Special Care Dentistry (SCD) Department at KCH has liaised with the PROKARE team in order to facilitate safe and effective care for older patients who require dental treatment under CS, whether intravenous (IV) midazolam or inhalation sedation (IHS) with nitrous oxide, or GA. The aim of this article is to summarise the impact of multi-disciplinary working with a geriatric liaison service on the care of older patients undergoing treatment under CS or GA within the SCD department at KCH.

METHODS

This was a case notes study to evaluate the impact that a PROKARE assessment had on the care that older patients undergoing dental procedures had received. Patients are referred to

the SCD department at KCH via general dental practitioners, community dental services, medical colleagues and social care teams. All older patients are initially assessed either by a SCD consultant or a specialty registrar in SCD under Consultant Supervision. If deemed necessary referrals to the PROKARE team are then made via the computerised KCH electronic patient record system. The patients included in this report are those who were considered for elective and emergency dental treatment under CS and GA between 5th January 2016 and 16th June 2018 (every patient referred to PROKARE since adoption of the service).

Referral Criteria for PROKARE for patients aged 65 years and over

Using a case note study approach[18] a member of the SCD team [CC] extracted patient characteristics, PROKARE attendance, recommendations and treatment outcomes from the patient notes. The patient characteristics included gender, age, place of residence, co-morbidities, source of referral and reason for the referral. A computerised report was also produced by the PROKARE team following their assessment. The data collected were retrospective and anonymised. After initial collection, the raw data on the data collection form was entered into an excel spread sheet.

The approach to analysing this data was inductive, in that, after reading and re-reading the case notes, a coding list or 'data abstraction form' was developed with defined categories. Those data were entered into a excel spreadsheet and analysed by converting it into Statistical Package for the Social Sciences (SPSS) software.

RESULTS

Patient Characteristics

A total of 52 patients were included in this service delivery evaluation, 20 male and 32 female. Table 1 summarises the characteristics of the patients included in this study. Most patients were over 60 years of age, living in residential care and had been referred to the SCD department by the community dental service (CDS). Comorbidity was common with just over one quarter of patients 27%, being assessed as having four or more co-morbid conditions. In total, 58 % of the patients were diagnosed with dementia, 38 % with a neurological disease, and 33% cardiovascular conditions. Patients were referred to the SCD team for a range of reasons, mostly for the management of caries (38%), retained roots (27%) and poor co-operation (17%). On dental assessment it was deemed GA was the most appropriate option pending PROKARE assessment for almost all of patients (87%), with the remainder to be considered for conscious sedation or local anaesthetic.

PROKARE attendance

Attendance to the PROKARE assessment was high (85%). Reasons for non-attendance included patients being discharged or having died. The majority of patients were assessed within three months of referral (66 %), but for almost one quarter (23%) of patients, more than six months had elapsed prior to the assessment, see Table 2.

PROKARE Recommendations

Table 3 shows the summary of recommendations made by the PROKARE team for the cohort of patients analysed. Of the patients assessed by the SCD clinicians as suitable for GA, almost all (89%) of cases were deemed as appropriate and the patient deemed fit for

dental treatment under GA, following the PROKARE consultation. In the remaining five cases (11%), the SCD team had recommended that a patient was treated under GA but the PROKARE team concluded that CS was the most appropriate option. Financial concerns were identified during discussions with the PROKARE team with one patient and her next of kin (NOK) and PROKARE requesting that the General Practitioner (GP) contact the patient's daughter about the financing of her mother's care. Issues concerning capacity to consent to treatment were raised in eight instances (18 % of patients), including the need for a formal capacity assessment and a Best Interest (BI) meeting involving a learning disability clinical nurse specialist and the need for involvement of an Independent Mental Capacity Advocate (IMCA).[xix] In one case, it was established that the patient had fluctuating capacity but may be able to make decisions with the necessary support. This highlighted the need to redo BI discussions with family because, following the PROKARE assessment, they had further questions about the procedure.

To minimise the risk of complications, over half (57%) of the patients assessed by PROKARE were advised to make pre/peri or immediate postoperative changes to their medication, and/or to avoid medications associated with potential drug interactions. Table 4 lists examples of medication-related advice. Over one quarter of patients (27%) were recommended to be first on the operation list and a bed was advised to be booked as a precaution either pre and/or postoperatively for one-third (34%). Three in four (72%) were recommended to have tailored multidisciplinary delirium guidance recommended; this is a multicomponent intervention that helps prevent the development of postoperative delirium and reduce the severity of delirium if it does develop (see Table 5).

For half of the patients (50%) the PROKARE team communicated directly with their general medical practitioner (GMP), requesting a review of medications/advising a permanent change in medications (27%), advising further investigation of previously undiagnosed conditions (32%), or requesting a referral to social/occupational health/specialist services (20%). The medications, conditions and onward referrals are summarised in Table 6.

Treatment Outcomes

Following the PROKARE assessment, five patients declined treatment and eight patients died prior to treatment being undertaken. In total, 39 patients (75%) assessed by PROKARE underwent dental treatment under either GA or IV sedation. There were no adverse outcomes and no unplanned admissions, for those patients who underwent treatment.

Of the 39 patients who had treatment, 32 (82%) required radiographs while either sedated or under anaesthesia. One patient (2%) had restorations only and this was carried out under intravenous sedation. Seventeen patients (43%) had both restorations and extractions, while fifteen (38%) patients had extractions only. Eight patients (20%) had a full dental clearance.

DISCUSSION

The characteristics of the patients included in this service evaluation highlight the complex nature of the patients within this age group and in particular their multimorbidities. WHO have outlined their concerns that people with multiple health conditions are at higher risk of safety issues for multiple reasons including polypharmacy, complex management regimes,

demanding self-management regimens and competing priorities, and greater vulnerability due to poor health, advanced age, or cognitive impairment.[20] In their analysis of the implications of multimorbidity for the delivery of dental care, Watt and Serban[9] advocate 'whole system' and organisational interventions that promote integrated care management and enhanced use of multidisciplinary teams, as seen in our study.

One of the criteria for referring to PROKARE is being aged 65 years or above. However, nine patients (17%) under the age of 65 were referred to the team. When assessing older patients, it is vital that clinicians acknowledge that chronological age alone is a poor indicator of physiological and functional status.[21] Currently, there are no available biomarkers that precisely reflect an individual's physiological or functional age. It is important to use clinical tools such as geriatric assessments, which are considered the gold standard when determining physiological status.[21]

The impact on multiple body systems, and the gradual reduction in older people's in-built reserves, can also give rise to 'frailty'. Frailty is a distinctive health state that differs from multi-morbidity and disability, although the three can present a single individual.[16] Frailty is more strongly associated with death than chronological age and co-morbidity among community-dwelling older people,[20] and it is associated with complications, prolonged duration of stay and 30-day mortality in patients undergoing elective surgical procedures.[22] Of particular concern is the risk of post-operative delirium after anaesthesia, which has been found to be three-eightfold higher in individuals who have been assessed as frail.[23] Post-operative delirium is a state in which patients have altered consciousness, orientation, memory, perception and behaviour. It can lead to agitation, hallucinations, instances of self-

harm, or falls and fractures.[24] Therefore, an awareness of frailty and its implications for the care proposed should be considered by clinicians managing this group of patients. It is estimated that about ten per cent of people aged 65 years are frail with this rate rising to between one quarter and half of those aged over 85.[16]

There are numerous frailty indices, but the CGA recommended for use by the PROKARE team incorporates the Clinical Frailty scale,[25] which uses clinical descriptors and pictographs to enable clinicians to classify individuals according to their level of vulnerability. Frailty indices are useful for assessing the suitability of patients for referral. Assessing clinicians did not use the scale to determine who should be referred to PROKARE; rather, they were referred according to the assessors' clinical judgement and experience. It is possible that the frailty scales were used only when assessing patients aged under 65 in order to assess whether a referral to PROKARE was appropriate. Ideally, assessing clinicians should be using frailty scales in all cases to standardise referrals, although the PROKARE electronic referral form has no facility for recording this information. It would have been helpful to correlate frailty to other key variables to highlight any particular patterns of need in the frail patient.

This service evaluation found that PROKARE's input in the assessment of older, frail patients did not recommend any major changes in treatment plans. It did raise a series of recommendations to improve patient safety beyond that which could be expected to be within the knowledge base of the assessing clinician and, in some cases, is contrary to what dentists would routinely follow if adhering solely to dental guidance. For example, for advice pertaining to anti-coagulants, PROKARE recommended '*stopping apixaban 24 hours preoperatively and restart 48 hours post operatively'* in one instance, whereas guidance

issued by the Scottish Clinical Dental Clinical Effectiveness Programme[26] advises 'f*or a patient, where there is a higher risk of bleeding complications, to miss their morning dose of apixaban on the day of their treatment, and then take their evening dose at the usual time as long as it is no earlier than four hours after haemostasis has been achieved*.'

It was through having an individual, multisystem assessment by an appropriately-skilled team that there were cases in which CS rather than GA was advised. The use of CS was recommended over GA in some cases because the risk of giving frail patients a GA was considered to be high.

In line with Royal College of Anaesthetists guidance, delirium prevention interventions were considered in all cases[27] and Delirium guidance was recommended for the majority of patients.

This evaluation did not focus on the relationship with carers or family members but it must be noted that, in all cases, carers or family members were involved in the decision-making process for the recommended treatment options and care pathway. In cases where a patient was assessed as lacking the capacity to consent to dental treatment, the Mental Capacity Act (2005)[28] was followed. In some instances, family members/carers used the PROKARE assessment appointment as a useful opportunity to re-discuss the treatment options and gain further knowledge of the risks and benefits of the proposed treatment in discussion with an independent Medical Practitioner. In one case, after being informed of the risks of having dental treatment, the patient, with support from their carer, decided to

withdraw their consent for extractions. The patient subsequently died prior to any dental treatment being carried out.

It is likely that the recommendations obtained from PROKARE would be similar to those from the patient's GMP, medical specialist or treating anaesthetist. However, liaising with one entity is less time-consuming than co-ordinating multiple services and is likely to reduce the risk of receiving conflicting advice. In half of the PROKARE assessments, issues that had not yet been identified or needed to be reviewed by the patient's GMP were highlighted. A CGA can be undertaken in primary care but is time consuming, taking up to two hours to complete. With short appointment times and limited time availability, asking a GMP to complete a CGA may be an unreasonable request in the current model of care.[15] Accordingly, utilising the PROKARE service in secondary care enables the patient to access care that may be difficult to receive locally. It further highlights the importance of integrated care across healthcare professions. The PROKARE assessment does, however, slow down patient care, adds an additional visit which may not be welcomed by patients and carers, and uses a large amount of valuable resources but it may be argued that it is likely to result in less postoperative delirium. It provides a useful holistic patient review preoperatively that may lead to an enhancement in the patient's life; examples of this are where medications are reviewed and altered and appropriate social care referrals are made.

In respect of the dental treatment, all patients treated had a genuine treatment need that required intervention; 27 (69%) patients had scaling as part of their treatment, and none had scaling alone. Only one (2%) patient required restorations alone and this was managed under intravenous sedation. Thirty-two (82%) of patients had radiographs taken while under

anaesthesia or sedation, indicating that co-operation was a key factor in the treatment modality choice.

When undergoing treatment under general anaesthesia in which there is a significant risk of morbidity and mortality, dental practitioners are likely to be more radical in their approach to dental extractions. Interestingly, one in five patients only had a dental clearance and two in five of patients had restorative treatment. This suggests a conservative and respectful approach to patient management.

Considering the efficiency of the referral process, attendance at the PROKARE assessment was good, but the time between SCD and PROKARE appointments could be improved. In one quarter of cases more than six months had elapsed. It is not clear why this was so, and it must be noted that the PROKARE team is proactive in inviting patients to assessment appointments in a timely fashion. Reducing the waiting time for assessment appointments would decrease patient waiting time for treatment and decrease the risk of continuing deterioration of the patient's oral health and any associated pain/infection that may arise. Further exploration of the reasons behind the time lapse is needed to establish an action plan that could lead to improvements.

Overall, this evaluation is the first to assess the use of a multidisciplinary tool such as PROKARE for the assessment of frail older patients prior to dental treatment. Although the sample size is small, the study is retrospective and the data limited in scope, it provides a useful insight into how a tool such as this could be further developed to meet the needs of dental practitioners seeking safe and effective dental treatment for frail older patients.

Limitations of this study must be noted. First, the sample size was small and five patients (10%) declined treatment. Reasons for not taking up the treatment offered were outside the scope of this evaluation, but it is possible that these patients had more severe medical issues and the risks of carrying out treatment were considered to be too high. Secondly, the initial patient assessments were carried out by several different clinicians. This may have led to some diversity in the behavioural management technique chosen (CS versus GA). No validated tools were used in the decision making process and the authors are unaware that there are any such tools in existence. This may affect the validity of the findings and it would have been more consistent if the same clinician assessed all of the patients. A future helpful area of development would be the creation of a validated tool which would standardise the selection of behavioural management techniques to be utilised for the older and frailer patient.

This study was carried out as a single-centre study and it is not known how many other hospitals have similar services such as PROKARE. Prior to carrying out any future studies, it would be advisable to locate any similar services and carry out a multi-site study. This would provide information such as differences in dental treatment and behavioural management techniques used.

In conclusion, this service evaluation suggests that liaising with a geriatrician-led service with multi-disciplinary input enables the dental team to plan for potential post-operative complications and take actions to limit these. The involvement of this service in the

management of older patients requiring dental care, under CS or GA, appears to be beneficial to overall patient care.

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TABLES

Table i: *Characteristics of patient population (N =52)*

	Number of patients, n (%) (N =52)
Sex	
Male	20 (38)
Female	32 (62)
Age, years	
50-59	5 (9)
60-69	18 (35)
70-79	14 (27)
80 +	15 (29)
Place of residence	
Residential Care	28 (54)
Community Dwelling	24 (46)
Source of referral	
Community Dental Service	28 (54)
GDP	17 (33)
Hospital	7 (13)
Medical conditions	
Dementia	30 (58)
Neurological	20 (38)
Dysphagia	6 (12)
Respiratory	9 (17)
Cardiovascular	17 (33)
CVA	8 (15)
Mental Health Disorders	9 (17)
Generalised Anxiety	3 (6)
Diabetes	8 (15)
Musculoskeletal	8 (15)
Osteoporosis	4 (8)
GI Disease	3 (6)
Liver Disease	4 (8)
Kidney Disease	4 (8)
Endocrine	4 (8)
History of alcohol abuse	2 (4)
Skin Condition	3 (6)
Learning Disability	2 (4)
Sensory Issues	1 (2)

Mobility Issues	14 (19)
Incontinence	1 (2)
Double Incontinence)	1 (2)

Table ii: *PROKARE Attendance (N =52)*

	Number of patients, n (%)
Patient attended PROKARE (N = 52)	
Attended	44 (85)
Not attended	8 (15)
Time range from SCD assessment to attendance to PROKARE (N = 43)	
One month	10 (23)
Two- Three months	19 (43)
Four - Six months	5 (11)
More than six months	10 (23)

Table iii: *Summary of PROKARE Recommendations (N = 44)*

	Number of patients, n (%) (N = 44)
Treatment Modality Advised **GA** **IV sedation** **IHS sedation** **Local Anaesthetic**	 39 (89%) 5 (11%) 0 (0%) 0 (0%)
Capacity Issues Identified	8 (18)
Financial Issues Identified	1 (2)
Advice Pertaining to Surgery **Advising pre/peri/immediate post-operative change in medication** **Advice regarding potential drug interactions** **Advised patient be placed first on list** **Advised booking pre and/or post-operative bed** **Number of patients who were recommended delirium guidance**	 25 (57) 2 (5) 21 (48) 15 (34) 32 (72)
Communication with GP **Advising permanent change/ review of medication** **Advising further investigation regarding previously undiagnosed condition** **Advising liaising with social/ occupational health/ specialist services**	 12 (27) 14 (32) 9 (20)

Table iv: *Example of medication related advice for the pre/peri/ and immediate post-operative period*

Medication preoperatively

- GP to prescribe amlodipine pre-operatively to prevent postural hypotension
- Stop perindopril 1 day preop
- Stop anti hypertensives preop
- Stop aspirin 7 days pre-operatively
- Stop aspirin five days prior to procedure

- Switch to low molecular weight heparin prior to procedure as cannot have this on warfarin
- Stop apixaban 24 hours preop

Medication on the day of procedure

- Stop sitagliptin and give levatericam on day of procedure
- Omit metformin on day of procedure
- Take half normal morning dose of Novomix insulin dose on the day of procedure alone
- Give gabapentin the day of operation
- Hold ACE inhibitor on day of surgery.
- Ensure he has Levetiracetam even though nil by mouth
- Do not use metoclopramide and domperidone as anti-emetics
- Patient to continue aspirin during surgery and rinse mouth post op with beclomethasone inhaler

Medication postoperatively

- Haloperidol 0.5mg post op for delirium if necessary
- No sedative analgesics to be used post op due to drug interactions
- Restart apixiban 48 hours post op

Blood tests

- Pre-operative sodium levels need to be assessed and infusion to be initiated if low

Table v: *King's College Hospital Delirium Guidance*

- Deliriogenic drugs are avoided where possible
- Sensory impairments are optimised (give patient glasses / hearing aids)
- Day/night orientation is promoted
- Bowels are monitored
- Hydration and nutrition is maintained
- Falls risk is assessed
- Constipation is avoided
- Pain is controlled
- Infection is prevented or treated promptly
- Treat Hypoxia
- Early mobilisation

Table vi: *Summary of medications/ undiagnosed conditions communicated to GP*

Medications to be prescribed/ reviewed	**Undiagnosed medical conditions**	**Requested onward referrals**
• Co-careldopa • Thiamine • Vitamin D • Furosemide • Rotigotine • Risperidone • Ferritin • Levetiracetam • Replacement therapy for low haemoglobin • Calcium supplements • Statin • Alendronate	• Postural hypotension • Microcytic anaemia • Folic acid Deficiency • Hypertension • Peripheral Oedema • Vit D deficiency • Vision and Hearing deficiencies • Osteoporosis • Decompensated swallow • Syncope	• Mental Health Services • Tissue Viability services • Parkinson's services • Speech and Language Team • Physiotherapy • Cardiology • Occupational/ Social services to discuss issues surrounding mobility/ manual handling in the home