A cost analysis of non-surgical extractions in primary care versus secondary care: what impact could this have?

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Abstract

Aim: Compare costs of a simple extraction performed in general dental practice versus in hospital on an individual patient level.

Method: General dental practices were contacted within the catchment area of the Eastman Dental Hospital and information about the study was provided. A meeting was arranged as necessary. Lists of costs and other data about equipment and duration of stages involved in the patient pathway were requested and sent to the practices. The data was collated in Excel. Secondary care costs were calculated using invoices and data from the Finance Department in the hospital as well as through discussion with staff regarding timings for each stage in the patient pathway.

Results: Two NHS dental practices participated in this study. The mean cost for a non-surgical extraction in primary care was £51.99 versus £94.67 in secondary care.

Conclusions: This study shows cost per patient for a simple extraction is almost 50% higher in secondary care than in primary care. This adds to the growing body of evidence to support diversion of simple cases from secondary care into primary care. However an important caveat to this, is the need to retain sufficient cases in secondary care for training purposes.

Key words: commissioning, oral surgery, cost, evaluation, extraction

Introduction

It has been well-established that the secondary care sector often receives high volumes of referrals for extractions from General Dental Practitioners (GDPs). [1] This has a significant financial impact for the NHS as secondary care costs are higher than in the primary care sector.[2, 3] One barrier to treatment in primary care is due to patient choice; patients may request treatment in hospital as they perceive the level of care in secondary care is superior. [4] Furthermore, primary care dentists may feel they do not have adequate skills or confidence to carry out such dental extractions, [4] suitable equipment may not be available or they may perceive their remuneration for this service is inadequate which may affect decision-making. [5]

Recently a Tiering system has been developed to categorise complexity of patients undergoing oral surgery procedures. [6] Case complexity may be affected by medical comorbidities, patient anxiety and social factors. The tiering levels are summarised in Table 1.

Table 1: Summary of Oral Surgery Tiering System based on the draft framework of oral surgery complexity levels and procedures [6]

Level	Types of procedures	Expected location of delivery of care
1	- Simple extractions of erupted teeth including erupted uncomplicated third molars - Extraction of buried roots	Primary care – skill set and competency level achieved following

	- Patients with no medical co-morbidities	undergraduate and dental foundation training
2	- Surgical removal of uncomplicated third molars requiring bone removal - Surgical extraction of buried roots - Surgical extraction of ectopic teeth such as supernumeraries - Surgical exposure and bonding of orthodontic bracket and/or chain - Surgical endodontics - Minor soft tissue surgery - +/- Patients with some medical co-morbidities	Primary care - by a suitably qualified practitioner E.g. Oral Surgery Specialist working in primary care/ Dentist with enhanced skills and experience in Oral Surgery. Providers must have a formal link to an Oral Surgery Specialist.

3	- Cases where there is an increased risk of complications such as inferior alveolar nerve damage, mandible fracture or displacement of tooth into the antrum - Surgical removal of teeth which require access into the antrum. - Advanced surgical procedures such as management of cysts, management of salivary gland disease, management of facial pain and TMD which have not resolved with initial measures, suspicious oral lesions, treatment of complex dentoalveolar injuries, implant placement which requires pre-implant procedures such as bone grafting, management of spreading odontogenic infections which require extraoral drainage. - Other cases such as facial fractures, jaw anomalies and advanced implantology. - +/- Patients who are medically compromised or require hospital services e.g. additional investigations.	3a) Procedures expected to be delivered by an Oral Surgery specialist or Consultant OR 3b) -Consultant-led care (Oral Surgery or Oral and Maxillofacial Surgery) - Care may be provided by a team which may include specialist trainees, specialists and SAS (Specialty and Associate Specialist) grades but is performed with Consultant supervision.

	- Patients undergoing general anaesthesia.	

However, some Level 1, 2 and 3 procedures may be performed in secondary care because a provider with an appropriate skill mix or multidisciplinary care is not available in primary care. [6] Furthermore, Tier 3 providers are often either dental hospitals or district general hospitals whereby the workforce also includes junior staff such as dental core trainees; hence cases which are categorised as Level 1 may be accepted for training purposes.

To date, there have been several studies investigating referral patterns in oral surgery.[3, 7, 8] However, there has been no study assessing the cost implications of providing oral surgery services in different settings on an individual patient level. Despite it being commonly known that overall secondary care costs are higher than primary care, the cost-effectiveness of performing such treatment in different locations has not been explored.

The aim of this article is to determine the average cost per patient of a simple dental extraction in primary care versus the cost of the same treatment in secondary care.

Method

The average cost of an extraction has been assessed adopting a micro-costing (bottom up) approach, where each component of resource use is estimated and a unit cost is derived. [9] For each setting, the activities and resources which are involved throughout the entire pathway of the patient (Figures 1a and 1b) have been identified including materials, devices, staff time and general costs. Data on quantity of resources used and their unit costs have been collected in primary and secondary care through interviews.

1. Primary care

A list of dental practices that refer patients to the Eastman Dental Hospital and are located within the catchment area was obtained. The practices were contacted by telephone or e-mail with an initial meeting arranged as required. A summary of the information required from the practices was provided. Two practices agreed to participate in the study. Neither of the practices had an Intermediary Minor Oral Surgery contract.

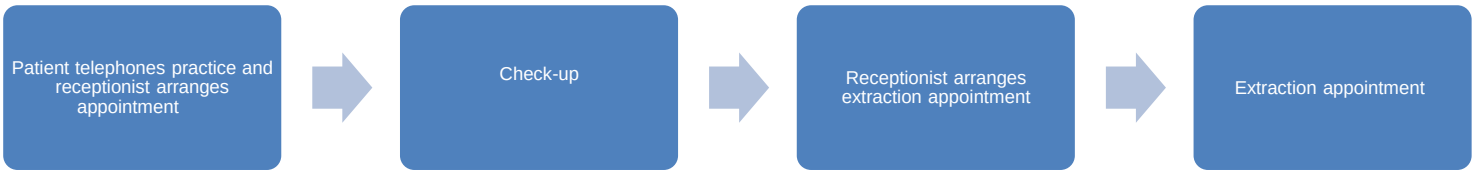
The patient pathway for oral surgery in primary care is illustrated in Figure 1a. An average cost per patient was calculated using the total costs in each of the 2 practices.

2. Secondary care

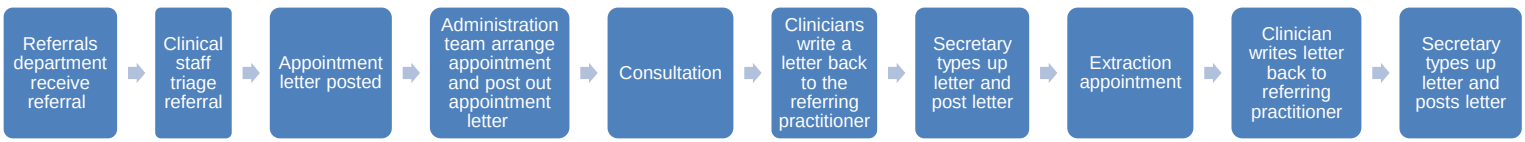
Each of the stages involved in the patient pathway for oral surgery, from receipt of the referral, to consultation and completion of the extraction, was identified and is shown in Figure 1b.

Figure 1: Patient pathways for oral surgery

a) Primary Care



b) Secondary Care



Results

Table 2: Cost of a non-surgical extraction in primary care

Resource	**Formulae**	**Cost per patient in Practice 1**	**Cost per patient in Practice 2**
Receptionist cost for initial appointment	Wage per minute x Time spent per patient in minutes	£1.67	£1.79
Nursing cost for initial appointment	Mean nursing wage per minute x Average time taken for initial appointment including decontamination, radiographs and chair turnaround	£2.86	£3.57
Clinician cost for Band 2 treatment	Payment for 3 UDAs	£30.00	£30.00
Premises cost	Cost per square metre: Monthly rent / square metre of practice Cost per surgery = Cost per square metre x Average square metre of surgery Cost per patient = Cost per surgery/ Average number of patients seen per surgery per month	£2.46	£2.04

Utilities costs (water, electricity, heating, insurance, maintenance, phone, stationary)	Total cost/Total number of patients seen in an average month	£0.80	£0.43
Consumables for assessment(barrier tape, wipes, mirror, gloves, masks, patient apron, hand towels)	Unit cost x number needed per patient	£1.44	£1.19
Cost of X-rays	X-may machine cost per year= Initial cost of X-ray machine/Lifespan of X-ray machine in years Cost = X-ray machine cost per year/ Number of X-rays taken in 1 year	£0.05	£0.13
X-ray holder	Similar formula as above Cost per patient	£0.004	£0.002
X ray film	X-ray maintenance cost per year/Number of X-rays taken in 1 year	£0.15	£0.20
X ray maintenance			

		£0.13	£0.07
Sterilisation	Sterilisation cost per year = Initial cost of machine/Lifespan in year Cost per patient = Sterilisation cost per year/ Total patients seen in practice in 1 year	£0.04 £0.15	£0.14 £0.06
Receptionist cost at extraction appointment	Wage per minute x Time spent per patient in minutes	£2.00	£1.43
Nursing cost at extraction appointment	Wage per minute x Time spent per patient in minutes	£3.82	£7.14
Clinician cost at extraction appointment	Paid for 3 UDAs as above	-	-
Premises cost at extraction appointment	As above	£2.46	£2.04
Consumables for treatment(Local anaesthetic, dental needle, gauze, gloves, gowns, visors/masks, wipes	Unit cost x number needed per patient	£2.44	£3.09

Wipes			
Extraction equipment: Elevators Forceps	(Initial cost/lifespan in years)x number of extractions performed in 1 year	£0.02 £0.06	£0.03 £0.06
TOTAL COST		**£50.56**	**£53.41**

The mean cost of a dental extraction in primary care was £51.99.

Table 3: Cost of a non-surgical extraction in secondary care

Resource	**Formulae**	**Cost per patient**
Referral administration staffing cost for receipt of referral	Wage per minute x Time taken to process 1 referral in minutes	£1.92
Clinical staff triaging cost for referrals	1.Staff Grade 1 Cost = Wage per minute x Time taken to triage 1 referral in minutes	

	2.Staff Grade 2 Cost = Wage per minute x Time taken to triage 1 referral in minutes 3.Consultant Cost = Wage per minute x Time taken to triage 1 referral in minutes Mean cost	£1.28
Administration team staff cost for arranging consultation appointment	Wage per minute x Time taken to arrange appointment and send out appointment letter	£1.75
Cost of appointment letter	Cost of paper + printing cost + postage cost	£0.58
Nursing cost for consultation	Mean nursing wage per minute x Average time taken for a consultation appointment for an extraction	£2.90
Clinician cost for consultation	Weighted average cost per consultation	£5.46

Premises cost for consultation	Departmental space charge per month / average total number of patients attending department in 1 month	£9.40
Consumables cost for consultation (barrier tape, drape, disposable mirror, wipes, gloves, masks/visor)	Unit cost x number needed per patient	£3.77
Receptionist cost for consultation	Wage per minute x Time spent per patient in minutes	£1.92
Cost of X ray	Calculated by Business Manager in Radiology	£5.40
Clinician cost to write letter to referrer	Clinician cost per minute x Average time taken (Consultant, Staff Grade, Registrar, SHO) Mean calculated	£2.72
Secretarial cost for writing and processing a letter	Wage per minute x Time spent	£0.85
Cost of letter to referring practitioner	As above	£0.58
Nursing cost for treatment	Wage per minute x Average time taken for an extraction appointment	£5.80
Clinician cost for treatment (SHO)	Wage per minute x Average time taken for an extraction	£7.19

	(assuming SHOs see simple extraction Tier 1 type cases)	
Premises metre cost for treatment	As above	£9.40
Receptionist staff cost	Wage per minute x Time spent per patient	£0.72
Consumables for treatment (sterilisation, gauze, local anaesthesia, dental needle, barrier tape, drape, disposable mirror, wipes, gloves, masks/visor, surgical gloves, surgical gown, extraction equipment)	Unit cost x number needed per patient (Initial cost/lifespan in years)x number of extractions performed in 1 year	£29.22
Clinician cost for writing a letter back to the referring practitioner	As above	£2.72
Secretarial cost for writing and processing letter	As above	£0.51
Cost of letter	As above	£0.58
TOTAL COST		**£94.67**

The cost of a dental extraction in secondary care was £94.67.

The difference between primary care and secondary care costs for a simple extraction was estimated to be £42.68.

Discussion

Oral surgery procedures carried out in hospitals increase service delivery cost for the NHS in comparison to the costs of the same procedure being provided in primary care. [8] However common reasons for referrals from GDPs to secondary care are due to a patient's need for multiple extractions or GDPs may anticipate the extraction to be difficult. [1, 7] In some cases, GDPs' lack of surgical experience may also be a relevant factor when considering reasons for referral for simple extractions. [10]

The British Association of Oral Surgeons (BAOS) has been a key driver for the provision of routine oral surgery services to occur in primary care to enable patients to access care locally and to reduce waiting times. [11] New triaging systems have demonstrated shortened waiting times which improves patient care, and have also reduced numbers of referrals directed to secondary care. Kendall 2009 found 59% of referrals were diverted to primary care as opposed to remaining in secondary care. [12] Similarly, a study in North West England showed a fall of 37% in dentoalveolar procedures performed in secondary care following the introduction of the Primary Care Oral Surgery service. [13]

However, Chiu 2017's report stated there had been no overall cost saving from the primary care oral surgery service. [13] In contrast, the results of this article show the cost was almost twice as high to treat a patient in secondary care compared to primary care for a Tier 1 type case. This shows on a local level the minimum potential cost savings that could be made by the NHS if Tier 1 cases were performed by GDPs.

Although costs are at the forefront of this study, we think that these findings should not overlook the importance of delivery of training in secondary care. Undergraduates'

confidence in oral surgery has already been reported to be low for simple surgical procedures. [14] Therefore in line with the medical training pathway, dental core training positions in oral surgery or oral and maxillofacial surgery may help improve competence in performing surgical extractions as well as simple extractions. This has been reflected by the findings of a survey which found 40% of foundation trainers in England and Northern Ireland also thought newly qualified dentists were unable to carry out a surgical extraction independently. [14]

In our hospital, referrals are triaged by SAS grades and Consultants and cases are accepted for training. If these cases were redirected to primary care, this may impact on the skills of the future workforce in terms of current trainees. Therefore accepting relatively simple cases is beneficial for training, in particular dental core trainees, to help develop their confidence and competence. We have also found that almost 50% of Tier 1 cases performed in our department were performed by dental core trainees. This shows the importance of retaining certain numbers of cases to help develop skills of trainees. The mere assessment of costs of treatment provision does not allow for cases where more than one clinician helped treat a patient as well as treatment by more than one grade of clinician over more than one visit. For instance, in cases where dental core trainees require assistance with extractions, this support would be provided by SAS grades, Registrars or Consultants. This cost assessment does not allow for this. Despite the financial implications regarding where NHS care is provided, suitable cases need to be retained in secondary care as oral surgery is a field with a growing need for training to be providing beyond undergraduate years.

There were several limitations such as when calculating costs per patient in secondary care, there was no accurate method used to determine the mean consultation time or treatment time. Expert opinion of individual clinicians' was used and may induce a recall bias. An improvement would be to use a direct measurement of time. It is also difficult to attribute costs of all equipment used on an individual patient level. Furthermore, the study did not incorporate costs where more than one clinician had to help, for instance if a senior clinician helps a junior colleague. However this is unlikely as the nature of Tier 1 cases means that complexity is low. Some minor resources (e.g. hand wash, cup for rinsing, and cost of folder for medical notes) were also not included in the analysis as the magnitude of the cost was not relevant.

Looking at limitations in terms of estimated primary care costs, only 2 NHS practices were included as it had been difficult to recruit more practices due to the time required for participation and as sensitive information was involved. Both practices also were 2 surgery practices and therefore using a range of sized practices would improve the assessment of costs. However, both practices were based within the same borough of London, therefore increasing comparative accuracy of costing based on regional effects with the hospital as the results may be context-specific. The results are based on a limited sample of practices, and therefore cannot be generalised for other geographical areas such as outside London, where costs of land and staff are different. However, these results are informative to decision-makers.

Conclusions

This is the first cost analysis undertaken in dentistry of which we are aware. We found that the average cost per patient of a simple extraction in primary care is £51.99

compared to the cost in secondary care of £94.67. This demonstrates the financial benefit of diverting simple dentoalveolar procedures from secondary care to primary care but potentially this could be at a cost to training.

Disclaimer

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