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The impact of a quality improvement initiative to reduce denture loss in an acute hospital

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Key points

- Denture loss is an under-reported problem in hospitals, often causing patients significant distress.
- The most common reasons for denture loss are during inpatient transfers, when dentures are left on meal trays and when bed linen is changed.
- Dentures reported lost during an admission are rarely ever found again.

Abstract

Background Denture loss is a significant problem for patients admitted to hospital in the UK. Initiatives aimed at staff and patients have been introduced at many hospitals to try and reduce and solve this issue.

Aim This investigation aimed to evaluate the impact of a quality improvement programme on denture loss at an acute hospital, the reasons dentures were reported as lost or broken and who reported them.

Method Information on dentures which were lost or broken was collected in an acute hospital between 2016–2021 and included the number of losses, the reason for the loss/breakage and who reported them. The number of complaints and financial reimbursement related to denture loss was also obtained from the Trust for the same period.

Results In total, 123 dentures were reported as lost or broken between 2016–2021. The most commonly reported reasons for loss were patient transfers between wards, being left on hospital trays, or when patients were sleeping. Patients or carers are more likely to report a lost denture compared to hospital staff. Reimbursement paid by the Trust for denture incidents is much lower than the numbers reported.

Conclusion Creating a single reporting pathway for denture loss and implementing methods to reduce denture loss led to an increase in the numbers of dentures reported as lost. This is likely to be attributed to an increased awareness of reporting pathways. Denture loss is a significant financial burden to the NHS, in addition to causing patients and families distress and is most likely under-reported in many hospitals.

Introduction

Denture loss is a common problem when people are admitted to hospital and can be devastating for patients and their families.[1] The loss of a denture can have a detrimental effect on a patient's wellbeing, impacting on nutrition, communication and dignity. Patients will usually need to wait until they are discharged from the hospital before they can access dental services to start the process of having a denture remade.[2] Many older people may spend time in a rehabilitation facility before being discharged to a care home or their own home and again, during this time, it may not be possible to access dental care. Many patients will never be able to have their dentures replaced, including those living with a severe cognitive impairment who cannot cooperate with the process of having an impression taken. Some patients will be too unwell or frail for dental interventions and others may be unable to adapt to wearing a new set of dentures. The longer a patient is without a denture, the harder it is to get accustomed to wearing a new denture.[3] A very distressing time for a patient and family to lose a denture is towards the end of life as there is often not enough time to remake a denture for a patient, or it becomes apparent that a denture has been lost as it does not arrive at the mortuary after death. Individuals and families may have chosen how they want to be 'presented' in terms of hair and clothing during a viewing before being cremated or buried and the loss of a denture can drastically change the facial appearance. A key recommendation from the *Oral health of older people* report by the Royal College of Surgeons in 2017 was that all hospitals and care homes have policies in place to minimise denture loss.[4]

Research in hospitals across Kent, Surrey and Sussex has found that dentures are often lost during hospital admission.[1] Mann and Doshi carried out an evaluation in 11 Trusts in the South East of England and between them they found that 695 dentures were reported as lost over 5 years (2011–2016). Additionally, 7 Trusts reported financial reimbursements for denture losses; results showed £357,672 was reimbursed over six years (2010–2016) and the highest amount reimbursed for a single denture was £2,200.

There are fewer studies published on denture loss in care homes, but it is the experience of dental teams that denture loss/breakage is also a significant issue nationally in care homes, often during transfer to or discharge from a hospital.[5] For residents in care homes, accessing dental services to remake dentures

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Refereed Paper.
Accepted 28 July 2021
https://doi.org/10.1038/s41415-022-4137-6

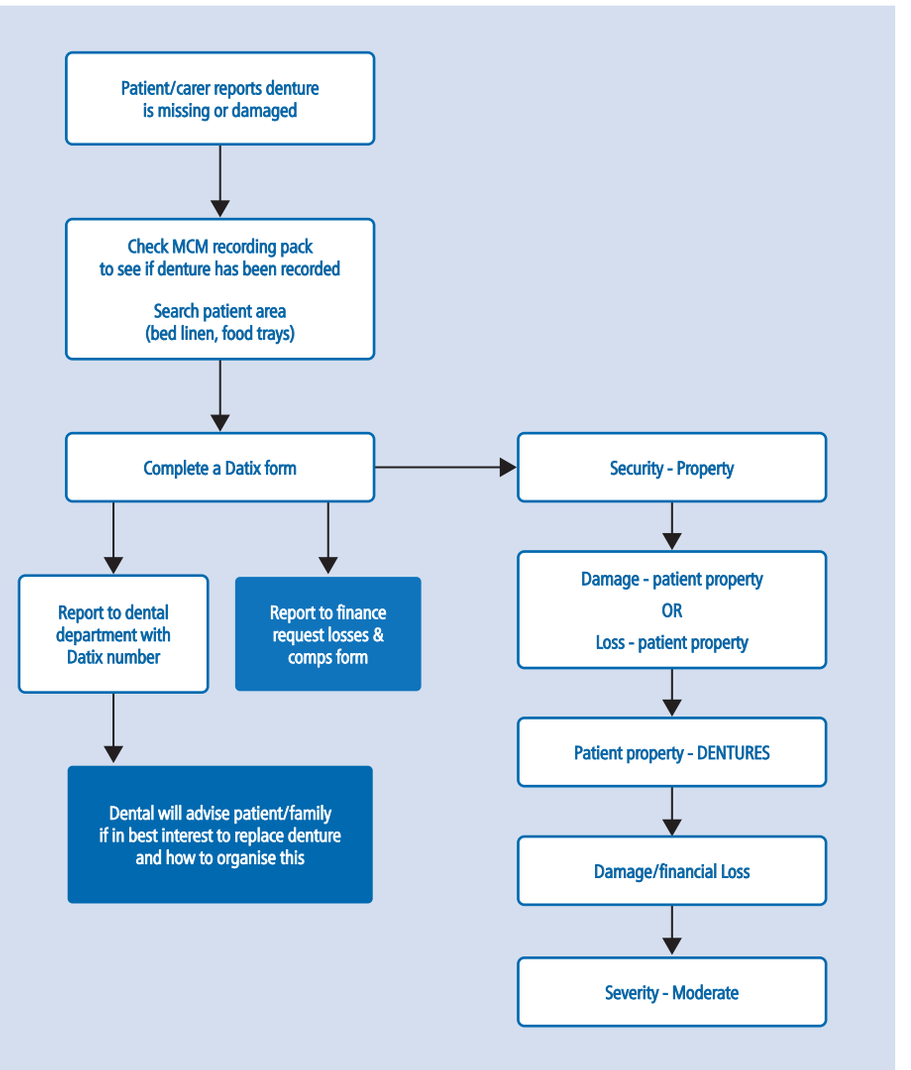
can be a problem, as identified by the Care Quality Commission (CQC) report *Smiling matters*.[6] The report highlighted that access to dental care, in particular domiciliary care, is a significant issue for people living in care homes.[6] A study by Watson in care homes in the Midlands found that 51% of residents wore a denture, so denture safety remains a significant issue, even though many older adults are increasingly remaining dentate.[7]

Dentures have been found to improve the quality of life in people living with dementia but if lost, especially in the later stages of dementia, they may be unable to cooperate with the denture remaking process.[8] Denture labelling has been recommended as an intervention to reduce denture loss, which may be more beneficial in a care home setting compared to a hospital, where dentures tend to be lost and not found again.[9] Denture labelling for identification can be carried out when constructing new dentures or with denture labelling kits for existing prothesis.

Mann and Doshi[1] found the most commonly reported reasons for denture loss were when dentures were:

- Wrapped in tissue and left on meal trays
- Hidden in bed linen
- Mistaken for rubbish and thrown away
- Lost in transit between wards or theatres
- Disposed of following an episode of vomiting when the denture was expelled at the same time.

Fig. 1 Denture loss pathway



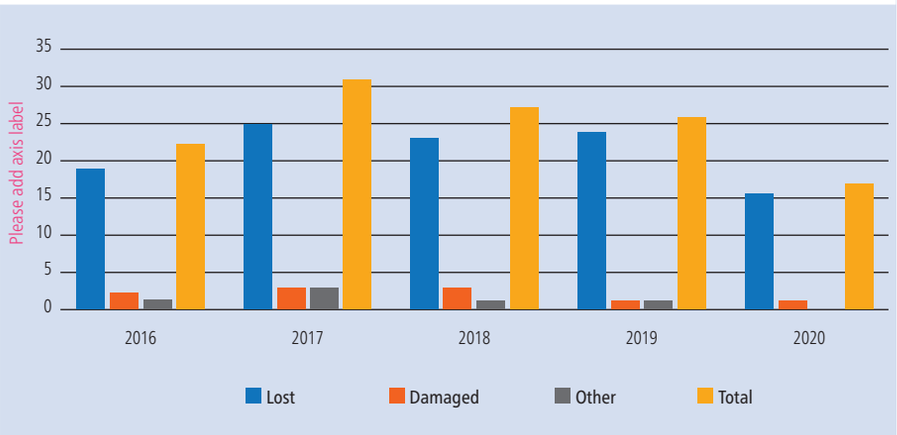
The Health Education England initiative 'Mouth Care Matters' (MCM) was developed to improve the oral health of adult inpatients. Thirteen Trusts employed MCM leads (nurses, dental nurses or speech and language therapists) in Kent, Surrey and Sussex to improve the standards of mouth care for each Trust, including reducing denture loss.[10] Methods implemented by the MCM team at Surrey and Sussex Health Care NHS Trust to reduce denture loss included:

- Mouth care policy: policy on mouth care was developed and implemented in the Trust that included the denture loss pathway (see Figure 1). When a denture was lost, broken or involved in an incident regarding the patient's wellbeing, staff would complete a Datix form. The Datix would automatically alert the MCM lead nurse, who would carry out a local investigation. This included checking that a mouth care assessment had been completed on admission and identifying when the dentures were recorded as last cleaned to create a timeline of when the denture may have gone missing. The MCM lead nurse would check other places in the hospital where the patient had been including the emergency department, x-ray department and other wards. If the denture was not found, the MCM lead would advise the patient and family on accessing dental care after the patient was discharged. In a few exceptional cases, dentures were remade for very vulnerable adults by the onsite dental department. However, this was not feasible for all lost dentures as most patients would be discharged before the denture was made
- Denture pots were made available on all wards: an audit on mouth care products found that many wards did not regularly supply patients with denture pots or ordered them without lids. Denture pots with lids were added to the essential ordering list for every ward. Staff and patients were made aware of the importance of using these correctly to store and transport dentures during a hospital stay
- Mandatory mouth care assessment plans: all patients admitted to the hospital for more than 24 hours had a mouth care assessment that included details on whether they had a denture and if they had access to denture cleaning products and a dental container
- Staff training for all hospital staff: staff training on the wards was introduced to raise awareness of the importance of dentures for patients and how easily they can be lost or damaged during transfers, mealtimes and often when changing bed linen. Staff trained included nurses, doctors, allied health care professionals, porters and the hostess team, who were made aware of how dentures are not easily replaced and

Table 1 The number of dentures reported as lost or damaged

Reported	2016	2017	2018	2019	2020	Total
Lost	19	25	23	24	16	107
Damaged	2	3	3	1	1	10
Other	1	3	1	1	0	6
Total	22	31	27	26	17	123

Fig. 2 Chart to show denture incidents from 2016–2020



the challenges of remaking them

- Sunflower sign as an *aide-mémoire*: the hospital carried out a trial of placing a laminated picture of a sunflower above the bed of patients identified as having a denture (see http://www.mouthcarematters.hee.nhs.uk/wp-content/uploads/2018/10/Sunflower_Hostess_KB_V1-without-quality-mark.pdf). This was to raise awareness with all clinical and domestic teams during a patient's stay and to be extra vigilant for dentures when changing beds, at mealtimes and during patient transfers. Patient signs are similarly used around patient beds for other reasons in hospital including allergies, end of life and being nil by mouth
- Hospital screensavers: a campaign working with the hospital communications team promoting the importance of care of dentures was transmitted through staff computer screensavers and messages displayed on the communication screen in the hospital's restaurant and communal areas
- Visual displays: laminated posters were placed throughout the hospital as a reminder to staff, patients and relatives to be aware of the importance of safe care and the adverse effects of not being careful with dentures (see http://www.mouthcarematters.hee.nhs.uk/wp-content/uploads/2018/10/Denture-Care_KB_V1-without-quality-mark.pdf)
- Patient information leaflets on mouth care: patient information leaflets on mouth care were developed and made available on wards for patients and carers, including information on safe care and storage of dentures during hospital stays. If patients were not wearing their dentures daily, staff were advised to ask carers or their family to take them out of the hospital to their residence
- Reporting pathway for dentures: the Trust lead for Datix (the hospital incident reporting system) worked with the MCM project team to ensure there was the option to locally report on all mouth care-related incidents, including denture loss or breakage.

As part of the quality improvement programme, nurses from different wards were asked about the actions they would take if a denture was lost or broken. It was found that there was no clear reporting mechanism for denture loss and the following would commonly occur:

1. Nothing – denture not reported as missing
2. Signposting patient/families to Patient Advice and Liaison Service (PALS)
3. Signposting patients/families to loss and compensations team
4. Reported on Datix
5. Refer for advice to onsite dental department or maxillofacial surgery unit.

Aim

The primary aim of this investigation was to evaluate the impact of the quality improvement programme on the number of dentures lost or damaged at an acute hospital. The secondary aim was to assess the main reasons for denture loss, who reported them as missing and the financial implications.

Method

The evaluation was registered and approved with the governance department at Surrey and Sussex Health Care Trust to be undertaken as a quality improvement programme. A search was conducted for all Datix reports at the hospital that included the word 'denture' between January 2016 and December 2021, following the implementation of a standardised pathway to report loss across the hospital. Different parameters were collected, including whether the denture was lost or broken, whether they were subsequently found, the reason reported for loss and who reported them as lost/broken. Datix reports for 2014–2015 were collected in terms of overall numbers as the additional parameters had not been added.

The number of official and non-official complaints made by patients and families relating to denture loss were collected via PALS for the same timeframe.

The loss and compensation team provided information on how much money was paid for denture-related issues over this period. The data was entered into an Excel spreadsheet and analysed in terms of trends over the five years. The reason for denture loss or breakage was categorised into themes.

Results

Data collected as part of this initiative found that between 2016–2020 there were 123 denture incidents reported on Datix. This is broken down by year and whether they were lost, damaged or reported for another reason (see Table 1 and Figure 2).

In 2014 and 2015, just before implementation of the denture safety initiative at the Trust, seven dentures were reported lost each year. In all years, lost dentures represented the majority of Datix reports.

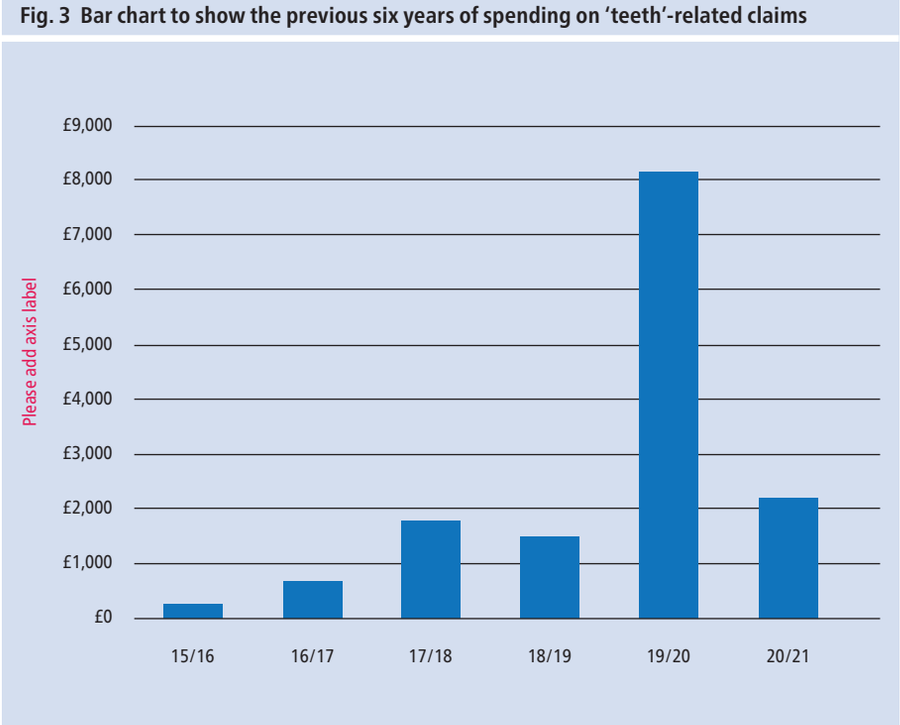
Table 2 How dentures were lost (the most common reason being during transfer)

Explanation of incident	2016		2017		2018		2019		2020		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
During transfer	6	16	9	24	10	27	5	14	7	19	37	30
Whilst cleaning	2	50	0	0	1	25	1	25	0	0	4	3
During an operation or procedure	2	20	4	40	0	0	1	10	3	30	10	8
Cleared from meal tray	7	23	6	20	6	20	9	30	2	7	30	24
When sleeping	4	14	9	32	6	21	5	18	4	14	28	23
Accidental drop	1	13	1	13	2	13	3	13	1	13	8	7
Discarded with vomit bowl	0	0	2	33	2	33	2	33	0	0	6	5
Total per year	22		31		27		26		17		123	
% per five years	18		25		22		21		14		100	

Table 3 Who reported lost dentures (they are commonly reported by the patient or relative)

Year	Reported by patient	Reported by staff	Reported by care home	Reported by relative	Total
2016	11	5	0	6	22
2017	13	5	2	11	31
2018	13	4	0	10	27
2019	10	4	1	11	26
2020	8	3	0	6	17
Total	45	21	3	44	123

Fig. 3 Bar chart to show the previous six years of spending on 'teeth'-related claims



The reasons provided for the denture being reported on Datix each year is shown in Table 2. Reasons for denture loss most commonly included: during transfer between wards or hospitals, being cleared from a meal tray, lost while sleeping and during a procedure/operation.

Details on who reported lost dentures were recorded on the Datix system; most commonly, it was reported by the patient or relative (n = 45 and n = 44, respectively, over the 5 years) and less commonly, care homes (n = 3) and staff (n = 21) reported denture loss (see Table 3).

The number of dentures that were subsequently found and not found after being reported missing is shown in Table 4.

Denture incidents can lead to formal complaints and non-formal complaints and the figures shown for the five years are in Table 5.

Cost reimbursements to patients for each year are displayed in Table 6. Figure 3 shows there has been a steady increase and spike in 2019/20 related to a replacement tooth. An average payment of £567 can be seen over the 6 years.

Case story

The case story described in Figure 4 is sadly a very common scenario; not only does this cause distress to individuals and families but there is also no satisfactory outcome and there is a significant associated financial cost. Written consent was obtained to share this case story.

Discussion

The findings from this investigation of 123 denture incidents in 1 hospital over 5 years show that denture loss and accidental breakage are significant problems for inpatients. Losing a denture has an impact on eating, drinking, communicating and overall dignity. There is also the financial burden to the NHS, plus the subsequent management of trying to remake them and patient and family complaints.[11]

If these figures are extrapolated to all 135 acute Trusts in England, this could mean, on average, 3,375 dentures are being lost or broken in hospitals every year and this figure would be much higher if we included community rehabilitation facilities.

Interestingly, these figures were collected after an intensive, Trust-wide denture loss prevention drive as part of the Health

Education England MCM initiative. For the 2 years before MCM, the numbers of dentures reported lost or broken averaged 7 a year and this increased by nearly 70% to an average of 25 in the subsequent 5 years. This might suggest that the number of dentures being lost increased following staff training, the introduction of denture containers and increased awareness among patients, carers and staff. However, it is the experience of the authors that the increased number of dentures reported lost is due to greater awareness of the issue and introduction of a linear denture reporting pathway. This supports the suggestion that denture loss is a grossly under-reported issue. As discussed earlier, before MCM was implemented, there was no consistency in how or when to report a lost denture. Establishing a pathway that involved every denture incident being reported via the Datix incident reporting system is very important for hospitals. The authors are optimistic that the numbers of dentures lost has actually reduced since MCM was introduced and the increased numbers reported is due to the greater overall mouth care awareness in the hospital. Between 2014–2020, the numbers lost ranged between 17–31, with a mean of 25 a year.

In 2020, 17 dentures were reported lost, which is at the lower end of the range and may be a consequence of the COVID-19 pandemic, due to there being fewer patients in the hospital as a result of a less elective activity or the fact that families who often notice a denture is missing and speak up on behalf of the patient were unable to visit. People living with dementia who are admitted to hospital will often depend on family and carers to advocate on their behalf and this was significantly reduced during the pandemic.[12]

The numbers of dentures damaged ranged between 1–3 and the reasons cited were mostly patient-related, including being accidentally dropped by patients who had a visual impairment or accidently falling off a patient's bedside tray.

The most common reason for dentures being reported lost (Table 2) was during patient transfer within a hospital (30%). Dentures may go missing when patients move onto a new ward or are admitted from the emergency department and this is attributed to them being lost in transit. Unfortunately, there have been many cases where dentures are wrapped in tissues and left on meal trays (24%) or fallen out of the mouth while

Table 4 How many dentures were found/not found. This table shows 89% of lost dentures are not found. (Those with dentures that are found will wait several days/hours without dentures, causing patient and family distress, nutritional intake changes and impacted communication of the patient)

Year	Dentures found	Dentures not found	Total
2016	2	17	19
2017	1	24	25
2018	1	23	24
2019	5	20	25
2020	3	13	16
Total	12	97	109

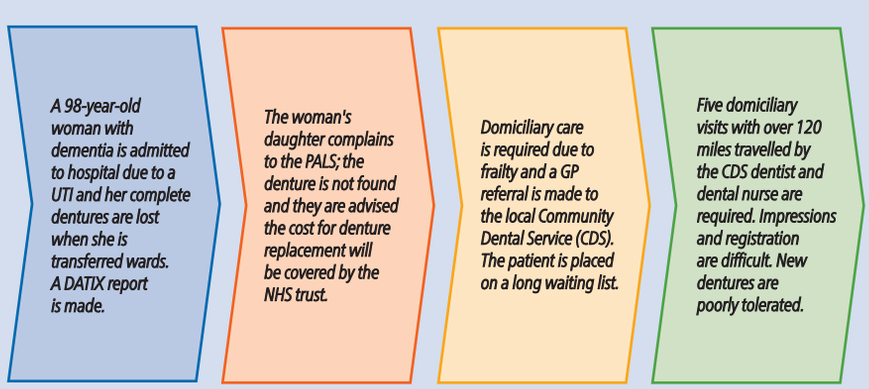
Table 5 Complaints and concerns (concerns can be raised through formal complaints or PALS)

Year	Formal complaint	Concern raised with PALS
2016	2	4
2017	1	4
2018	6	11
2019	1	11
2020	1	3
Total	11	33

Table 6 Costings from financial accounts showing spending following claims regarding 'teeth'-related incidents

Year	Cost	Denture loss
2015/16	£250	1 lost denture
2016/17	£594	2 lost dentures
2017/18	£1,759	2 lost dentures
2018/19	£1,478	5 lost dentures
2019/20	£8,184	6 lost dentures
2020/21	£2,233	3 lost dentures
Total	£14,498	19 dentures

Fig. 4 Case story



sleeping and lost when bed linen is changed (23%). These areas are focused on in MCM training and denture awareness within the hospital (Fig. 2). It is easy to signpost blame towards hospital staff for denture loss, but there can also be patient factors. A patient who has a level of confusion or delirium may unintendedly dispose of or misplace their denture. Dentures are considered as 'patient property' in hospital and it is not always clear who is responsible for compensating the cost of the loss. In 2013, NHS Protect (now NHS Counter Fraud Authority) provided a framework for NHS organisations to develop policies to ensure the secure management of patient property on admission, during the inpatient stay and on discharge.[13]

Only 12 out of 109 dentures (11%) dentures were found and reunited with their owner after being reported as missing (Table 4). Labelling dentures is often promoted as an intervention to reduce denture loss, but these findings suggest that this would not help in hospitals where dentures go missing but are not often found. Labelling dentures may help to reduce denture loss in care homes where patients reside in their own room and are cared for by more familiar staff; however, there is little literature about denture loss in care homes.[5]

Patients (37%) and families (36%) are most likely to report that a denture has been lost and again highlights the importance of families who can advocate for their family members when they are in hospital. As discussed, the impact of no or very limited family visiting may be the reason for this this during the COVID-19 pandemic.

Complaints

The loss of a denture understandably leads to patient complaints. There is often an expectation that dentures can be made in the hospital and replaced quickly. However, most hospitals do not have links with dental services and the patient will need to wait until they are discharged before seeing a dentist. The conventional process for remaking a denture takes, on average, 6–8 weeks, involving at least 5 dental appointments with invasive impressions that the individual does not always tolerate. Patients and carers are often unaware of the challenges of this process, leading to potentially unrealistic expectations for replacements for the denture. The longer the length of time a person is without a denture, the greater the risk that they will not tolerate wearing a new set. Many patients will have worn their denture for years and will be unable to adapt to wearing a new denture.[3] While many patients/carers will complain about lost dentures, others will choose not to. Many will have experienced good care and feel indebted to the staff and hospital and choose not to complain or ask for financial reimbursement.

A number of patients that are in a hospital may be discharged to a care home where there are barriers to accessing dental care. The *Smiling matters* CQC report, released in 2018, identified that residents in care homes face barriers to accessing dental care which can have an impact on them having dentures remade. Many of these residents need homes visits but domiciliary dental care and levels of commissioning this service are very low.[14] COVID-19 is likely to have increased barriers to dental access, with longer waiting times occurring across both primary and secondary care.[14] Key recommendations from the 2017 *Oral Health for older people* report from the Royal College of Surgeons in England included that all care homes should have pathways for denture loss.[4]

Financial burden

The financial burden of denture loss to the NHS is great. Data from the Trust accounts show consistent spending to reimburse patients for lost dentures. A claim needs to be made via a 'losses and compensation' form and this is part of the denture loss reporting pathway which requires a Datix incident form from the ward. Over the 5 years, an average of 25 dentures were lost a year, yet an average of only 4 claims were made; therefore, only a small proportion of patients were reimbursed for their replacement dentures. If all 25 lost dentures were reimbursed, with an average cost of £567, the true cost to the Trust could total £14,175 a year. If this is extrapolated to 135 acute Trusts across England, the figure would total £1.9 million. We are confident that denture loss is under-reported in hospitals that have not focused on mouth care and so this is likely to be a very conservative estimate.

The financial burden to the patient is overshadowed by the inability to smile and function without their dentures; as previously mentioned, remaking dentures through traditional means is often not possible for patients with cognition issues, such as those with advanced dementia or those who are very frail and are in the later stages of life, unable to wait for domiciliary care. It is unclear why such a small proportion of claims are made in relation to the incidents reported for lost dentures. Those at the highest risk of denture loss are commonly the most vulnerable adults who often cannot advocate for themselves to claim from the NHS Trust. Negotiating hospital reimbursement systems can be challenging, which may also contribute to the lower than expected claims in relation to incidents. As previously discussed, there will also be people who will have had their lives saved when admitted to hospital and may choose not to complain or claim, especially is they are exempt from NHS dental charges.

Impact on the patient

Losing a denture in a hospital can have a profound effect on a person. They may struggle to eat without their denture, impacting their nutritional status, which consequently may keep them in hospital for longer. They may also feel very self-conscious about how they look without a denture and it may impact on their ability to communicate. There is evidence to show that the oral health of adult inpatients deteriorates during hospital admissions, which can impact eating and drinking, risk of hospital-acquired infections and overall recovery, extending the length of admission.[15,16,17] Denture loss during a hospital admission can have a devastating impact on an already vulnerable person.

Oral-related problems, including denture issues, can be a significant burden on someone who is already medically unwell and can lead to their health deteriorating. Inpatients are more susceptible to developing oral and dental problems as a result of a number of factors, including polypharmacy, multiple comorbidities, changes in oral hygiene practice and increasing age. It is important that oral health in general is promoted as an element of essential care in hospitals.

There needs to be a continued focus on denture loss in all settings. The Trust in which this evaluation was carried out has invested in training and awareness of denture loss significantly, yet still, on average, 25 are lost or broken a year. It is likely that, in other hospitals, this figure may be higher if denture safety has not been introduced and awareness among staff and patients on reporting lost or broken dentures is low. Staff

turnover in hospitals is high and training needs to continue to focus on patient transfer, checking linen and meal trays. Hospitals need to be aware of how to advise patients and carers about dental access upon discharge. The introduction of a dedicated mouth care lead or champion for a hospital can help ensure that patients, relatives and staff have a specialist point of contact for any mouth care issues. One area they can focus on can be to reinforce the importance of safe denture care through education and training, but also initiate implementation of changes that could help reduce the risk of denture loss within a Trust. Mouth care leads can offer advice, guidance and support to patients and families who can experience anxiety and distress, often starting an investigation on their behalf, building a timeline leading up to the reported loss, conducting a search of areas visited and ultimately, creating the pathway to the remaking or reimbursement of the prosthesis where appropriate. Recommendations to reduce denture loss include continuing to raise awareness of the issue among hospital staff and patients, having denture containers available on wards, mandatory mouth care recording and regular staff training.

This evaluation has shown that despite implementation of an intensive denture prevention initiative to reduce denture loss, it is still a significant problem for the reasons described. It is important to develop ways to replace dentures, especially for those who cannot easily have a denture replaced. If may be feasible for care homes to have a 'spare set of dentures' constructed via the established copy denture technique.[18] There have been advances in digital dentistry over the last year and there may be applications for 3D scanning and printing of dentures for care home residents.[19] Further work is needed to test the feasibility of this.

More research is needed in this field, especially with regards to denture loss numbers in community settings. It would also be interesting to extend this evaluation to other hospitals in England that have and have not been part of the MCM initiative to see if the findings of increased reporting of denture loss once a pathway is implemented is similar. It is important that denture loss numbers are accurately recorded and highlighted to all hospital staff, including the executive team, so that there is an understanding of the significance of this issue and support at all levels within the hospital. Local Dental Networks should work on ensuring that they have good pathways in place for vulnerable people so that they can have dentures remade where appropriate, either when admitted or on discharge. These pathways could involve clinical dental technicians.

Conclusion

Denture loss is an under-reported and significant problem for inpatients. It most commonly occurs during a patient transfer and most dentures are subsequently not found. Lost dentures can have a devastating impact on a vulnerable patient and can cause significant distress for patients and their families. Raising awareness through training may help reduce this problem; however, the data presented in this evaluation shows that it remains a significant issue that is under-reported. Reporting lost dentures via a risk management framework should be promoted and dental care pathways should be established as to remake dentures where it is possible. There is a need for further research for innovative ways to replace dentures, including utilising digital technology.

Ethics declarations

Ethical approval was not required for this study as it was categorised as a service evaluation. The authors declare no conflicts of interest.

Author contributions

Mili Doshi, Daniel Gillway and Loraine Macintyre all contributed to collecting the data for this study, interpreting the results and developing the manuscript.

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