INTRODUCTION

Malnutrition is a common problem in hospitalised patients affecting up to 40% of patients and the adverse effects on patients’ management and outcome as a result are well recognised.\(^1\) However in patients where nutritional requirements are not met because they are unable to tolerate oral intake, active intervention is required, in the form enteral feed, which in the short term is delivered via a Nasogastric (NG) tube. In patients who require enteral nutrition for a longer period a gastrostomy is a more appropriate method. Problems related to nasogastric tubes limit their suitability as a long-term method, principally the likelihood of non-elective extubations. Nutritional support is considered a form of medical treatment, and would be unethical to withhold in patients who are already, or are at risk, or becoming malnourished.\(^2,3\)

Nasal Bridles are a method for securing nasogastric feeding tubes, to prevent accidental or intentional dislodgement. They avoid the need for repeated reinsertion of nasogastric tubes, which can be an uncomfortable process with associated risks, and in turn avoids the disruption to prescribed feeding regimens. Nasal Bridles have been introduced in Lancashire Teaching Hospital Trust since August 2005 as part of the established Multidisciplinary Nutrition Services, with an aim to improving nasogastric feeding and nutrition. They also provide a more reliable alternative in patients whom require long term feeding enteral feeding but are unsuitable for Percutaneous Endoscopic Gastrostomy (PEG) insertion, or in whom feeding will not be long enough to justify a PEG.

An audit performed previously by the department has shown Nasal Bridles were safe and effective. As a result trust guidelines had been developed for the insertion and management of nasal bridles along with Trust wide training, to introduce this technique.\(^4,5\) The aim of this subsequent audit is to look at how the introduction of Nasal Bridles has impacted feeding of patients within Lancashire Teaching Hospitals Trust by looking to see if they improve the delivery of nutrition and decreases the need for repeated nasogastric tube reinsertion.
**NASOGASTRIC TUBE FEEDING LIMITATIONS**

Nasogastric tube feeding is the preferred route for delivery of enteral nutrition as it is the least invasive, cost effective and safe method. However it is not without its limitations and complications. The key problems posed by nasogastric tube feeding as reviewed by Pearce et al 2002 include mechanical difficulties such as failure to pass the nasogastric tube, misplacement, unwanted removal and blockage. There are also gastrointestinal and biochemical complications. Placement by trained personnel and development of nasogastric tube management protocols help to minimise many of the complications. But despite nasogastric tube feeding being a long established and widely utilised technique, inadvertent tube removal remains a recognised wide spread practical problem associated with their use. Risk factors which have been identified for Ng tube dislodgement include acute stroke suffers and those exhibiting confusion and disorientation. It has been suggested that on average up to 2-3 nasogastric tubes are needed to provide enteral nutrition for a 3 week period of a normal patient and extubation rates are highest during the first two weeks. Up to 23% of feeding tubes have been found to be removed within the first 24 hours. The following table summarises the results from some studies regarding to rates of tube dislodgement which has been quoted to vary widely from 17-67%.

<table>
<thead>
<tr>
<th>STUDY</th>
<th>RESULTS</th>
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</thead>
<tbody>
<tr>
<td>1986 Meer⁹</td>
<td>Retrospective review of 78 records for episodes of NG tube dislodgement, cause, plus documentation related to presence of confusion. Total of 78 NG tubes dislodges with 89.7% due to patient removal. 40% of patients had at least one episode of tube dislodgement. All patients documented as being confused at some point.</td>
</tr>
<tr>
<td>1988 Keohane et al.¹⁴</td>
<td>Retrospective review of 231 records specifically identifying number of NG tubes displaced, elective and non-elective reasons were documented. Total of 61.5% of NG tubes were inadvertently removed of which 40.9% was pulled out by patients. 3.8% by staff and 14.8% unknown. Majority pulled out forcefully by confused patients. 31% (n=62) of patients required tube reinsertion three or more times with significant delay in reinserion and recommencement of enteral feed.</td>
</tr>
<tr>
<td>1988 Cioccon et al ¹¹</td>
<td>Prospective study recoding evidence of agitation, which resulted in self-extubation, and use of restraints from 29 patients on NGT feed. 67% (n=36/54) patients experienced agitation and subsequent self-extubation of their NG tube.</td>
</tr>
<tr>
<td>2006 Whelan et al ¹²</td>
<td>Prospective study looking at the volume delivery of prescribed feed and the effects from nasogastric extubation as well as diarrhoea from 28 patients. Total of 49 NG tubes were extubated amongst 17 patients. One patient had a total of 13 episodes, with the median experience 1 to 2 episodes of extubation. 60% (n=17) of patients experienced NG tube extubation. Resulted in a total of 17% (n=53/319) patient days of having no NG tube in situ.</td>
</tr>
</tbody>
</table>

Table 1.1 Summary of Results from Studies looking at Rates of Nasogastric Tube Dislodgement.
Nasogastric tube extubation has been identified as the major contributing factor to suboptimal delivery of enteral feed. Time is required to resite another nasogastric tube, during which the delivery of feed is interrupted, an average loss of 1.5 days of potential feeding time. The time required is also dependent on factors such as the availability of adequately trained staff. In patients where tube replacement may be more complicated such as head and neck surgery patients or those with alimentary tract obstruction, may potentially endure a longer delay in re-establishing feed.

Delivery of nutrition is vital in patients on NG enteral feed as they are often malnourished or at risk of malnutrition without feeding. Enteral feed delivery has been reported to range from 59% to 87% in Intensive Care Unit (ICU) setting increasing to between 70-88% on general hospital wards. The study by Whelan found NG tube extubation reduced formula delivery to only 45% of the prescribed volume.

Nasogastric tube dislodgement is also potentially dangerous. Partial extubation can lead to aspiration and increased frequency of reinsertions increases the risk of misplacement. This is particularly important in patients in whom nasogastric tube placement are complicated. This includes those with impaired swallow where risk of misplacement into the respiratory tract is higher, due to their impaired protective reflexes.

There is evident discomfort which patients experience at each NG placement as well as the additional clinical costs, especially if repeated chest x-rays are required to confirm multiple placements. The National Patient Safety Agency’s 2005 review of nasogastric tube feeding practices have stressed the importance of minimisation of the number of intubations in patients amongst measures to reduce the risks of misplacement and displacement.

In the past, in patients where repeated NG tube dislodgement was a principal problem to artificial feeding, it had been suggested to implement earlier PEG feeding. The advantages of PEG feeding over NG feeding are evident as they reduce discomfort, rates of tube blockage and most significantly tube displacement resulting in better delivery of nutrition. Studies have shown PEG to be the superior method in achieving nutritional requirements as reflected through weight and other markers of nutrition. The site of the PEG tube is also concealed adding to greater patient tolerance and acceptance from an aesthetic point of view. The study by Norton et al comparing the two methods within stroke patients proposed the decrease in mortality levels in the PEG group to be related to a reduction in the rate of
extubation. The subsequent reduction in the risk of aspiration pneumonia would lead to a decrease in the deaths from bronchopneumonia. However, placement of a PEG tube involves a more invasive procedure and related risks include peristomal infection, leakage, and peritonitis.\(^3\)

The advent of the Nasal Bridle, which is safe and effective at preventing nasogastric tube dislodgement, minimises the risks of aspiration pneumonia and inconveniences of repeated NG replacement. The ability to maintain nasogastric tube feeding with minimal disruption to feed delivery also allows a longer period for careful patient assessment for appropriate nutritional intervention. Therefore, it allows PEG feeding to be reserved for patients with irreversible dysphagia.
NASAL BRIDLES

The effectiveness of adhesive tape is limited by loss of adhesion and is not effective at preventing accidental removal. Other methods have been described in the literature in an attempt to secure nasogastric tubes, including nasal ‘anchors’ or ‘splints’ involving direct suturing of nasogastric tubes through the nasal septum. Although effective, they were more invasive and were associated with greater risk of infection and soft tissue damage. The use of a modified oxygen cannula had previously been described and studies also looked at the effect of weighted and different types of nasogastric tubes on dislodgement rates. There was even a reference to the use of an American football helmet in an attempt to secure nasogastric tubes.

The nasal bridle is essentially a length of material, which has been looped behind the nasal septum to which the nasogastric tube is fastened to. Nasal Bridles help prevent accidental dislodgement of nasogastric tubes through the transmission of pressure to the nasal septum when the nasogastric tube is pulled. This increases patient’s awareness and helps to discourage behaviour in those who are tugging at the tube. Nasal Bridles were first described in 1980 by McGuirt and Strout, developed initially for the improved management of nasogastric tube feeding in patients who had undergone head and neck surgery. Nasogastric tube replacement in such patients was a high-risk procedure with altered anatomy, post operative swelling and the possibility of affecting wound healing.

Subsequent adaptations of the bridle system had been described, using different materials for the bridle and different methods for securing the nasogastric tube to the bridle. They have been successfully utilized in a range of patients including head and neck surgery candidates, on intensive care units, stroke patients and even paediatric cases, with minimal complications reported. Use of umbilical tape for the bridle material was advocated by the study by Popovich et al, who had suggested umbilical tape to be less traumatic and more comfortable for patients with a reduced risk of erosion and infection. It has been felt the relative rigidity of plastic tubing may cause unnecessary trauma to the nasal septum. The use of a clip to attach the bridle to the nasogastric tube was also introduced by this study. However they continued to require a similar technique to loop the nasal bridle around the nasal septum, which can take between 10-20 minutes to place depending on expertise. This has since been simplified with the
development of the AMT nasal bridle system utilized by the trust, which uses a technique involving a magnet.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Bridle</th>
<th>Attachment</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>Umbilical tape (covered in mupirocin antibiotic)</td>
<td>Central Venous Catheter Clamp</td>
<td>Two suction catheters of different sizes (R&amp;H). Insert one tube through one nostril into the oral cavity. Repeat with other tube in opposite nostril. Insert the smaller tube into the larger tube and gently pull the larger one nostril into the oropharynx bringing the umbilical tape. A guidewire is then passed via the other NG tube, and out through the opposite nostril. Both ends of the nasogastric tube are then passed through the oropharynx by forceps. The ends of the tube are sutured together.</td>
</tr>
<tr>
<td>1985</td>
<td>Rubber catheter</td>
<td>Tied with Silk suture</td>
<td>Two rubber catheters introduced through both nostrils and is connected in the oropharynx by a silk suture. It is then slowly retracted via nostrils into place in the posterior nasal septum. The two ends of the nasal bridge are then tied to the nasogastric tube, just below the nasal columnella using a suture tie with excess bridle material removed.</td>
</tr>
<tr>
<td>1988</td>
<td>Polyurethane Tube with one blunt end and one hollow end which interconnect.</td>
<td>Adhesive polyurethane tape (within nasal passage)</td>
<td>Either end of the bridge is passed through each nostril into the oropharynx. A forcep is used to retrieve the ends of the bridge, and the blunt tip is plugged into the hollow tip on opposite ends of the bridge. The loop is then gradually pulled out from one end so it sits posterior to the nasal septum. It is then attached to the nasogastric tube with adhesive tape which is adjusted so it sits within the nasal passage. The bridge is then tied off at the nasal columnella with a suture tie and excess tubing is removed.</td>
</tr>
<tr>
<td>1992</td>
<td>Nasogastric Tube/ Fine polyurethane tube</td>
<td>Unspecified</td>
<td>Either ends are inserted into the nostrils into the oropharynx and retracted by Magill Forceps. The ends are sutured together and rotated until the suture appears at the nasal columnella. The tube is then resutured to form a 'halter' around the nasal septum slightly loosely at the nasal columnella. Excess tubing is removed and the feeding tube is attached to the 'halter'.</td>
</tr>
<tr>
<td>1996</td>
<td>Umbilical Tape</td>
<td>Central Venous Catheter Clamp</td>
<td>Umbilical tape is inserted via a suction catheter into one nostril and extracted from the oropharynx. The procedure is repeated using the free end of the tape from the nostril. The tape ends are tied and the knot pulled out through the nostril and cut. Attached to the feeding tube with sutures with a central venous catheter clamp.</td>
</tr>
<tr>
<td>1999</td>
<td>Nasogastric Tube</td>
<td>Unspecified</td>
<td>Two nasogastric tubes are passed into each nostril and extracted from the oropharynx by forceps. A guidewire is then passed down one nasogastric tube and fed through the other NG tube and out through the opposite nostril. One tube is manipulated out of the other nostril pulling the other tube through and secured to the Nasal Lasso.</td>
</tr>
<tr>
<td>2003</td>
<td>Silicon Tubing</td>
<td>Adhesive Tape</td>
<td>One end of the silicon tubing is inserted into the oropharynx and brought out using Magill’s forceps. Both ends of the silicon tubing are attached and secured with the artery forceps. The nasogastric tube is then passed via the other nostril into the oropharynx and pulled retrograde through the nostril bringing the tape. This is then pulled out so the silicone tubing ‘lassos’ around the nasal septum. The nasogastric tube is then repassed in the normal way and secured to the Nasal Lasso.</td>
</tr>
<tr>
<td>2005</td>
<td>Umbilical Tape</td>
<td>Central Venous Catheter Clamp</td>
<td>Ryles tube inserted through one nostril into the oropharynx. Umbilical tape attached to the end of the tube within the oropharynx and pulled retrograde through the nostril bringing the tape. It is repeated through the other nostril. Both ends of the tape gentle pulled until it lies behind the nasal septum and is attached to the nasogastric tube via a fastening clip.</td>
</tr>
</tbody>
</table>

Table 1.2 – Summary of Development of Nasal Bridle Systems
The nasal bridle used by Lancashire Teaching Hospital Trust is the ‘AMT Bridle – Nasal Tube Retaining System’ which utilises a piece of umbilical tape for the bridle and a clip to secure the nasogastric tube in place. It is introduced internally into both nostrils via a catheter and retrieving probe. The utilization of a magnet system establishes connection of both probes behind the nasal septum. The guide stylet is then removed, leaving the catheter with the umbilical tape insitu, attached to the retrieval probe, via the magnet system. Withdrawal of the probe gradually pulls the umbilical tape through behind the nasal septum into the other nostril. Once a length of tape is visible from each nostril, the bridle catheter and retrieval probe are removed. The tape is then secured to the nasogastric tube via a clip, just beyond the nose. The bridle is further secured by tying a knot just below the clip with excess tape cut off.\(^{18,34}\)
Although the concept behind the nasal bridle remains the same, the introduction catheter and magnet system has greatly simplified the application procedure, making it more accessible for utilization on general hospital wards. As well as helping to reduce the time required to apply, it is a less invasive and more acceptable method. From our experience patients undergo only mild discomfort during the procedure. Since their introduction in 2005, more than 500 Nasal Bridles have been placed in Lancashire Teaching Hospitals Trust. Our own experience and data from a previous audit has shown that they are safe and effective. Their use also correlated to a decrease in PEG mortality during the same period as high risk stroke patients (e.g. acute stroke) could be given nutrition via an alternative route. Patients where recovery may be possible in the longer term were also bridled instead, eliminating unnecessary PEG placement and the associated risks from the more invasive procedure. They are also safe for utilisation within the community and there are a number of patients under the Nutrition Team’s care who receive long term nasogastric tube feeding secured by Nasal Bridle. These are routinely changed every 3 months. In addition to Specialist Nutrition Nurses, a training system has been setup and a number of staff are now competent to place Nasal Bridles.
AUDIT

AUDIT AIMS

The primary aim of the audit was to determine whether Nasal Bridles were effective at improving delivery of nutrition in indicated patients. This was through seeing if they were preventing the dislodgement of nasogastric tubes, by looking at the number of nasogastric tubes required prior and after insertion. We then looked at the impact it had on nutrition, in terms of successful delivery of prescribed enteral feed in patients and comparing efficacy before and after the insertion of Nasal Bridle.

AUDIT METHOD

A retrospective sample of patients, who had a Nasal Bridle placed within Royal Preston Hospital only, over a 12month period between March 2007 and March 2008 was audited. The patient list was drawn from a database maintained by the nutrition department. Each patient’s casenotes were reviewed thoroughly, looking at medical notes, nursing notes, fluid balance charts as well as dietetic department notes to gather the necessary data, which was subsequently recorded on an audit proforma.

Nutritional adequacy was determined as delivery of greater than 50% daily feed as prescribed by dietician review. This was through review of fluid balance charts in relation to suggested total volume and rate of enteral feed delivery, thus was not affected by starter regimens. The arbitrary value of 50% was suggested through discussion with the lead dietician and in relation to the BSG guideline that - ‘if patients were taking >50% of estimated nutritional requirements, it may be appropriate to delay instigations of enteral tube feeding’\(^2\). A day was considered from 00.00 hour as per fluid balance chart documentation, thus day 1 post bridle insertion would start from the 00.00 hour after insertion.

With consideration that nutritional intervention is recommended when intake is likely to be absent for greater than 5-7 days, a 7 day period prior to Nasal Bridle insertion was assessed for nutritional intake.\(^2\). This also took into consideration the availability of nutrition information in patients prior to nasal bridle insertion. Then a maximum of 30 day nutritional intake and outcome was looked at to assess the efficacy
of nasal bridles post insertion, including number of nasal bridles required, reason for bridle displacement and reason for days of inadequate feed delivery. Data was also collected on patient demographics including their primary diagnosis, indication for NG feeding and reason for referral for a Nasal Bridle. If restraints were used, to prevent tubes being pulled out, evidence was sought regarding documentation as per Trust restraints policy.

**AUDIT DATA**

![Diagram of audit data](image-url)

Fig 1.3 Breakdown of audit data
RESULTS

Of the 69 patients in whom we analysed nutrition pre and post bridle insertion, there was an equal representation with 34 male patients and 35 female patients. The mean age was 74.2±18 years (range 16-100). Primary diagnosis for our patients consisted of 27.5% acute stroke (n=19), 18.8% acute confusion/dementia (n=13), 17.4% neurological cause (n=12), 8.7% post operative (n=3), 4.3% cancer (n=3) and 23.2% due to other causes (n=16). Other primary diagnoses included renal impairment and dysphagia of unspecified cause. (See Fig 2.1)

61% of patients (n=42) required NG tube feeding due to dysphagia with risk of aspiration as determined by speech and language assessment. 33% (n=23) required NG feeding to supplement a poor oral intake as determined by dietician assessment and the remaining 6% (n=4) of patients required NG feeding for other reasons. (See Fig. 2.2)
The reason for referral for Nasal Bridle placement was due to repeated pulling out of nasogastric tubes by patients in 69.6% (n=48), with 8.7% (n=6) used as an alternative to PEG feeding due to contraindications, and the remainder 21.7% (n=15) bridled for other reasons including for safety or poor toleration of devices. (See Fig. 2.3) It has to be noted that due to the exclusion of patients who were on long term home Nasal Bridle placement, for NG tube security, there may have been a under presentation of patients in whom nasal bridles were used as an alternative to PEG feeding. The mean number of days between referral/indication for nasal bridle and placement was at 1.8 days.
NASAL BRIDLE & NASOGASTRIC TUBE EXTUBATION

As mentioned previously, the majority of patients (69.6%) had been referred for Nasal Bridle placement due to repeated dislodgement of nasogastric tubes. The average number of nasogastric tubes pulled out pre bridle insertion was 2.3, although in four patients it was difficult to determine the number of nasogastric tubes dislodged due to documentation. In two patients, 5 or more nasogastric tubes had been pulled out. (See Fig. 2.4)

![Graph to Show the Number of NG tubes Removed by Patients](image)

In comparison to post nasal bridle insertion, only 33% (n=23) of patients required more than one bridle to be inserted during the 30 day time period of follow up (See Fig. 2.5). Of those 61% of (n=14) required only two bridles, while 35%(n=8) required three bridles and in one patient 4 bridles were placed. A total of 33 nasal bridles had been displaced amongst the 23 patients with an average of 1.43 Nasal Bridle per patient. 23 Nasal Bridles had been attributed to being pulled out by 16 patients with certain patients removing more than one nasal bridle. (see Fig.2.6). Of these 16 patients, 5 had a primary diagnosis of dementia, 5 had neurological problem, 4 had an acute stroke and 2 had other diagnosis.
Graph to Show the Number of Nasal Bridles Required

![Bar graph showing the number of nasal bridles required for different numbers of patients.]

Fig. 2.5

Graph to show Frequency of Cause for Displaced Nasal Bridles

![Bar graph showing the frequency of causes for displaced nasal bridles.]

Fig. 2.6
In patients who repeatedly pulled out their Nasal Bridles, only seven patients were referred for extra restraints. They were all in the form of mittens and had been documented as per trust restraint policy. Four were in patients who had displaced two nasal bridles and three in patients who had displaced one nasal bridle. In one patient, it had been documented that restraints could not be placed due to the site of a venflon and in one patient, use of restraints had been refused despite thorough discussion with the family. Restraints had been used in an additional 7 patients who had not repeatedly removed their nasal bridles. Some of these had been in placed whilst awaiting nasal bridle placement. However in some patients they had been place for extra precaution due to the patient’s state of agitation and high risk for removing their Nasal Bridle.
**NASAL BRIDLE & NUTRITION**

Fig 2.7. and Fig 2.8 are bar charts representing nutrition in each individual patients pre and post bridle insertion respectively. The median total days of pre bridle nutritional information was at 7 days whereas the median total days of post bridle nutritional follow up was at 17 days. Before bridle insertion, the median days of adequate nutrition was 0 and 4 days of inadequate nutrition. Whereas post bridle insertion, the median days of adequate nutrition was 17 days and 1 day of inadequate nutrition. (see table 2.1 for upper and lower quartiles).

<table>
<thead>
<tr>
<th></th>
<th>Lower Quartile</th>
<th>Median</th>
<th>Upper Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Days Pre Bridle Nutrition</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Days of Inadequate Nutrition Pre Bridle</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Days of Adequate Nutrition Pre Bridle</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Days Post Bridle Nutrition</td>
<td>7</td>
<td>17</td>
<td>30</td>
</tr>
<tr>
<td>Days of Inadequate Nutrition Post Bridle</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Days of Adequate Nutrition Post Bridle</td>
<td>6</td>
<td>15</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 2.1 Median, Upper Quartile and Lower Quartile Values of Nutrition Data

Prior to nasal bridle insertion, just over 50% of patients (n=35) had received no adequate nutrition at all. 6 patients had received adequate nutrition for the full 7-day period. Of these, two patients had been referred for nasal bridle for added security due to contraindications for PEG feeding, while one was referred for nasal bridle purely for extra safety precautions. Therefore these patients did not have failed NG feeding prior Nasal Bridle Insertion, which would have disrupted the delivery of nutrition. The remaining three patients, despite being referred due to repeated NG tube dislodgement, did not have any disruption to their feeding regimen due to efficient replacement of the NG tubes on the ward where they were based.

With regards to nutrition post bridle insertion, by comparing the two graphs (note difference in scales), we can see that there is a dramatic improvement with the greater proportion of days where patients were receiving adequate nutrition in comparison to pre bridle insertion. 27 patients post bridle insertion had uninterrupted delivery of enteral feed during their follow up, which was up to the 30 day maximum of 9 of the patients. However it has to be noted that despite nasal bridles, nutrition delivery was not always
100% and 42 patients (60.9%) still had days of inadequate nutrition. In four patients there was no adequate feed delivered at all for the days followed up despite Nasal Bridle insertion. One had no nutrition for a period of 5 days post bridle insertion due to rapid medical deterioration, and it was felt inappropriate to start feed, whilst another patient had pulled out the nasal bridle within 24 hours and had passed away before it could be replaced. Another died before receiving any adequate nutrition due to awaiting confirmation of the position of the NG tube over 2 days and the remaining patient had deteriorated rapidly enough to be put on the Integrated Care Pathway of the dying once the nasal bridle had been placed, thus feed was withheld.

9 out of the 69 patients had greater than 5 days of inadequate nutrition during follow up for various reasons. In 3 patients feed delivery was affected for greater than 5 days due to separate episodes of vomiting or query aspiration where feed was stopped by staff. In 2 patient feed had been disrupted as patients had pulled out their NG tube despite being secured by Nasal Bridle and had been trialed for a period on pureed diet. However this was subsequently deemed inadequate thus was rebridged. One patient had pulled out their Nasal Bridle and refused to have another bridle placed. He was followed up until discharged by the nutrition team when it was deemed he had adequate oral nutrition with supplement drinks. One patient had initially been fed satisfactorily until his Nasal Bridle had been displaced for a procedure, after which he adamantly refused to have any nutritional intervention such as NG feeding or PEG feeding. As he was competent, no nutritional intervention could be instigated and the days of inadequate nutrition reflected his nutritional status until he was discharged from the Nutrition Team’s care. The remaining two patients had greater than 5 days of inadequate nutrition post bridle insertion due to repeated nasal bridle dislodgement, requiring 3 and 4 bridles respectively, despite the use of additional restraints. The average duration of each bridle was only 4 days and again the extended days of inadequate nutrition also reflected days where alternative forms of nutrition had been trialed plus awaiting Multidisciplinary Team discussion of the patient’s management. One patient was consequently referred for PEG feeding tube insertion and subsequently did not have any problems in relation to nutrition or the PEG. In the other patient, in view of her background dementia, and the evidence of slight damage to the nasal septum caused by repeated pulling of Nasal Bridles, the Nutrition Team felt further rebriding was inappropriate. However the patient also posed substantial risk for displacing a PEG feeding tube and in view of potential complications, she was also inappropriate for PEG feeding. Therefore it was decided to maintain on oral supplements, as best as possible, until she passed away around two weeks later.
Graph Showing Days of Adequate and Inadequate Nutrition Pre Bridle Insertion

Fig. 2.7
Graph to Show Days of Adequate and Inadequate Nutrition Post Bridle Insertion

Fig. 2.8
Graph to Compare Proportion of Days of Adequate Feeding Pre and Post Bridle Insertion

Fig. 2.9
NASAL BRIDLE & NUTRITION IN PROPORTION TO DAYS FOLLOWED

As patients were followed up for variable number of days, nutrition was further analysed in relation to the number days of nutritional follow up, with comparison of the proportion of adequate feed delivery pre and post bridle insertion. When comparing proportion over total days of nutrition, the median value for adequate nutrition prebridle was 0 with value for inadequate feed at 1 (see table 2.2). Whereas for post bridle insertion, the median value for adequate nutrition was 0.93 and 0.07 for inadequate nutrition.

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Upper Quartile</th>
<th>Lower Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate Nutrition</td>
<td>1</td>
<td>1</td>
<td>0.43</td>
</tr>
<tr>
<td>Pre Bridle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of Days of</td>
<td>0</td>
<td>0.57</td>
<td>0</td>
</tr>
<tr>
<td>Adequate Nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Bridle</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of Days of</td>
<td>0.07</td>
<td>0.25</td>
<td>0</td>
</tr>
<tr>
<td>Inadequate Nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Bridle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of Days of</td>
<td>0.93</td>
<td>1</td>
<td>0.75</td>
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<tr>
<td>Adequate Nutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Bridle</td>
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<td></td>
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</tbody>
</table>

Table 2.2 Median, Upper Quartile and Lower Quartile Values of Nutrition Data (Proportion)

From the graph (fig.2.9), comparing proportion of adequate feed delivery before and after bridle insertion, we can see that similar to the two graphs representing days of nutrition, the majority of patients have improved delivery of feed post bridle insertion. This graph revealed 7 patients who only received adequate nutrition over less than half of the days followed up. 4 of these patients had been discussed previously as having received no nutrition at all whilst 2 were the patients who had greater than 5 days of inadequate nutrition. An extra patient had been highlighted, as they received only 3 days out of 7 of adequate nutrition. 2 days had been inadequate resulting from displaced nasal bridle and then 2 days whilst awaiting confirmation of NG tube position by chest x-ray.
**NASAL BRIDLE & NUTRITION OVER TOTAL DAYS FOLLOWED**

A total of 443 patient days of feeding was analysed pre bridle insertion, 298 (67.3%) of which patients received inadequate nutrition whereas a total of 1256 patient days of feeding was analysed post bridle insertion of which only 168 days did patients receive inadequate nutrition (13.4%).

![Chart Representing Total Patient Days of Adequate/Inadequate Nutrition Pre and Post Bridle](image)

Of those 168 days, 75 (44.6%) was due to Nasal Bridle being displaced by the patient, 26 days (15.5%) was due to feed being stopped in view of query aspiration, 25 days (14.9%) was due to vomiting, 5 (3.0%) resulted from a blocked NG tube, 7 (4.2%) from staff/procedures resulting in removal, 14 (8.3%) due to awaiting confirmation of position of the NG tube and 16 days (9.5%) of unknown cause.
Although 75 days of inadequate nutrition resulted from Nasal Bridle displacement, the method of data collection has to be taken into consideration. 5 patients had 10 days of more of inadequate nutrition recorded as caused by nasal bridle displacement. However on closer review of notes, on displacement of the bridle, patients had been trialed for a number of days on a pureed diet, which was subsequently found to be inadequate, thus were rebridled. However these were documented as days lost due to nasal bridle displacement. Therefore there may have been an overestimation of the days of inadequate nutrition truly attributed to misplaced Nasal Bridle.

Despite displacement of Nasal Bridles, a mean of 11 days of nutrition were delivered per bridle in these patients, although this had decreased to an average of 5 days of nutrition delivered per bridle in patients with multiple extubations.
NASAL BRIDLE & NUTRITION - STATISTICAL ANALYSIS

Statistical test was performed on the data to see if introduction of the Nasal Bridle improved feed delivery, through decreasing the number of days of inadequate nutrition post bridle insertion. However, due to the high variability in the number of days followed up post bridle insertion, and in comparison of nutrition data pre bridle insertion limited to a maximum of 7 days, the nutrition data was adjusted to 15 days post bridle insertion to improve the validity of the results. Upon adjustment the mean number of post bridle nutritional follow up was at 11.4±4.8 days with a range of 1 to 15 days. (See Fig 2.12 representing post bridle nutrition in patients limited to 15 days)

The following table summarizes key statistical values calculated from data of days of inadequate nutrition pre and post bridle insertion.

<table>
<thead>
<tr>
<th></th>
<th>Pre Bridle Insertion Inadequate Nutrition</th>
<th>Post Bridle Insertion Inadequate Nutrition (15 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>298</td>
<td>114</td>
</tr>
<tr>
<td>Mean</td>
<td>4.32</td>
<td>1.65</td>
</tr>
<tr>
<td>Variance</td>
<td>5.69</td>
<td>4.23</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.39</td>
<td>2.06</td>
</tr>
<tr>
<td>Maximum</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Upper Quartile</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Median</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Lower Quartile</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.26</td>
<td>1.70</td>
</tr>
</tbody>
</table>

A spread plot (Fig 2.13) and box and whisker plot (Fig 2.14), are included to represent the distribution of the exact values of days of inadequate nutrition, as well as the calculated statistical values pre and post bridle insertion.
Graph to Show Nutrition Post Bridle Insertion (15 days)

- **Days adequate nutrition**
- **Days inadequate nutrition**

**Fig. 2.12**
Fig 2.13 Spread Plot Showing Distribution of Values for Days of Inadequate Nutrition Pre and Post Bridle (15 days)

Fig 2.14 Box and Whisker Plot Showing Distribution of Data for Days of Inadequate Nutrition Pre and Post Bridle (15 days)
We can see from the box and whisker plot that post bridle, the days of inadequate nutrition is appreciably lower than that pre bridle. The median and the upper quartile for post bridle are considerably lower than the value of the median for pre bridle nutrition. It can be seen that the data is skewed and not of a normal distribution. Therefore a non-parametric test in the form of Wilcoxon’s Signed Ranks Test was used. The null hypothesis was that there was no difference between the number of days of inadequate nutrition pre or post bridle insertion. The alternative hypothesis being that there was a difference in the number of days of inadequate nutrition, with the difference being less than zero (i.e. there is a reduction in the number of days of inadequate nutrition post Nasal Bridle insertion.).

From the spread plot, it can be seen that there is one significant outlier with a value at 10 days of inadequate nutrition post bridle insertion. This had been a patient who had removed their nasal bridle within the first day of placement and subsequently refused to have a nasal bridle replaced immediately, and had been trialed unsuccessfully on a pureed diet before having another nasal bridle placed. In view of this, this patient had been excluded from our statistical test.

This found an Upper side P value of <0.0001 (hypothesis that differences tend to be greater than zero). As P value is less than 0.05, then it is statistically significant and as a result we can reject the null hypothesis. It also calculated a 95% confidence interval between 2 and 3.5 with the median difference of 3 days. Therefore the test shows that introduction of Nasal Bridles does significantly reduce the number of days of inadequate nutrition, thus improves delivery of feed in indicated patients.
DISCUSSION

METHOD LIMITATIONS

Data collection had been a difficult process, complicated by poor documentation to the extent that 12 patients had to be excluded due to incomplete or unclear documentation. It often required careful reading of both medical and nursing notes to gather the necessary information. The number of nasogastric tubes, which had been dislodged, previously was often not clear and may have been under-represented in this audit. Documentation with regards to why nasal bridles had been displaced was also variable. Some documented a reason but it was often put as ‘NG/Nasal Bridle out’ which was assumed to have been pulled out by patients.

Fluid balance charts through which we determined nutrition delivery were maintained to varying standards, which was why we decided at the beginning to simplify nutrition to either adequate or inadequate based on an arbitrary 50% of prescribed feed. Admittedly this may have been an oversimplification, which could have affected the quality of the data and the accuracy of representation of feed delivery in our patients. It also has to be highlighted that this study only looked at nutrition in relation to successful delivery of prescribed enteral feed and does not take into account patients’ initial nutritional state or attainment of caloric requirements. The decision to limit data on nutrition pre bridle insertion to 7 days also reflects the practical limitations of this study, as an initial 14-day period proved too difficult for data collection. The 7-day pre bridle period subsequently complicated data analysis, as 7 days versus 30 days would have created significant bias when comparing the difference in the number of days of adequate feed delivery. Hence the data was altered to look at nutrition for 15 days only and to look alternately at the effects that Nasal Bridle introduction had on decreasing days of inadequate feed delivery.

Experience from data collection prior to nasal bridle insertion revealed, particularly in patients with greater than 5 days of inadequate nutrition, that it was because patients had been kept nil by mouth whilst awaiting Speech and Language Assessment. Therefore it may not be a true representation of the effects of failed NG feeding prior to Nasal Bridle insertion. Patients had often repeatedly extubate within the first
48 hours of establishing NG feeding, hence the referral for a Nasal Bridle. In view of the established poor nutrition, then it could be argued the data still reflects the importance of successfully establishing nasogastric tube feeding urgently due to the risk of malnourishment and the necessity of Nasal Bridles.

**NASAL BRIDLES EFFECT ON NASOGASTRIC TUBE EXTUBATION**

Our average number of 2.3 nasogastric tubes prior bridle insertion is less than the median of 4 from a comparative study. As discussed previously, documentation may have led to an underestimation of the number of Nasogastric tubes which had been extubated prior to Nasal Bridle insertion, but the difference may reflect the presence of an established trust protocol suggesting the use of Nasal Bridles for patients who extubate 2 or more NG tubes. However from the data, which have collected, we can see that Nasal Bridles does reduce the need for repeated nasogastric tube replacement from 69.6% of patients to only 33% of patients. A third of the bridles only required replacement of bridle due to unavoidable causes such as blocked NG tubes. However as two thirds of Nasal Bridles were attributed to being pulled out by patients and the high percentage of patients requiring more than one nasal bridle reflects that Nasal Bridles are not 100% foolproof as commented on in the study by Della Faille et al. However it is difficult to objectively directly compare the effectiveness of Nasal Bridles on extubation rates. A direct comparison was performed in one study only, due to varying practice on the use of Nasal Bridles between centres for a study amongst nasojejunal feeding tubes. This found bridled feeding tubes were significantly less likely to become dislodged at 4% versus 36% (P<0.02).

Our study reflects slightly higher rates of rebridling in comparison to the della Faille et al study of 28.2% (n=35 patients) and a considerably higher rate due to self extubation, in comparison to their 18.9% (n=37 Nasal Bridles). This may have been affected by documentation as discussed, and similar to studies on nasogastric tube dislodgement, information on extubation and whether patients were disorientated at the time, cannot be determined with certainty as they were often not witnessed. Review of the primary of diagnosis of these patients revealed they were at a significantly higher chance of being disorientated or confused leading to the continued removal of the Nasal Bridle. However a possible explanation for the difference could be because the connection site of the Nasal Bridle used in the della Faille et al study was hidden inside the nasal cavity, where patients could not reach. The connection site in the AMT Bridle system remains externally, and although the clip system is considered efficient and difficult to undo, it
has been known from the Nutrition Team’s experience for patients to tamper with the site and successfully loosen the connection. If the nasal bridle is pulled firmly enough, the nasogastric tube can still be pulled out to prevent significant damage to the nasal septum. It has to be taken into account that our study did not include the patients in whom Nasal Bridles are utilized long term as outpatients, where NG tubes can be maintained in situ for up to 3 months until routine replacement. Although patients do have Nasal Bridle replacements earlier than the 3-month period, the majority were due to problems with a blocked NG tube rather than displacement by patients.

**NASAL BRIDLES EFFECT ON DELIVERY OF NUTRITION**

There is limited literature available with regards to the use of Nasal Bridle and subsequent delivery of enteral feed, with most studies concentrating on its effects on nasogastric tube extubation. One audit by Taams et al. of paediatric burns cases described a significant rise in serum albumin, reflecting the effectiveness of Nasal Bridle in assisting attainment of nutrition requirement through preventing interruption of feeding. A prospective study by Anderson et al. looked at the effect Nasal Bridles had on the delivery of nutrition but this had concentrated on 12 patients only. However data on feed delivery was more precise, looking at the percentage daily feed received prior to and post Nasal Bridle insertion. Three quarters of their patients had a median of 0% of feed delivery pre bridle insertion, although daily percentages ranged from 0-100%, reflecting similar irregular but generally inadequate feed delivery. Post bridle 10 out of 12 patients had a median of 100% of daily feed delivery showing statistically significant increase in daily percentage feed delivery. However the daily range varied from 0-100% and only 5 patients received had a range between greater than 50% of daily feed, which we had set as the arbitrary mark for adequacy in our study, reflecting comparable experiences. Reasons for days where feed delivery was not 100% for individual days post bridle insertion had not been looked at. In addition in their study no patients had more than one Nasal Bridle inserted, thus it did not reflect days of inadequate delivery due to Nasal Bridle failure which we had also investigated.

Despite use of Nasal Bridle, non-elective displacement still occurred in some of our patients, resulting in disruption to feed delivery. This accounted for less than half of total days of nutrition lost post bridle. The remainder of days of inadequate nutrition resulted from factors such as vomiting or blocked NG tubes. However from our audit, it can be seen that despite our comparatively higher rate of extubation post
bridle, feed delivery was still significantly improved in the majority of patients. In our statistical analysis, other variables had not been taken into account, considering that half of the days of inadequate nutrition were due to factors, which could not be prevented by use of Nasal Bridles. Apart from in patients who, through multidisciplinary discussion, had been trialled on oral pureed diet between Nasal Bridle insertions, actual Nasal Bridle replacement accounted for average around two days of inadequate feed delivery. This potentially further strengthens our argument that Nasal Bridles decrease the number of days of inadequate feed delivery related to nasogastric tube extubation, thus improves the delivery of nutrition in patients.

Of the patients in whom we could not place nasal bridles, 3 had problems with their nasal septum (one patient’s nasal septum was too small, another had a deviated septum and another had a large nasal polyp) while two were due to reasons related to the patients co-morbidities (in one nasal bridle could not be placed due to a patient’s uncooperation and in another due to repeated fits.). There had also been another patient who we had difficulties placing a Nasal Bridle due to a deviated septum, but this was resolved with assistance from a Ear, Nose and Throat Specialist Nurse. Of the patients, nutritional information was collected from three. One had unfortunately passed away within three days but his initial NG tube had remained in situ. Another patient with a primary diagnosis of confusion who had been referred for repeated dislodged NG tube maintained his initial NG tube post assessment for 14 days, after which he had displaced 2 NG tubes. One was displaced within 24 hours of insertion, while another had been ‘coughed out’ after 12 days in situ and another remained for 5 days in situ until a PEG feeding tube replaced it. A total of 8 days of feed delivery had been affected within the space of 24 days. However another patient who suffered an acute stroke with dysphagia had no problems with nasogastric feeding after nasal bridle assessment, despite initially referred due to repeated dislodgement of his NG tube. In one of the patients, restraints in the form of mittens had been utilized to help prevent NG tube dislodgement.

**EXPERIENCE OF USING NASAL BRIDLES**

Many papers have advocated Nasal Bridles to be safe and effective which is especially true in the context of risks associated with frequent nasogastric tube dislodgement. From our audit, we had found limited complications related to Nasal Bridles. In one patient, there was epitaxis due to the placement of the
bridle but was quickly resolved. In one patient, NG feeding had to be stopped due to discomfort, but it was attributed to the Nasogastric tube itself rather than the Nasal Bridle. Only in one patient, did repeated displacement of the Nasal Bridle lead to some superficial damage to the nasal septum and considerable force is needed to cause tissue trauma through Nasal Bridles. Further Nasal Bridles were felt to be inappropriate in this patient. Even in patients who were on long term NG feeding with Nasal Bridles, there had been no notable complications apart from in one patient, whose carers had been concerned there may have been some erosion of the nasal septum. This was found to be not the case on subsequent careful examination.

Review of the literature had also shown limited cases of complications such as trauma, ulceration and infection, related to the use of Nasal Bridles. One case encountered a pressure ulcer on the nasal columnella secondary to the nasal bridle being placed too tightly, while 2 cases suffered from nasal mucosal erosion requiring removal of the nasogastric tube although the authors felt this may have been related to the fixed position of the NG tube rather than purely a complication of the Nasal Bridle. However McClave and Chang described a case where long-term use of a polyurethane based Nasal Bridle resulted in erosion through the nasal septum. The use of umbilical tape provides more flexibility than polyurethane based bridles allowing slightly more movement of the NG tubes.

As discussed by Meer, a potential drawback of nasal bridles is that they can look uncomfortable and undignified. It has even been described as an extreme method. There is the subjective discomfort during placement of the bridle, which is evident. However this aspect of nasal bridle use has not been widely studied and can be difficult to evaluate. When put into context of the discomfort caused by repeated feeding tube placement, Nasal Bridle is often considered a better option and four out of six patients expressed their preference of the Nasal Loop in the Anderson et al study. However one patient out of that study had complained of discomfort from the Nasal Bridle necessitating its removal. From our own experience, thorough explanation with patients and their families about the benefits or nasal bridles versus the risk of repeated dislodgement or other forms of invasive feeding has led to acceptance of the technique.
CASE DISCUSSIONS

It is often argued that the action of intentional removal of nasogastric tubes may reflect a patient’s wish not to receive artificial nutrition. However this is often a complicated issue in non-communicative patients, or those who suffer from periods of confusion. The use of Nasal Bridles raises the ethical issue over tube feeding and the concern whether their use prevents patients from expressing their wishes. Our audit revealed two interesting cases which highlights this issue.

One patient who had suffered from a stroke, and had severe dysphagia, had explicitly refused artificial nutrition. He had initially consented to the first Nasal Bridle after a long discussion, but subsequently refused any form of artificial nutritional intervention after his Nasal Bridle required replacing after elective removal for a procedure. Due to his severe irreversible dysphagia, he was realistically unable to tolerate any oral dietary intake. Although our patient was known to be suffering from depression since his stroke, Psychiatric review deemed him to have capacity and was competent to make the decision regarding nutritional therapy.

It firstly raises the question whether nutrition should be regarded as a medical therapy or necessary as part of basic humane care, with a moral and legal obligation for its provision. The general consensus over tube feeding is that it is a medical intervention as it is ‘non-volitional’ feeding. As part of medical care, a competent patient has the right to refuse (even if non-treatment could lead to death) and a doctor is not obligated to continue treatment based on a patient’s best interest. However benefit-risk considerations may not take into account the subjective aspects of patient’s views, including the effect the presence of a feeding tube (and Nasal Bridle) has on a patient’s dignity and morale, or the potential for ‘mental harm’. But it creates the ethical dilemma whether suicidally motivated refusals is any different from passive euthanasia, which is the omission of treatment with an intention on hastening a patient’s death. A review by Keown concluded that although competent patients have a right to refuse treatment, it does not equate to a right to be assisted in the act of suicide. But their rights have to be respected as long as the doctors are not intentionally assisting suicide refusals. In this case, despite the nutrition team’s best efforts, the patient’s preferences took precedence.
However the other case highlighted by this audit, was a patient who had a primary diagnosis of dementia, requiring NG feeding to supplement a poor oral intake, who was subsequently referred for Nasal Bridle due to repeated dislodgement. Despite this she had continued to forcibly remove numerous Nasal Bridles irrespective of the use of additional mitten restraints. By her third Nasal Bridle, superficial damage to the nasal septum was evident. The patient was incompetent due to the inability to communicate her wishes, and no advance directive had been made. As a result the legal duty was to act in the patient’s best interest. It highlights the question to the goal of artificial feeding in patients with dementia. There is limited evidence to advocate the use of artificial nutrition in patients with advanced irreversible dementia where patients naturally progressively lose the ability to eat. Understandably there are forms of dementia, which are reversible warranting a trial management, and use of restraints during episodes of confusion. But careful consideration is required for starting artificial feeding as the withdrawal of feed can be an emotionally difficult act due to the symbolic significance and feeding and life. However it is not unethical to discontinue feeding if it is purely a means of prolonging life, and the burden of the treatment outweighs the benefits. In our case in view of the poor prognosis from the dementia and the burdens had significantly outweighed the aims of treatment, it was decided to withdraw tube feeding. However the withdrawal of tube feeding does not equate to withdrawal of all nutrition and oral intake can still be maintained by providing long enough feeding time and adapted feeding techniques. 

WEN SHOULD NASAL BRIDLES BE USED

Nasal bridles are recognised as an effective method at preventing dislodgement of nasogastric tubes but since their wider introduction, another issue which has been highlighted, has been when should Nasal Bridles be used. Nasojejunal tubes should be secured by Nasal Bridles due to the more complicated placement, associated clinical costs and longer delay (thus interrupted feeding) in replacing dislodged tubes. Patients who are on home enteral feeding via nasogastric tube should also routinely secured by Nasal Bridles. Although it could be argued that nasogastric tube dislodgement does not necessarily occur in these patients, the potential for a longer delay and costs associated with replacement NG tube for patients in the community justifies the use of Nasal Bridles for extra security. However as with any other medical intervention, the use of Nasal Bridles should be carefully discussed with patients.
However the situation is less clear with in-patients where it has been suggested the importance of identifying patients who are likely to pull out their nasogastric tubes and implement preventive measures early on (Eisenberg et al). However studies on nasogatric tube dislodgement and associated risk factors often do not reflect experience of high-risk patients who receive nasogastric feeding without any problems. Even from our experience from this audit, a patient who could not have a bridle placed subsequently did not have any further problems with nasogastric tube dislodgement. Therefore the use of Nasal Bridles in all patients in at risk groups may not be fully justified especially when taking into consideration the cost and additional discomfort of placing Nasal Bridles. Our current protocol suggests the use of Nasal Bridles after two nasogastric tubes have been dislodged.
CONCLUSION

This audit has found Nasal Bridles to be an effective method at reducing the rate of nasogastric tube extubation. As a result it significantly decreased the number of days of inadequate feed delivery patients received, thus improved the delivery of nutrition. However Nasal Bridles are not successful in all cases and some patients still managed to remove their nasogastric tubes, irrespective of bridle placement, and sometimes required the use of additional restraints. Despite this we still found statistically significant decrease in inadequate feed delivery as a result of nasal bridle use. This study found there were still days of inadequate feed delivery post bridle insertion, which could not have been prevented by the use of nasal bridles. This study also revealed limited complications related to Nasal Bridles and they were used successfully amongst a number patient long-term. Therefore in patients who repeatedly remove their nasogastric tubes, Nasal Bridles should be used to prevent disruption of nutrition delivery and the associated risks from multiple nasogastric tube extubation. The current trust protocol suggests the use of Nasal Bridles in patients who have extubated more than two nasogastric tubes, although patients’ individual risks for extubation should also be taken into consideration. Hence patients who are pulling out other devices or patients who are to be discharged on long term home NG feeding should be considered.
AUDIT RECOMMENDATIONS

From this audit, it has been found that Nasal Bridles are effective at preventing nasogastric tube dislodgement and the delivery of enteral feed. Hence a key recommendation would be to continue their use within the trust as per current protocols. Further to this, education programmes should be continued, to raise awareness of the availability and effectiveness of Nasal Bridles. An evaluation of the current awareness and understanding of the technique, amongst clinical members of staff within the trust, could be performed to identify any potential factors impeding the use of Nasal Bridles in indicated patients. With the placement of Nasal Bridles extending beyond just the Nutrition Team, an audit in relation to their use as per trust protocol should be performed in the future. This should be aided with the anticipated instigation of a trialled NG tube monitoring form aimed at improving documentation of NG tube care.

In view of the limitations associated with this audit, a re-audit should be performed prospectively. It would prevent the major limitation due to documentation. A more accurate assessment of levels of feed delivery could be performed in terms of actual volumes and whether adequate calorific delivery was achieved. This could be related to a patient’s nutritional status and risk of malnutrition at initial assessment. This would place into context the clinical significance of inadequate nutrition delivery resulting from NG tube extubation, and the clinical effectiveness of Nasal Bridles at preventing malnutrition in hospital. From the experience of this audit, nutritional information could realistically be limited to 14 days post bridle insertion.