Percutaneous Endoscopic Gastrostomy and Gastrostomy Tube Complications at a Rural Referral Hospital: Aetiology and Outcomes

Michelle Murray
Dietitian
Manning Rural Referral Hospital

In fulfilment of requirements for the 2007 Rural Research Capacity Building Program provided by the NSW Institute of Rural Clinical Services and Teaching

Research Mentor
Dr. Anne Duggan
Associate Director, Clinical Governance, Hunter New England Area Health Service
Conjoint Professor, University of Newcastle
Senior Staff Specialist Gastroenterology
John Hunter Hospital
Newcastle NSW

Acknowledgements

- NSW Institute of Rural Clinical Services and Teaching for education, training, and financial support for this project
- Emma Webster (Rural Research and Executive Support Officer, NSW Institute of Rural Clinical Services and Teaching) for mentoring and support for the project
- Tim Badgery-Parker (NSW Health Biostats Trainee) and Lyn Boylan (Project Officer) for assistance with data management and statistical analysis
- Dr. W. Slater (Medicine), Dr. M. Ghaly (Surgery), Dr. E. Livshin (Medical Registrar), Charles McCloskey (Director of Pharmacy) and Donna Williams (Clinical Nurse Specialist) for input on the retrospective medical file audit
- Stephen Reilly (Nurse Unit Manager Palliative Care/Rehabilitation), Dr. E. Livshin (Medical Registrar) and Donna Williams (Clinical Nurse Specialist) for input on the Staff Questionnaires
- Robyn Grove (Patient Services Manager) and Medical Records Staff for identification of patients and gathering medical files for the retrospective medical file audits
- Nutrition and Dietetics Department, Manning Rural Referral Hospital

Address for Correspondence

Michelle Murray
Dietitian
Manning Rural Referral Hospital
York St. Taree 2430
Australia

Tel: +61 2 6592 9336
Fax: +61 2 6592 9817
Email: Michelle.Murray@hnehealth.nsw.gov.au

Table of Contents

Abstract

Anecdotal reports of high complication rates after Percutaneous Endoscopic Gastrostomy (PEG) placement at Manning Rural Referral Hospital led to a decision to undertake this study. Medical Staff at Manning Rural Referral Hospital raised concerns during a Medical Mortality and Morbidity Meeting, however no evidence was available or documented on the rates and types of complications, and in particular the contribution of patient co-morbidities or risk factors to tube complications and no prospective audit had been considered.

Previous studies of PEG/Gastrostomy tube complication rates at hospital sites elsewhere reported rates of complications ranging from 2% to 70% depending on the definition of "complication", the patient population used, and the time period of the study (Lynch and Fang 2004, Paillaud, Bories, Merlier, Richardet, Jeanfaivre, and Campillo 2002, McClave and Chang 2004).

The aim of this study was to determine the rates and types of complications (both minor and major) for patients who had a PEG tube placed, were admitted (for any reason) with an existing PEG/Gastrostomy tube, had an existing PEG tube removed, had another PEG tube inserted, or who presented to the Emergency Department (ED) with a PEG/Gastrostomy tube at Manning Rural Referral Hospital over a five year period (1st October 2002 – 30th September 2007). Potential contributing factors to PEG/Gastrostomy tube complications were also investigated, including determining staff knowledge, practices and challenges in managing a patient with a PEG or Gastrostomy tube. Data was collected by the researcher using a retrospective medical file audit involving 54 individual patients (137 admissions to hospital and 20 Emergency Department presentations), and a staff questionnaire targeting 142 participants (37 non-nursing, and 105 nursing staff).

The overall complication rate for patients admitted to the hospital who had a PEG tube placed or who had an existing PEG/gastrostomy tube was 28% (Table 27). The overall minor complication rate was 15% in comparison to major at 13% (Table 27). The complication rate for patients who had PEG tube placed at Manning Rural Referral Hospital was 42%, with minor complications at 26%, compared to major at 16% (Table 27). The complication rate, both overall (28%), and for PEG tubes placed (28%) is within previously reported ranges of 2% to 70% (Lynch and Fang 2004, Paillaud et al 2002, McClave and Chang 2004). However the reported range is wide and the complication rate for PEG tubes placed (42%) was at the range's higher end. This raises the question of preventability and the importance of analysis of the data to identify effective strategies to reduce complications.

Potential contributing factors to PEG tube complications at Manning Rural Referral Hospital included patient demographics (including age), lack of monitoring of patient weight, no standard policy/procedure on PEG tube management (including pre and post insertion), no clear guidelines on patient selection suitability criteria for PEG placement, inappropriate medications, and lack of staff knowledge (self rated).

Recommendations from this study include standardising patient screening and preparation for PEG tube placement with the implementation of the Hunter New England Area Health Service guideline for PEG/Gastrostomy tube management, and the provision of ongoing training and education for staff on PEG/Gastrostomy tube care.

Key Words
Percutaneous Endoscopic Gastrostomy (PEG) Tube, Gastrostomy Tube, Complications of PEG (Gastrostomy) Tube, PEG (Gastrostomy) Infection Rate, Rural Referral Hospital

Introduction

Placement of a Percutaneous Endoscopic Gastrostomy (PEG), is a surgical procedure in which a thin, hollow, flexible tube is placed through the abdominal wall and into the stomach via a small surgical opening (a stoma). An endoscope is passed into the stomach to enable the proceduralist to identify the preferred entry point of the inducer into the stomach wall. Once placed, the tube is then available to provide long term nutrition, hydration and medications to patients who are unable to meet nutrition and hydration requirements, or swallow medications orally (Holmes, 2004). The procedure was developed in 1980, and was considered safe because it had less than a 2% intra-operative complication rate and effective because it allowed adequate feeding (Plonk 2005, Schrag, Sharma, Jaik, Seamon, Lukaszczyk, Martin, Hoey, and Stawicki 2007). After the stoma has healed, patients can have the PEG replaced by a gastrostomy tube/button which sits closely to the skin (Young, Bidner, McNabb and Duggan 2006).

Background

Complication Rates

Previous studies conducted at hospital sites of PEG/Gastrostomy tube complications have found rates of complications ranging from 2% to 70% depending on the definition of "complication", the patient population used, and the time period of the study (Lynch and Fang 2004, Paillaud et al 2002, McClave and Chang 2004). For example, in some studies, the complication time period studied is only the actual procedure itself, in comparison with other studies which investigated beyond the actual procedure (Chaudhary, Smith, Cuddy and Clarkston 2002). In one study, 70% of patients had at least one complication following PEG insertion, which the authors felt was secondary to the consideration of digestive disorders and lung infections related to the procedure, as well as the length of the study period and the frail presentation of the sample (Paillaud et al 2002).

Minor and Major Complication Definition

Other studies have further separated the term complication into minor and major, with minor complication rates quoted at between 13-50% minor complication and 1.6-3.0% for major complications (those requiring PEG tube removal, and/or hospitalisation)(Sheehan, Hill, Fanning, Healy, McDermott, O'Donoghue, and O'Higgins 2003, Figueiredo, da Costa, Pelosi, Martins, Machado, and Francioni 2007, Schurink, Tuynman, Scholten, Arjaans, Kinkenberg-Knol, Meuwissen, and Kuipers 2001, McClave and Chang 2004). For the purpose of this study, minor complications include (but are not limited to) periostomal wound infection, cellulitis, ileus, periostomal leakage, haematoma, stomal leak, nausea/vomiting/diarrhoea post insertion, and granulation. Major complications (which may have required surgical intervention) included (but are not limited to), necrotizing fasciitis, migration of the tube, peritonitis, intra-abdominal abscess, gastrocolic fistula, tube dislodgement/extubation, buried bumper, gastric outlet obstruction and perforation (Lin, Ibrahim, Kheng, Fee and Terris 2001). The benefit of a PEG tube to the patient must be weighed against the risks associated with any indwelling gastrostomy feeding tube.

Potential Risk Factors for PEG tube Complication
Paillaud et al (2002) identified by univariate analysis that poor prognostic factors post PEG procedure included age, low weight, active infection, and presence of pressure sores. Further, Plonk (2005) outlines a number of poor prognostic indicators for PEG placement which includes; Age >75, Male Gender, Diabetes Mellitus, Chronic Obstructive Pulmonary Disease, Advanced Cancer, Previous Aspiration, Nil By Mouth 7 Days, Urinary Tract Infection, Charlson Score >3, Low Body Mass Index, Albumin <3g/dL, Hospitalised, Bedridden, Pressure Sores, Confusion and Cardiac Disease. Lipp and Lusardi (2006), also report that patients who are immunosuppressed, have a malignancy, have compromised nutritional intake, and the increasing incidence of methicillin-resistant Staphylococcus aureus (MRSA) are also further potential impacts on the risk of infection following PEG tube placement (Chaudhary et al 2002). A Cochrane review also recommends that patients undergoing PEG placement receive prophylactic antibiotic cover at the time of insertion to reduce the risk of complication, namely infection post insertion (Lipp and Lusardi 2006).

Mortality Rates post PEG Placement
Procedure related mortality rates for PEG insertion has been reported to range from 0% to 2%, with 30 day mortality post PEG placement at 1.5% to 2.1% (Lynch and Fang 2004). It is obviously important that patients are suitably selected for PEG placement to reduce the risk of morbidity and mortality, and that the PEG insertion is conducted within recommended guidelines (Krenitsky 2005, Plonk 2005). For example, the Clinical Guidelines for Acute Stroke Management (2007), state that nasogastric feeding is the preferred route in the acute phase, and if continued for the first month, was associated with increased functional recovery and increased likelihood of resumption of swallowing function within 6 months when compared to PEG feeding (National Health and Medical Research Council 2007).

Recommended Guidelines for PEG tube Management to Decrease Risk of Complications
In regards to management of a PEG/gastrostomy tube, Schurink, et al (2001) recommend strict guidelines be in place in order to reduce the risk of complication. This includes post operative management of the tube, including tube access within recommended timeframes (for enteral feeding 3 – 6 hours post insertion)(Condron 2006). Young et al (2006), provide an outline of management of PEG/Gastrostomy tube which minimise risk of complications. These include; cleaning and drying under the disc, measuring the skin disc against tube numbering to monitor for possible migration, daily rotation of tube, daily check of site, monitoring of nutritional status by Dietitian, and regular PEG/Gastrostomy water flushes (Young et al 2006). Also of importance is regular weight monitoring of patients who have enteral feeding, especially patients with a PEG or Gastrostomy tube (Lynch and Fang 2004). Monitoring weight not only allows for accurate medication dosing, but identifies the need for resizing of the PEG/Gastrostomy tube (which can prevent associated PEG tube complications), and assists in the nutritional assessment of enteral feeding regime adequacy (which helps to prevent

malnutrition and associated morbidity and mortality) (Lynch and Fang 2004). Ensuring standardisation of PEG/Gastrostomy tube management, identifying problems and providing standard of care can potentially decrease length of stay, the costs surrounding admission, and prevent readmission.

Aims

The aim of this study was;

(i) To investigate a cohort of patients managed at Manning Rural Referral Hospital who over a five year period (1st October 2002 – 30th September 2007) either;

1. Had a PEG placed – any patient who had been admitted to Manning Rural Referral Hospital who had a PEG tube placed for the first time during an admission
2. Had another PEG placed – any patient who had been admitted with an existing PEG who had another PEG tube placed during an admission
3. Had PEG removal – any patient who was admitted with an existing PEG tube who had surgical removal of the tube during the admission
4. Had an existing PEG/Gastrostomy – any patient who had been admitted (for any reason) with an existing PEG or Gastrostomy tube
5. Had an existing PEG/Gastrostomy who had an ED Presentation – any patient who had presented to the Emergency department with an existing PEG or Gastrostomy

(ii) To determine staff knowledge, practices and challenges in managing a patient with a PEG or Gastrostomy tube.

The outcome of the study was to determine;

1. The frequency and type of PEG related complications (both minor and major), and
2. The factors contributing to these complications

Method

Data was collected using two strategies:

1. Retrospective Medical File Audit
2. Staff Questionnaires

1. Retrospective Medical File Audits

(i) Participants

Participants in the retrospective medical file audits included all patients who had been admitted or presented to Manning Rural Referral Hospital over a five year period (1st October 2002 – 30th September 2007). The presentation and admission criteria for each group in the study was;

1. PEG placed – any patient who had been admitted to Manning Rural Referral Hospital who had a PEG tube placed for the first time during that admission
2. Another PEG placed – any patient who had been admitted with an existing PEG who had another PEG tube placed during that admission
3. PEG removal – any patient who was admitted with an existing PEG tube who had removal of the tube during the admission
4. Existing PEG/Gastrostomy – any patient who had been admitted for any reason with an existing PEG/Gastrostomy tube
5. ED presentation – any patient who had presented to the Emergency department for any reason with an existing PEG/Gastrostomy

Complicating the data collection was that one patient may have had admissions under each of these group definitions and coding was used to identify such patients.

The time period was chosen to provide an adequate number of patients who had a PEG/Gastrostomy tube inserted during the admission, while still maintaining clinical relevance. The 30th September 2007 was the limit on the time period as this was the time when the principal researcher applied and gained funding for the project. As the principal researcher works in a clinical capacity with the participant group, results after this time may have been influenced.

Medical Records staff identified eligible patients by searching the medical record database iPM, which allows patients/medical record numbers to be identified from coding completed at discharge for Gastrostomy status. All medical records were stored securely in the medical records department when not in use by the researcher.

(ii) File Audit Content

Data collected from the medical file audit included demographics, admission details, tube insertion details, documented signs of complications, diagnosis of complications, co-morbidities/risk factors for tube complications, treatment of tube complications and patient outcome (Appendix 1). Only the principal researcher conducted the medical file audit and defined procedure/criteria was utilised to minimise errors and subjectivity.

(iii) File Audit Data Management
Data entry was completed using the Retrospective Medical File Audit coding (Appendix 1), with data entered directly from the medical file onto Microsoft Excel. All CD files containing data were kept in a locked cabinet, and post data entry and analysis, de-identified.

(iv) File Audit Statistical Analysis
Descriptive statistics were completed using Microsoft Excel. Stata 11 was utilised for statistical testing, however due to limited numbers (and hence inability to assume independence of the patient sample), no conclusions could be drawn.

2. Staff Questionnaires
(i) Participants
A total of 142 participants were targeted for the staff questionnaires and included those who are involved in the multidisciplinary team who manage an inpatient with a PEG/Gastrostomy tube. Of those targeted, 37 were non-nurses and 105 were nurses.

The Non-Nursing group (n=37) were Senior and Junior Doctors, Allied Health professionals and Pharmacists who were identified by the researcher from the Doctor Roster, and current staff lists. Questionnaires were sent to 100% of the eligible group.

The Nursing group totalled 105, and included ward nursing staff and Nurse Unit Managers on wards which manage patients with PEG/Gastrostomy tubes. Of this group, 63% were Nurse Unit Managers/Registered Nurses, 22% Enrolled or Endorsed Nurses, 9% Clinical Nurse Specialists, and 6% Trainee Enrolled Nurses. Nursing staff in specialist roles (9%) were also recruited and included Clinical Nurse Educators, Stomal Therapist, Infection Control, Discharge Planners, and Advanced Care Planner. The Nursing group who received questionnaires represented approximately 28% of the current nursing population employed by Manning Rural Referral Hospital (370 as at January 2008). It was felt that targeting approximately 25% of the nursing population would provide a representative sample.

Nursing staff uninvolved in the inpatient management of PEG patients were excluded. These included ward staff from Mental Health, Oncology, Maternity, Preadmission Clinic, and Renal Unit. No community based nursing staff or nursing staff in positions of hospital management were included in the study.

Recruitment of the Nursing group was conducted by using the ward roster for the selected day of questionnaire distribution. All names of nursing staff rostered onto shifts for the full 24 hour period were collected, and for nurses in specialist roles, a list was gathered from the internal phone book.
This method of recruitment was conducted in order to target those nursing staff who work on the designated wards for the study, to ensure that questionnaires were being sent to staff who were at work (not on leave), and

to obtain a representative sample from the ward (qualifications, type of shift worked and ages).

(ii) Questionnaire Distribution
Questionnaires were distributed via the internal mail system. The envelopes contained a participant information letter (Appendix 2), questionnaire (Appendix 3), return addressed pre-paid envelope, and a tea and coffee sachet to encourage staff to complete the surveys and to thank participants for their time in completing the survey. Return date for questionnaires was two weeks

(iii) Questionnaire Content (Appendix 3)
The questionnaire involved demographic data collection (occupation, years of experience, involvement in the care and management of a patient with a PEG/Gastrostomy tube), and in regards to a PEG/Gastrostomy tube, participants self rated knowledge, previous training and education, policy and procedures used and challenges. Respondents were also asked to document the signs and symptoms that they use to determine when a patient with a PEG or gastrostomy is at risk of, or experiencing a PEG/Gastrostomy tube complication, and specifically Nursing Staff were asked questions regarding dressing, lotions, and creams that are used on both an infected and non-infected PEG/Gastrostomy tube site. All respondents had the opportunity to add any comments in the last question.

(iv) Questionnaire Data Management
Returned questionnaires were coded (from 001) on return, to allow clarification of data entry. Data was managed with Microsoft Excel. All questionnaires and CD files containing data were kept in a locked cabinet, and post data entry questionnaires were confidentially shredded.

(v) Questionnaire Statistical Analysis
Descriptive statistical analysis was conducted using Microsoft Excel. Due to the small sample size of returned surveys, no other statistical testing could be complete

Ethics Approval
Ethics approval was obtained from the Hunter New England Human Research Ethics Committee for this project (Reference Number 08/05/21/4.08)

Results

1. Retrospective Medical File Audit

Demographic Data

Between 1st October 2002 and 30th September there were 137 PEG related admissions involving 54 patients. Table 1 shows admissions by patient group.

Table 1: Frequency of admission and presentation for individual patients and admissions in each PEG/Gastrostomy patient group at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG/Gastrostomy Patient group	Individual Patients (n=54) n (%)	Admissions (n= 137) n (%)
PEG Placement	19 (35)	19 (14)
Another PEG Insertion	-	4 (3)
PEG Removal	4 (7)	9 (6.5)
Existing PEG/Gastrostomy Tube	31 (57)	105 (77)

Of the 54 patients included in the study, there were also 20 Emergency Department presentations.

Patient Demographics

The demographic profile of patients on the initial presentation to the study by patient group is shown in Table 2.

Table 2: Patient demographics on initial presentation and inclusion in the study for patient group admitted to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Demographic	PEG Placed (n=19) n (%)	PEG Removal (n=4) n (%)	Existing PEG/ Gastrostomy (n=31) n (%)
Mean Age (years)	73	72	42
Median Age (years)	74	71	54
Age Range (years)	46 – 89	64 – 84	1 – 84
Age >60 years n (%)	16 (84)	4 (100)	12 (39)
Gender Male n (%)	10 (53)	3 (75)	22 (71)
Length Of Stay Mean (days)	32	1.5	13.4
Length Of Stay Median (days)	28	-	8
Length Of Stay Range (days)	0 – 116	0 – 6	0 -114

PEG Indication

PEG/Gastrostomy tube indication for patients on initial admissions to the study can be seen in Table 3.

Table 3: PEG/Gastrostomy tube indication for individual patients on initial presentation to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG Indication	PEG Placed (n=19) n (%)	PEG Removal (n=4) n (%)	Existing PEG/ Gastrostomy (n=31) n (%)	TOTAL (n=54) n (%)
Stroke	13 (68)	2 (50)	4 (13)	19 (35)
Head/Neck/ Oesophageal Cancer	2 (11)	1 (25)	8 (26)	11 (20)
Neurodegenerative Disorder	2 (11)	-	5 (16)	7 (13)
Neurological disability/dysfunction	-	-	12 (39)	12 (22)
Head Injury	1 (5)	-	1 (3)	2 (4)
Other	1 (5)	1 (25)	1 (3)	3 (6)

Residence of Patients Prior to and Post PEG Placement Admission

The residence of patients prior to the first initial admission (and entry into the study) can be seen in Table 4.

Table 4: The residence of patients at first admission in the study period to Manning Rural Referral Hospital 1st October 2002 – 31st September 2007

Residence Prior to Admit	PEG Placed (n=19) n (%)	PEG Removal (n=4) n (%)	Existing PEG/ Gastrostomy (n=31) n (%)	TOTAL (n=54) n (%)
Home	13 (68)	2 (50)	21 (68)	36 (67)
Another Hospital	1 (5)	-	9 (29)	10 (19)
Hostel	3 (16)	-	-	3 (6)
Nursing Home	2 (11)	-	-	2 (4)
Group Home	-	-	1 (3)	1 (2)
Rehabilitation	-	2 (50)	-	2 (4)

The discharge residence of patients in each PEG/Gastrostomy patient group on initial presentation to the study can be seen in Table 5.

Table 5: The discharge residence by patient group after first admission in the study period to Manning Rural Referral Hospital 1st October 2002 – 31st September 2007

Discharge Destination	PEG Placed (n=19) n (%)	PEG Removal (n=4) n (%)	Existing PEG/ Gastrostomy (n=31) n (%)	TOTAL (n=54) n (%)
Home	4 (21)	2 (50)	17 (55)	23 (43)
Another Hospital	3 (16)	-	7 (23)	10 (19)
Nursing Home	7 (37)	-	2 (6)	9 (17)
Group Home	-	-	1 (3)	1 (2)
Respite	-	-	1 (3)	1 (2)
Rehabilitation	3 (16)	2 (50)	-	5 (9)
Died	2 (10)	-	3 (10)	5 (9)

Patient Co-Morbidities/Risk Factors

Most patients who were admitted to Manning Rural Referral Hospital who had a PEG tube placed or were admitted with an existing PEG/Gastrostomy tube had severe co-morbidities/risk factors for PEG tube complication (Table 6).

Table 6: Co-Morbidities/Risk factors for PEG tube complication for each patient group admitted/presenting to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Number of Co-Morbidities/Risk Factors for Tube Complication	PEGs Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	TOTAL (n=157) n (%)
0	1 (5)	-	1 (11)	5 (5)	1 (5)	8 (5)
1 – 3	9 (47)	2 (50)	6 (67)	89 (85)	19 (95)	125 (80)
>4	9 (47)	2 (50)	2 (22)	11 (10)	-	24 (15)

Frequency of Prescribed Medications

Most patient admissions involved many varied medications which had the potential to cause problems with the PEG/Gastrostomy tube. For example proton pump inhibitors (including Lansoprazole), and slow release medications (especially for pain relief). One patient who was on Lansoprazole did not have this medication changed during the admission, and later represented to the hospital with a blocked tube.

Frequency of Recording Patient's Weight during Admission

A number of patient admissions did not have a recorded weight in the medical file (Table 7), and did not have a weight taken on admission (Table 8).

Table 7: The frequency of documented weight for PEG/Gastrostomy patient admissions at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Frequency of recording weight for patient admissions	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Number of Patients weighed	14 (74)	-	9 (100)	58 (55)	-	81 (52)
Number of Patients not weighed	5 (26)	4 (100)	-	47 (45)	20 (100)	76 (48)

Table 8: Frequency of patient weights taken at preadmission/admission to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Documented patient weight at Pre/Admission	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	TOTAL (n=157) n (%)
At admission/ preadmission	3 (16)	-	8 (89)	35 (33)	-	46 (29)
No weight documented	16 (84)	4 (100)	1 (11)	70 (67)	20 (100)	111 (71)

Table 9 shows the ideal number of weights that should have been taken on patients if weights were documented at admission and weekly (each 7 days).

Table 9: The frequency of documented weights for patients versus ideal frequency of patient weights if completed on admission, and weekly (at seven day intervals) by patient group at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Patient Group	Number of times with documented weight (n=actual)	Number of times weight ideally taken considering LOS (n=ideal)	Percentage of times weight was documented versus ideal (%)
PEG Placed	22	97	23
Another PEG Placed	0	12	0
PEG Removal	9	9	100
Existing PEG/Gastrostomy	99	227	44
ED Presentation	0	20	0
TOTAL	130	365	36

The maximum number of times that a patient was weighed during admission was 7, which was a patient within the existing PEG/Gastrostomy group.

PEG/Gastrostomy Tube Information Documented at Admission

There was limited documentation on the brand, size, type, insertion date and insertion location for all patient groups, with the old medical record providing limited additional information for these criteria.

Hospital Location of PEG/Gastrostomy Tube Placement

Hospital location of tube placement for individual patients on first presentation to Manning Rural Referral Hospital and admission into the study for patient groups can be seen in Table 10.

Table 10: Hospital location of tube placement for individual patients on first presentation to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Hospital Site for PEG/Gastrostomy Placement	PEG Placed (n=19) n (%)	PEG Removal (n=4) n (%)	Existing PEG/ Gastrostomy (n=31) n (%)	TOTAL (n=54) n (%)
Manning Rural Referral Hospital	19 (100)	-	1 (3)	20 (37)
Private Hospital		1 (25)	4 (13)	5 (9)
Tertiary Hospital		3 (75)	10 (32)	13 (24)
Another Rural Hospital		-	1 (3)	1 (2)
Unknown		-	15 (48)	15 (28)

Nutritional Intake pre PEG Placement

Not all patients who underwent PEG insertion had enteral nutrition (EN) commenced prior to tube placement (Table 11). Of those patients who did receive nasogastric enteral feeding, commencement time from day of admission varied greatly (Table 12).

Table 11: Nutritional background from admission to PEG placement for patients who underwent PEG/Gastrostomy insertion at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Nutrition summary from admission to PEG placement	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)
Nil by Mouth	4 (21)	3 (75)
Oral intake (inadequate to meet estimated nutritional requirements)	3 (16)	-
Enteral Nutrition (Nasogastric)	5 (26)	1 (25)
Enteral Feeding (Nasogastric) + Oral Intake	7 (37)	-

Table 12: Enteral Feeding introduction via Nasogastric Feeding in patients who later underwent PEG insertion at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Enteral Nutrition (EN) commencement time from admission	PEG Placed (n=19)	Another PEG Placed (n=4)
Mean time for EN introduction post admission (days)	5.2	3
Median time for EN introduction post admission (days)	3.5	-
Range of time for introduction of EN post admission (days)	1 – 18	-

Only one patient who had another PEG tube placed had nasogastric enteral feeding prior to the procedure without problems identified with EN delivery. Of the eleven patients who received nasogastric enteral feeds there were a number of problems to disrupt feeding goals including; nasogastric tube being pulled out or dislodged (n=10, 83%), vomiting/nausea (n=2, 17%), diarrhoea (n=2, 17%), tube blockage (n=1, 8%), and other causes (n=5, 42%).

Other documented problems for patients who had a nasogastric enteral feed prior to PEG tube placement included perceived risk of refeeding syndrome, delays in confirmation of nasogastric position for feeding, staff unsure of feeding rate, unable to aspirate tube to confirm position therefore feeds suspended, stoppages for oral trials/barium swallow testing, change of enteral feed, patient agitated, and feed disconnected/suspended for no reason.

PEG Identification/Consultation

There appeared to be early identification and consultation of patients who required PEG tube placement in the patients admitted, especially considering this group had 68% stroke patients (Table 13, Table 14). As expected, most patients in the another PEG placed group were directly admitted for tube reinsertion, which is reflected in the following results.

Table 13: Number of days from admission to documentation of identification in the medical record that patient required PEG placement at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Documentation that PEG tube required	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)
Patient notes with data available	16 (84)	3 (75)
Notes with insufficient documentation	3 (16)	1 (25)
Mean (days)	15.4	0
Median (days)	14.5	0
Range (days)	-6 – 39	0

NB: One patient was identified as needing PEG tube placement 6 days prior to their admission day.

Table 14: Number of days from documentation in the medical notes of need for PEG tube to consultation for tube placement for patients at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Documentation of consultation for PEG tube from day of identification	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)
Patient notes with data available	14 (74)	3 (75)
Notes with insufficient documentation	5 (26)	1 (25)
Mean (days)	1	1.5
Median (days)	0	0
Range (days)	0 – 4	0 – 6

When the stroke patients are analysed separately (n=13), the identification and consultation times remain relatively early as seen in Table 15.

Table 15: Number of days from admission to documentation in medical notes of need for PEG tube and consultation time for PEG placement, from admission for stroke patients (n=13) who had PEG placed at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Documentation that PEG tube required and consultation record	Time from Admission to documentation that PEG tube required (n=13) n (%)	Time from Admission to documentation of consultation that PEG tube required (n=13) n (%)
Patient notes with data available	12 (92)	11 (85)
Notes with insufficient documentation	1 (8)	2 (15)
Mean (days)	19.4	20
Median (days)	16	18.5
Range (days)	7 – 39	7 – 39

PEG Placement Preparation

The fasting time for patients who underwent PEG placement for the first time was considerably lower than that for patients who were undergoing another PEG placement, as seen in Table 16.

Table 16: Fasting time for patients who underwent PEG tube placement at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Fasting Time	PEG Placed (n=19) n (%)	Another PEG placed (n=4) n (%)
Patient notes with data available	10 (53)	4 (100)
Notes with insufficient documentation	9 (47)	-
Mean	8 Hrs 40 Mins	78 Hrs 25 Mins
Median	8 Hrs 20 Mins	43 Hrs 8 Mins
Range	4 Hrs 48 Mins – 12 hrs 9 Mins	11 Hrs 26 Mins – 9 Days

There was no routine blood pathology completed on patients prior to PEG placement.

PEG Placement

For patients who had PEG tube placed for the first time, 14 patients (74%) had tube insertion less than 28 days post admission, which included eight stroke patients. Of this 14 patients, four (29%) had tube insertion on the day of admission. The following table (Table 17), shows the days from admission to PEG placement, with Table 18 showing the days from admission to PEG placement for stroke patients (n=13).

Table 17: Days from admission to PEG placement for patients admitted to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Days from admission to PEG placement	PEG Placed (n=19) n (%)	Another PEG placed (n=4) n (%)
Patient notes with data available	19 (100)	4 (100)
Notes with insufficient documentation	0	0
Mean (days)	18.5	6.5
Median (days)	14	7
Range (days)	0 - 100	2 – 11

For the PEG tube placed group, one patient had placement 100 days post admission (61 days post consultation). This extended time period was due to the patient requiring recovery time from cellulitis and discharging abdominal wounds.

Table 18: Days from admission to PEG placement for patients admitted with a stroke (n=13) to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Days from admission to PEG placement	PEG Placed (n=13) n (%)
Mean (days)	25.5
Median (days)	21.5
Range (days)	0 – 100

Prophylactic Antibiotic Therapy

Only one patient who underwent PEG tube insertion and one patient who had another PEG placed received prophylactic antibiotics (Table 19). Few patients were on antibiotics prior to the procedure for other indications.

Table 19: Antibiotic regimen for patients who had PEG tube inserted at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Antibiotic Regime	PEG Placed (n=19) n (%)	Another PEG placed (n=4) n (%)
Prophylactic antibiotic therapy on insertion	1 (5)	-
Already on antibiotics for another infection	5 (26)	2 (50)
No prophylactic antibiotic cover given	13 (68)	1 (25)
Prescribed antibiotics post insertion (no documented reason)	-	1 (25)

PEG Access

There was a wide range of time from PEG placement to first accessing of the tube post placement, and for enteral feeding commencement post placement for patients having PEG placement at the hospital (Table 20, Table 21).

Table 20: Time from PEG placement to first access of the PEG tube post placement at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

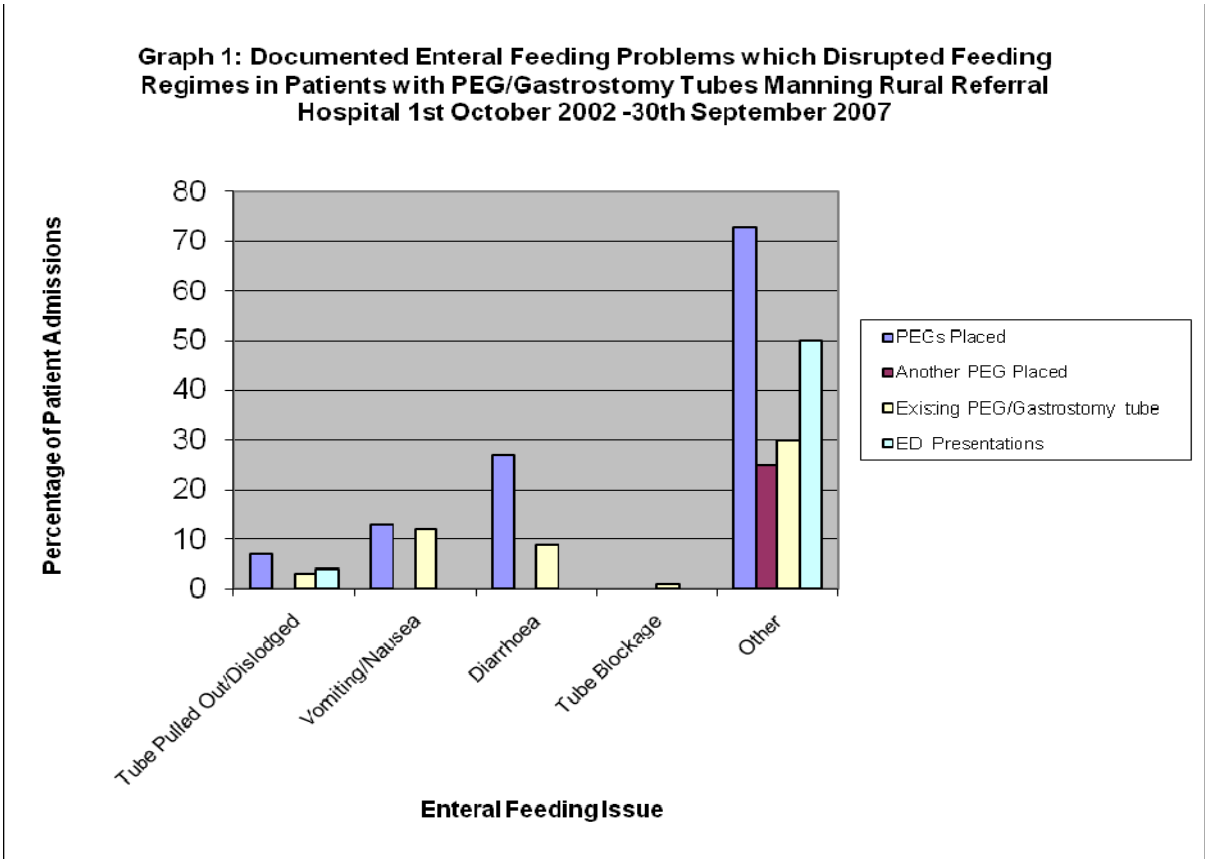
PEG Access	PEG Placed (n=19) n (%)	Another PEG placed (n=4) n (%)
Patient notes with data available	16 (84)	3 (75)
Notes with insufficient documentation	3 (16)	1 (25)
Mean	21 Hrs 59 Mins	27 Hrs
Median	22 Hrs 50 Mins	24 Hrs 25 Mins
Range	4 Hrs 14 Mins – 53 Hrs 59 Mins	9 Hrs 27 Mins – 47 Hrs 8 Mins

Table 21: Time from PEG placement to enteral feeding commencement via the PEG tube for patients who underwent PEG tube insertion at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Enteral Feeding Commencement	PEG Placed (n=19) n (%)	Another PEG placed (n=4) n (%)
Patient notes with data available	15 (79)	2 (50)
Notes with insufficient documentation	4 (21)	2 (50)
Mean	35 Hrs 31 Mins	35 Hrs 47 Mins
Median	24 Hrs 17 Mins	35 Hrs 47 Mins
Range	4 Hrs 14 Mins – 101 Hrs	24 Hrs 25 Mins – 47 Hrs 8 Mins

PEG Enteral Feeding Problems

There were a number of problems with establishing enteral feeding in patients who underwent PEG tube placement, as seen in the following Graph.



Other problems which disrupted regimes, included abdominal symptoms, PEG tube infection/leaking, perceived risk of refeeding syndrome, lack of documented feeding regime/feeds, missed or feeds delayed, patient interference with feed, lack of resources (feed/equipment), patient gate pass or leave, seizure activity, lump/nodule around site, broken adapter on tube, and palliative treatment of patient.

PEG/Gastrostomy Tube Associated Hospital Presentation

There were varied reasons for patient presentations with a PEG/Gastrostomy tube problem, as seen in Table 22.

Table 22: Reasons for presentation by each PEG/Gastrostomy group who were admitted or presented to Manning Rural Referral Hospital 1st October 2002 – 31st September 2007

Tube Presentation Reason	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=138) n (%)
Tube Blockage	3 (75)	-	-	-	3 (2)
PEG/Gastrostomy Site Infection		-	8 (8)	3 (15)	11 (8)
PEG/Gastrostomy Site Leaking	1 (25)	-		1 (5)	2 (1)
Cellulitis at tube site	-	-	3 (3)	-	3 (2)
Septiceamia due to tube site infection	-	-	1 (1)	-	1 (1)
Dislodged tube/Accidental Removal	-	-	2 (2)	5 (25)	7 (5)
Tube feeding complication/Training	-	-	3 (3)	1 (5)	4 (3)
Change and Confirmation of tube position	-	9 (100)	-	5 (25)	14 (10)
Broken Tube Connection	-	-	1 (1)	2 (10)	3 (2)
Erythema around tube	-	-	-	2 (10)	2 (1)
Pain/Discharge at site	-	-	-	1 (5)	1 (1)
No Tube Problem on Admission	-	-	87 (83)	-	87 (63)

PEG Tube Complications

There were a number of patients in the patient groups who had a PEG/Gastrostomy tube complication (Table 23).

Table 23: Number of patients who were diagnosed with a PEG/Gastrostomy tube complication for each PEG/Gastrostomy patient group admitted to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG/Gastrostomy tube Complication	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Number of patients diagnosed with tube complication at, or during admission	8 (42)	4 (100)	2 (22)	18 (17)	12 (60)	44 (28)
Number of patients not diagnosed with complication at, or during admission	11 (58)	-	7 (78)	87 (83)	8 (40)	113 (72)

The timing of the diagnosis of a PEG/Gastrostomy tube complication in relation to the patient admission can be seen in Table 24.

Table 24: Time of Diagnosis of PEG/Gastrostomy Tube Complication for patient groups at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG/Gastrostomy tube Complication - time of diagnosis	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Admission/Presentation	-	4 (100)	2 (22)	11 (10)	12 (30)	29 (18)
During Admission	8 (42)	-		7 (7)		15 (10)
No Complication	11 (58)	-	7 (78)	87 (83)	8 (40)	113 (75)

For the Existing PEG/Gastrostomy group, of the seven patients not diagnosed on day of admission, three patients were diagnosed on Day 1 post admission, and the remaining four patients were diagnosed on Days 5, 6, 7, and 75 post admission. It should be noted that the patient diagnosed on Day 75 did have reported signs of a PEG tube problem throughout the admission notes.

There was a range of complication diagnoses as shown in Table 25.

Table 25: Complication diagnosis for most serious documented complication by patient group admitted, or who presented, to Manning Rural Referral Hospital with a PEG/Gastrostomy tube (1st October 2002 – 30th September 2007)

PEG/Gastrostomy tube Complication	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Localised Cellulitis	1 (5)	-	-	3 (3)	1 (5)	5 (3)
Periostomal Wound/Site Infection	3 (16)	-	-	4 (4)	4 (20)	11 (7)
Stomal Leak	1 (5)	-	1 (11)	1 (1)	2 (10)	5 (3)
Granulation	-	-	-	2 (2)	-	2 (1)
Tube Extubation	-	-	-	2 (2)	3 (15)	5 (3)
Buried Bumper	2 (11)	3 (75)	1 (11)	1 (1)	-	7 (4)
Peritonitis/Intraperitoneal Leakage	-	-	-	1 (1)	-	1 (1)
Abscess Formation	-	-	-	2 (2)	-	2 (1)
Blocked Tube (Requiring Removal)	-	1 (25)	-	-	-	1 (1)
Pressure Necrosis	-	-	-	-	-	-
Necrotising Fasciitis	1 (5)	-	-	-	-	1 (1)
Tube Migration	-	-	-	1 (1)	-	1 (1)
Fistula	-	-	-	1 (1)	-	1 (1)
Broken Tube					2 (10)	2 (1)
No Complication diagnosed	11 (58)	-	7 (78)	87 (83)	8 (40)	113 (72)

NB: For patients who had more than one complication diagnosis documented in the medical file, the more serious complication was reported in the above table.

Secondary complication diagnosis for patients included the minor complications of cellulitis, periostomal wound infection, stomal leak, and blocked tube as seen in the following table (Table 26).

Table 26: Secondary complication diagnosis by patient group admitted, or who presented, to Manning Rural Referral Hospital with a PEG/Gastrostomy tube (1st October 2002 – 30th September 2007)

PEG/Gastrostomy tube Secondary Complication	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=148) n (%)
Localised Cellulitis	1 (5)	-	4 (4)	-	5 (3)
Periostomal Wound/Site Infection	1 (5)	1 (25)	1 (1)	-	3 (2)
Stomal Leak	1 (5)	-	1 (1)	-	2 (1)
Blocked Tube (not requiring tube removal)	-	-	-	1 (5)	1 (1)
Not diagnosed with secondary complication	16 (84)	3 (75)	99 (94)	19 (95)	137 (93)

No patient in the PEG removal patient group was diagnosed with a secondary complication.

Table 27 stratifies the diagnoses into minor and major complications.

Table 27: Frequency of major and minor tube complications for PEG/Gastrostomy patient groups diagnosed with a complication at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG/Gastrostomy tube Complication	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Minor	5 (26)	-	1 (11)	10 (10)	7 (35)	23 (15)
Major	3 (16)	4 (100)	1 (11)	8 (8)	5 (25)	21 (13)
No Complication	11 (58)	-	7 (78)	87 (83)	8 (40)	113 (72)

Readmission

A number of patients within each PEG/Gastrostomy patient group were readmitted to the hospital within 28 days of discharge and within 28 days of PEG placement (Table 28, Table 29).

Table 28: Patient Readmission up to 28 days post discharge presenting with a PEG problem to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Admission Detail	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	TOTAL (n=138) n (%)
Represented within 28 days post discharge with Complication	3 (75)	-	6 (6)	5 (25)	14 (10)
Represented within 28 days post discharge, no complication	-	2 (22)	33 (31)	7 (35)	42 (30)
Not representing within 28 days discharge or information not available	1 (25)	7 (78)	66 (63)	8 (40)	82 (59)

Table 29: Patient Readmission within 28 days of PEG Placement diagnosed with a PEG complication at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Admission Detail	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	TOTAL (n=138) n (%)
Represented with tube complication within 28 days of PEG insertion	1 (25)	-	9 (9)	3 (15)	13 (9)
Represented within 28 days of PEG insertion, no complication	-	-	5 (5)	-	5 (4)
Not representing within 28 days PEG insertion or information not available	3 (75)	9 (100)	91 (87)	17 (85)	120 (87)

For patients who represented within 28 days of PEG placement, the facility where the tube placement occurred can be seen in Table 30.

Table 30: Facility of tube placement for patients readmitted within 28 days of PEG Placement diagnosed with a PEG complication at Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

PEG Placement Site	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	TOTAL (n=138) n (%)
Manning Rural Referral Hospital	1 (25)	-	2 (2)	3 (15)	6 (4)
Private Hospital	-	-	3 (3)	-	3 (2)
Tertiary Hospital	-	-	3 (3)	-	3 (2)
Unknown	-	-	1 (1)	-	1 (1)
Did not present within 28 days post PEG placement	3 (75)	9 (100)	96 (91)	17 (16)	125 (91)

<u>Tube Removal</u>

Table 31 shows the number of patient admissions within each PEG/Gastrostomy patient group who had tube removal during the admission.

Table 31: Number of patient admissions that had PEG/Gastrostomy tube removal in each patient group when admitted/presenting to Manning Rural Referral Hospital 1st October 2002 – 30th September 2007

Tube Removal During Admission	PEG Placed (n=19) n (%)	Another PEG Placed (n=4) n (%)	PEG Removal (n=9) n (%)	Existing PEG/ Gastrostomy (n=105) n (%)	ED Presentation (n=20) n (%)	Total (n=157) n (%)
Tube Removed	4 (21)	4 (100)	9 (100)	6 (6)	5 (25)	28 (18)
No Tube Removal	15 (79)	-	-	99 (94)	15 (60)	129 (82)

Reasons for tube removal for the PEGs placed patient group included accidental removal (50%, n=2), and PEG tube complication (50%, n=2). Complications included buried bumper (n=1), and necrotising fasciitis (n=1). For the Another PEG tube placed group, reasons for tube removal included tube blockage (n=3), and leaking tube (n=1). All PEG tubes in the PEG removal group were intended removal (n=9). The Existing PEG/Gastrostomy group reasons for removal included accidental removal (n=2), and PEG tube complication (n=4)(abscess n=1, tube migration n=1, cellulitis n=1, and gastric fistula n=1). The most varied removal reasons were in the Emergency Department group with accidental removal (n=2), PEG tube complication (n=1, damaged tube), intended removal (n=1), and unknown (n=1).

PEG Policy/Procedures

Only 2% (n=3) of patient admissions/presentations had a policy, procedure or protocol on PEG/Gastrostomy tube management filed into the medical record, and all three admissions involved patients with an existing PEG/Gastrostomy tube.

PEG Site Swabs

There were a total of 54 PEG/Gastrostomy site swabs involving 37 admissions (24%), and 27 identified microorganisms. The three most common microorganisms identified were; coagulase negative staphylococcus (n=18, 15%), corynebacterium species (n=18, 15%), and Staphylococcus aureus (n=17, 14%). The number of positive MRSA swabs was only two (2%). Of note some patients had multiple swabs of the PEG/Gastrostomy site within a short period.

Documentation of PEG tube Care

For no patient group was there daily documentation in the medical notes of the routine care of the PEG/Gastrostomy tube provided.

Mortality

Overall mortality during the study period was 18.5% (n=10), with 7% (n=4) for patients who underwent initial PEG placement at Manning Rural Referral Hospital. The commonest cause of death was the original presenting problem (not PEG/Gastrostomy related)(80% n=8), with one patient also having the PEG tube as a contributing factor. For the remaining 20% (n=2), death was caused by a new presenting problem (not PEG/Gastrostomy related).

2. Staff Questionnaires

The response rate from the staff questionnaires was 36% (n=51). Due to the limited response number, only descriptive statistics have been used in the analysis

Job Description of Respondents
The distribution of professions who responded in the survey can be seen in Table 32.

Table 32: Distribution of professionals responding to the Manning Rural Referral Hospital staff survey on PEG/Gastrostomy tube management

Present Job Description	Potential Number (n=142) n (%)	Number of Responding Participants (n=51) n (%)	Response Rate for Professional Group (%)
Doctor	29 (20)	11 (22)	38
Allied Health/Pharmacy	8 (6)	3 (6)	38
Registered Nurse/Nurse Unit Manager	61 (43)	23 (45)	38
Enrolled Nurse/Endorsed Enrolled Nurse	21 (15)	6 (12)	29
Clinical Nurse Specialist/Educator/Consultant	16 (11)	6 (12)	38
Other	7 (5)	2 (4)	29
TOTAL	142	51	36

Reported Years of Experience of Respondents
Most staff who participated in the questionnaire had greater than 20 years of experience in their current profession (53%, n=27). Table 33 shows the years of experience of responders.

Table 33: Years of experience in current profession for staff of Manning Rural Referral Hospital involved in the care of patients with a PEG/Gastrostomy tube

Years of Experience	Number of Participants (n=51) n (%)
0 – 5	10 (20)
6 – 10	5 (10)
11 – 15	5 (10)
16 – 20	4 (8)
>20	27 (53)

Self Rated Knowledge
The majority (80%, n=41) of staff who responded to the staff questionnaire had been involved in the care and management of a patient who had a PEG/Gastrostomy tube, with around half (57%, n=29) having a self described adequate knowledge rating for the patient type. Table 34 shows the self rating of participants of knowledge of PEG/Gastrostomy tubes

Table 34: Years of experience and self rated knowledge for staff at Manning Rural Referral Hospital on the care and management of PEG/Gastrostomy tubes for patients who have a PEG/Gastrostomy tube

Participants Self Rated Knowledge	Years of Experience					TOTAL (n=51) n (%)
	0 – 5 (n=10) n (%)	6 – 10 (n=5) n (%)	11 – 15 (n=5) n (%)	16 – 20 (n=4) n (%)	>20 (n=27) n (%)	
None	-	-	-	-	1 (4)	1 (2)
Poor	3 (30)	2 (40)	1 (20)	1 (25)	4 (15)	11 (22)
Adequate	6 (60)	2 (40)	3 (60)	3 (75)	15 (56)	29 (57)
Above Average	1 (10)	1 (20)	1 (20)	-	6 (22)	9 (18)
Excellent	-	-	-	-	-	-
No Rating provided	-	-	-	-	1 (4)	1 (2)

Education/Training for PEG/Gastrostomy tubes

Only 14% (n=7) of responding participants had attended an educational session in the past 5 years. The type of sessions attended included in-service (n=5), and seminar (n=2).

Policy/Procedure Used

There was a wide variety of responses to whether respondents used a policy/procedure when managing a patient with a PEG/Gastrostomy tube, as seen in Table 35.

Table 35: Manning Rural Referral Hospital staff response to the type of policy/procedure used when managing a patient with a PEG/Gastrostomy tube

Policy/Procedure Used	Years of Experience					TOTAL (n=51) n (%)
	0 – 5 (n=10) n (%)	6 – 10 (n=5) n (%)	11 – 15 (n=5) n (%)	16 – 20 (n=4) n (%)	>20 (n=27) n (%)	
No – I know sufficient to not need to	-	2 (40)	1 (20)	1 (25)	4 (15)	8 (16)
No – There is no material available	1 (10)	1 (20)	2 (40)	-	5 (19)	9 (18)
No – The current material does not meet my needs	1 (10)	1 (20)	1 (20)	-	1 (4)	4 (8)
Yes – But the current guide is inadequate	1 (10)	-	1 (20)	1 (25)	5 (19)	8 (16)
Yes – And the current guide is adequate	4 (40)	-	-	-	6 (22)	10 (20)
No answer provided	3 (30)	1 (20)	-	2 (50)	6 (22)	12 (24)

Table 36 compares self rated knowledge to the type of policy/procedure used in the hospital.

Table 36: Manning Rural Referral Hospital staff response for self rated knowledge to the type of policy/procedure used when managing a patient with a PEG/Gastrostomy tube

Policy/Procedure Used	Self Rated Knowledge						TOTAL (n=51) n (%)
	None (n=1) n (%)	Poor (n=11) n (%)	Adequate (n=29) n (%)	Above Average (n=9) n (%)	Excellent (n=0) n (%)	No Rating Provided (n=1) n (%)	
No – I know sufficient to not need to	-	-	6 (21)	2 (22)	-	-	8 (16)
No – There is no material available	-	6 (55)	2 (7)	1 (11)	-	-	9 (18)
No – The current material does not meet my needs	-	-	3 (10)	1 (11)	-	-	4 (8)
Yes – But the current guide is inadequate	-	-	7 (24)	1 (11)	-	-	8 (16)
Yes – And the current guide is adequate	-	-	7 (24)	3 (33)	-	-	10 (20)
No answer provided	1 (100)	5 (45)	4 (14)	1 (11)	-	1 (100)	12 (24)

Challenges when Caring for a Patient with a PEG/Gastrostomy Tube

Respondents nominated a wide range of challenges when managing a patient with a PEG/Gastrostomy tube, however the top five were; enteral feeding (managing feeds/feeding tolerance/ensuring correct position of patient when feeding)(41%), prevention and management of infection (37%), blockage of tube (25%), tube removal/dislodgement/position (25%), and care of the PEG/Gastrostomy tube (24%).

Signs and Symptoms

The top five signs and symptoms respondents reported they felt may indicate patients at risk of, or suffering from a PEG/Gastrostomy tube complication were; erythema (63%), nausea/vomiting/feeding intolerance (51%), pain/tenderness at site (47%), fever/febrile (45%), and tube occlusion/blockage (37%). The number of signs/symptoms nominated by staff ranged from zero to 13 (mean 5, median 5).

Appropriate and Inappropriate Daily Routine Care of PEG/Gastrostomy Tube

The daily routine care that is provided to patents with a PEG/Gastrostomy tube by participating staff in order of the top five responses was; site/tube observation (81%), follow feeding regime and protocol (62%), provide general nursing observations and cares (51%), clean the area (41%),and prevent tube blockage (flushes)(41%). Only 35% of respondents stated that daily the tube should be rotated and the flange and balloon checked.

Dressings and Lotions

Respondents reported using a variety of lotions, creams and dressings on both an infected PEG/Gastrostomy site, and a non-infected site.

Comments
The main voluntary comment from respondents was a request for further education and training on PEG/Gastrostomy tube management, and to have a stock of Y port adapters in the ward areas for tube replacements.

Discussion

Complication Rate
Overall, the hospital complication rate for all groups combined was 28% (n=44), with a 15% (n=23) minor complication and 13% (n=21) major complication rate (Table 27). For patients who had a PEG tube placed for the first time, the complication rate was 42% (n=8) with 26% (n=5) minor complications and 16% (n=3) major complications (Table 27). All of the patients who had another PEG tube placed, (100%, n=4) had a major complication (Table 27). Existing PEG/Gastrostomy tube patients had a 10% (n=10) minor complication rate and 8% (n=8) major complication rate, with patients requiring tube removal having an 11% (n=1) minor and major complication rate respectively (Table 27). For patients who presented to the Emergency Department, minor complication rate was 35% (n=7) with major complication at 25% (n=5)(Table 27). A number of patients with PEG/Gastrostomy tube complications were diagnosed at admission 18% (n=29), in comparison to during the admission 10% (n=15)(Table 24).

The complication rate, both overall (28%, n=44), and for PEG tubes placed (42%, n=8) is within previously reported ranges of 2% to 70% (Lynch and Fang 2004, Paillaud et al 2002, McClave and Chang 2004). However the reported range is wide and the complication rate for PEG tubes placed (42%, n=8) was at the range's higher end.

Complication Types
The main complication of PEG/Gastrostomy tubes at Manning Rural Referral Hospital is the minor complication of periostomal wound (site) infection (7%, n=11)(Table 25). However, of concern is the major complication of buried bumper syndrome, which presented across all patient groups (except ED presentations), and this complication was the second highest behind periostomal wound infection (4%, n=7)(Table 25). Studies have reported complication rates of buried bumper syndrome to be rare, with some reports that this condition is a result of inadequate gastrostomy care (Horbach, Teske, Hohenberger, and Siassi 2007, Anagnostopoulos, Kostopoulos, and Arvanitidis 2003, Schrag, Sharma, Jaik, Seamon, Lukaszczyk, Martin, Hoey, and Stawicki 2007).

Potential Factors in PEG/Gastrostomy Tube Complications

Patient Age and Co-morbidities
A potential cause for PEG/Gastrostomy tube complications was patient age. In this study, the majority of patients admitted who had a PEG tube placed for the first time were greater than 60 years (84%)(mean age 73 years)(Table 2). All patient group admissions had severe co-morbidities and risk factors for

PEG tube complications which may have also contributed to the complication rates found in this study (Table 6)(Paillaud et al 2002).

Patient Selection for PEG Placement

In regards to patient selection for PEG tube placement, there did not appear to be any formal selection criteria or guideline that was utilised to assess patient suitability. In this study, the mean time from admission to PEG tube placement for patients having tube insertion for the first time was 18.5 days, with four patients having the tube placed on day of admission (Table 17). Currently there is no multidisciplinary team, or designated gastrostomy nurse role to provide pre-placement education and training for patients who are admitted specifically for PEG placement. This can lead to delays in discharge, and patients who are not well informed of the management of the tube.

PEG Placement in Stroke Patients

For stroke patients, the time from admission to identification, and admission to consultation for PEG placement was 19.4 and 20 days respectively (Table 15). The mean time from admission to actual PEG placement for stroke patients was 25.5 days (Table 18). Further to PEG placement in stroke patients, 62% had PEG placement less than 28 days post admission, with a further 31% having PEG placement less than 40 days post admission. The Clinical Guidelines for Acute Stroke Management (2007), state that nasogastric feeding is the preferred route in the acute phase, and if continued for the first month, was associated with increased functional recovery and increased likelihood of resumption of swallowing function within 6 months when compared to PEG feeding (National Health and Medical Research Council 2007). Factors that may be impacting on this decision at the hospital is firstly the number of documented problems with nasogastric enteral feeding in patients who underwent PEG placement. For patients undergoing PEG placement, 83% had the nasogastric tube dislodged or accidently removed. Secondly, there is a desire from rehabilitation wards to have PEG tubes placed instead of nasogastric tubes for enteral feeding prior to transfer. Of the patients who were admitted for PEG tube removal at the hospital, 56% had the PEG tube placed due to stroke that later had swallowing recovery. Of this group, 80% of patients had the tube inserted for less than one year (range 52 days to 8 months).

Policy & Procedures

It is also evident from conducting the retrospective medical file audits that no formalised procedure is routinely followed pre, and post PEG placement. The time from PEG tube placement to PEG tube access varied from 4 hours 14 minutes to 53 hours 59 minutes, with enteral feeding commencement varying from 4 hours 14 minutes to 101 hours (Tables 20 and 21). The recommended time from PEG tube placement to enteral feeding commencement has been quoted within 3 – 6 hours post PEG placement, with no evidence of harm (Condron 2006). There is a need for a consistent approach to initiating PEG tube access, including enteral feeding, in order to ensure nutritional requirements are met which promotes wound healing of the PEG tube site (Condran 2006). Given the number of disruptions to nasogastric enteral feeding pre PEG placement, patients are often nutritionally compromised

when PEG tubes are placed which increases risk of complication, therefore early initiation of PEG tube feeding is imperative (Beau, Kull, Kaffy, Matrat and Ingrand 2001).

In regards to the daily management of the PEG tubes, there were only 2% of patients who had some form of policy or protocol in the medical file on managing a PEG/Gastrostomy tube. Further compounding this problem was that staff questionnaire respondents nominated a number of policy and procedures that are used within the hospital to guide PEG/Gastrostomy tube management, and further, respondents were in disagreement on the suitability and adequacy of the guides (Tables 35 and 36). A majority (81%) of staff respondents in the questionnaire when asked on daily routine care of the PEG/Gastrostomy site, did state that site observation would be conducted however less than half would clean the area (41%), prevent tube blockage (flushes)(41%), and rotate tube and check flange and balloon (35%) . There was also no daily documentation in the medical notes on PEG/Gastrostomy tube management which potentially, if these routine tasks are not being completed, will increase the risk of PEG/Gastrostomy tube complications (Young et al 2006). Considering the proportion of staff that self rated knowledge on managing PEG/Gastrostomy tubes to be poor or none was 24%, it is imperative that one policy/protocol is available for staff to ensure consistency and best practice strategies are employed (Tables 34 and 36). This is extremely important for a Rural Referral Hospital, which does not have a specialised gastroenterology unit, nor a specialised staff member who is a resource person for staff and patients at the hospital.

Prophylactic Antibiotics

Only a third (38%) of patients received prophylactic antibiotic cover, or were already on antibiotics when the PEG tube was placed (Table 19). This included 32% of patients who had PEG tube placed for the first time, and 60% for patients who had another PEG tube inserted, however this latter group were already on antibiotic therapy for another infection. There have been randomized control trials, and systematic reviews which have recommended that prophylactic antibiotic cover is provided to all patients who have a PEG tube placed (Lipp and Lusardi 2006, Sharma and Howden 2000). Lipp and Lusardi (2006) support the use of systemic antibiotics at PEG placement to be statistically significant in reducing the risk of periostomal infection (Ahmad, Mouncher, Abdoolah, Stenson, Wright, Daniels, Tillett, Hawthorne, and Thomas 2003, Jafri, Mahid, Minor, Idstein, Hornung, and Galandiuk 2007). Potentially, the lack of routine prophylactic antibiotics may be another contributing factor to the rate of complications at the hospital.

Weight Monitoring

Another potential cause for PEG/Gastrostomy tube complications, including buried bumper syndrome, is the lack of documented weights on patients who had a PEG tube placed, and for all other patients admitted with an existing PEG/Gastrostomy tube (Tables 7, 8 and 9). This is especially a concern considering buried bumper was a major complication in all of the groups, and this major complication occurs when there is excessive tension between the internal and external flanges (Table 24)(Lynch and Fang 2004). When PEG

enteral feeding is initiated, there is potential for weight gain due to increased nutritional provision, and patients tend to gain around the abdominal area where the tube is situated (Lynch and Fang 2004). Monitoring patient weight for nutritional adequacy is important, but it is also crucial to determine whether a PEG tube needs to be resized (loosened or tightened) (Lynch and Fang 2004).

In this study, the number of patients who had weight documented in the medical notes on admission or preadmission was 29% (n=46) with a range across the groups of 16% (n=3 for PEGs placed) to 89% (n=8 for PEG removal) (Table 8). If patients were ideally weighed at admission and at seven day intervals during admission to monitor for changes, the documented number of weights in the patient groups totaled only 36% (Table 9). For patients who had a PEG tube placed, the percentage of times weight was actually documented versus the ideal frequency of weighing was only 23%, (Table 9). For patients admitted to the hospital the range for patients not ever having a recorded weight documented totaled 48% (n=76)(Table 7).

Contraindicated Medications

Patients who had a PEG tube placed, or who were admitted with an existing PEG/Gastrostomy tube, had medications which could cause tube blockages, especially certain proton pump inhibitors, and slow release medications. For example, one patient who was readmitted twice within 28 days of discharge was on Lansoprazole which is well known to cause tube blockages which is what the patient presented with on the second admission, and subsequently underwent another tube insertion at a financial cost to the hospital. Potentially this admission could have been simply avoided if the medication was changed during the first admission.

<u>Challenges with PEG/Gastrostomy Tube Patients</u>

Staff questionnaire respondents, did outline many challenges in managing a patient with a PEG/Gastrostomy tube, including enteral feeding delivery and tolerance (41%), prevention and management of infection (37%), blockage of tube (25%), tube removal/dislodgement/position (25%), and care of the PEG/Gastrostomy tube (24%). Associated with this was that staff did request ongoing educational updates on managing PEG/Gastrostomy tubes, which may help in alleviating some of these challenges.

<u>Readmission</u>

A number of patients (n=56, 41%) in the audit represented to the hospital within 28 days of discharge, with 10% of patients having a PEG/Gastrostomy tube complication (Table 28). For the patients who had a PEG tube placed at Manning Rural Referral Hospital, six admissions involved a PEG tube complication and readmission within 28 days (Table 28, Table 29). A further seven admissions involved patients who had PEG tubes placed at other hospitals who were readmitted within 28 days with a complication post placement (Table 29). It is difficult to determine whether the patients themselves are contributing in any way to this representation, however there are potential causes from a hospital viewpoint to consider. Are patients receiving adequate tube management education prior to discharge, especially

considering there is no dedicated Gastrostomy Nurse in the hospital, and there are a number of policies and procedures in use, hence no standardization of treatment. Staff may not be identifying and/or managing signs and symptoms of PEG/Gastrostomy tube complications during the admission (especially considering self rated staff knowledge was poor or none for 24% of respondents)(Table 36). Patients may not have been referred for follow up or know how to access services in rural areas post discharge from other hospitals, including Tertiary Centres, which highlights the need for a multidisciplinary PEG/Gastrostomy team across the acute and community sectors in every Area Health Service, including rural regions.

Conclusion

This study has determined baseline complication rates for Manning Rural Referral Hospital for patients. The overall complication rate was 28% (minor 15%, major complications 13%)(Table 27). For patients who underwent PEG tube placement at Manning Rural Referral Hospital the overall complication rate was 42% with minor complication rate of 26%, and major complication rate of 16% (Table 27). The main complication type was the minor periostomal wound/site infection, however there are concerns that the hospital has a higher rate of the major complication buried bumper syndrome. Potential contributing factors of patient demographics (increased number of co-morbidities and risk factors, including age), no standardised selection criteria on patient suitability for PEG placement, no standard guideline on PEG tube management (including pre and post insertion), lack of patient weight monitoring, contraindicated medications, and lack of staff knowledge (self rated), with no designated Gastrostomy position. The type of complications and potential risk factors may be a potential problem for other rural hospitals.

Strengths and Limitations

This research has been conducted by Manning Rural Referral Hospital as a quality initiative to determine baseline complication rates, and to identify areas of improvement in the management of PEG and gastrostomy tubes at the hospital. The study not only included patients, but also allowed staff input to identify issues surrounding the care and management of the PEG and Gastrostomy tubes. However, this study was conducted as a retrospective audit which is limited by the amount of reliable and valid information obtainable from the medical record. The limited sample sizes of the retrospective medical file audit and staff questionnaires was also a limitation with this study, and did not allow statistical testing. The views of the small sample size for respondents in the staff questionnaire may not be a true reflection of the hospital staff population. The complication rates from this study are difficult to compare to other previous studies due to the differing patient demographics, length of study period, small sample sizes, retrospective nature of study and definition of complication (including minor and major). However, this study has determined a baseline of complication rate for this hospital, which can be monitored with ongoing audits.

Recommendations

Protocols and Procedures

1. Implementation of the updated Hunter New England Area guideline on the management of patients with PEG/Gastrostomy tubes to ensure standard care which is based on best practice and evidenced based protocols. This should include pre PEG placement patient care (for example mouth care), and post placement management (including standard protocol for initiation of enteral feeding)
2. Screening tool/checklist be developed and implemented for patients being considered for PEG placement to assist staff in determining patient suitability
3. Protocol for patients coming for PEG placement in day only surgery (PEG insertions and/or changes), including pre placement education and information provision by the multidisciplinary team including Gastrostomy Nurse, Dietitian, Speech Pathology, Social Work (and other disciplines as required).

Resources

4. Funding for a part time Gastrostomy Nurse to conduct clinics for patients pre and post PEG placement, including ongoing education, training and support for both patients and staff, and to change gastrostomy tubes
5. Develop and implement a standard PEG/Gastrostomy care form to prompt staff in the routine care required for a PEG/Gastrostomy tube, and so staff on the following shift can easily see what care is outstanding from the day. There is currently a similar standard care form for Tracheostomy tube management within the hospital
6. Implement the Hunter New England Enteral Feeding Prescription chart which is a form to allow clear and standard documentation of the enteral feeding regime of the patient

Education

7. Education by Gastroenterologist/Gastrostomy Nurse to all staff on PEG/Gastrostomy tube management (for example grand rounds presentation, Nursing grand rounds, Junior Medical Officer education)
8. Consideration of a training day on PEG/Gastrostomy tubes and Enteral Feeding to include MRRH Staff as well as Community Organisations and Aged Care Centre staff who also manage feeding tubes post discharge of patients from the hospital
9. Develop and implement a concise and clear troubleshooting guide on PEG/Gastrostomy tube problems to be placed in all patient notes with to assist staff in recognising problems and guide treatment. This guide should also be located in the Emergency department, and include information on when to swab the area.

Medication Management

10. Routine pharmacy review of all patients with PEG/Gastrostomy tubes to assess medication compatibility to prevent potential tube blockages
11. Consideration of prophylactic antibiotics at PEG placement

Weight Monitoring

14. All patients presenting to the hospital, regardless of PEG/Gastrostomy tube presence are to be weighed on admission, and at weekly intervals during the admission. Weights to be documented on the observation chart

Further Research

15. Ongoing audit of PEG tube placements is recommended across Hunter New England utilising the audit tool currently in use at John Hunter Hospital

References

Ahmad, I., Mouncher, A., Abdoolah, A., Stenson, R., Wright, J., Daniels, A., Tillett, J., Hawthorne, A.B., and Thomas, G. (2003) **Antibiotic prophylaxis for percutaneous endoscopic gastrostomy – a prospective, randomised, double-blind trial** Alimentary Pharmacology Therapy Nov 1;18(9)(Pages 947-948)

Anagnostopoulos, G.K., Kostopoulos, P., and Arvanitidis, D.M. (2003) **Buried Bumper Syndrome with a Fatal Outcome, Presenting Early as Gastrointestinal Bleeding after Percutaneous Endoscopic Gastrostomy Placement** Journal of Postgraduate Medicine 49; 4 (Page 325-327)

Beau, P., Kull, E., Kaffy, F., Matrat, S., and Ingrand, P. (2001) **Malnutrition is an independent risk factor of early complications following percutaneous endoscopic gastrostomy** Gastroenterology and Clinical Biology Oct;25(10)(Pages 891-895)

Chaudhary, K.A., Smith, O.J., Cuddy, P.G. and Clarkston, W.K. (2002) **PEG site infections: the emergence of methicillin resistant Staphylococcus aureus as a major pathogen** Review Gastroenterology Disorders Spring;4(2)(Pages 95-96)

Condron, S. (2006) **Post-PEG Feeding: Why Wait?** Practical Gastroenterology Nov; Series 44 (Pages 48-58)

Figueiredo, F.A., da Costa, M.C., Pelosi, A.D., Martins, R.N., Machado, L. and Francioni, E. (2007) **Predicting outcomes and complications of percutaneous endoscopic gastrostomy** Endoscopy Apr;39(4)(Pages 333-338)

Holmes, S. (2004) **Enteral Feeding and percutaneous endoscopic gastrostomy** Nursing Standard Jan 28-Feb 3;18(20)(Pages 41-43)

Horbach, T., Teske, V., Hohenberger, W., and Siassi, M. (2007) **Endoscopic therapy of the buried bumper syndrome: a clinical algorithm** Surgical Endoscopy Aug;21(8)(Pages 1359-1362)

Jafri, N.S., Mahid, S.S., Minor, K.S., Idstein, S.R., Hornung, C.A., and Galandiuk, S. (2007) **Meta-analysis: antibiotic prophylaxis to prevent periostomal infection following percutaneous endoscopic gastrostomy** Alimentary Pharmacology and Therapeutics 25 (Pages 647-656)

Jenkins, M., and Duggan, A. (2006) **How to Manage Drugs and PEGs** Medicine Today Nov:7;81

Krenitsky, J. (2005) **To PEG or Not To PEG – Another Perspective** Practical Gastroenterology July;Series 29

Levine, C.D., Handler, B., Baker, S.R., Mohit-Tabatabai, M., Wachsberg, R., Simmons, M.Z., Cho, K., and Javors, B.R. (1995) **Imaging of Percutaneous Tube Gastrostomies: Spectrum of Normal and Abnormal Findings** American Journal of Radiology Feb;164 (Pages 347-351)

Lin, H., Ibrahim, H.Z., Kheng, J.W., Fee, W.E., and Terris, J. (2001) **Percutaneous Endoscopic Gastrostomy: Strategies for Prevention and Management of Complications** Laryngoscope Oct:111(10);1847-1852

Lipp, A., and Lusardi, G. (2006) **Systemic Antimicrobial Prophylaxis for Percutaneous Endoscopic Gastrostomy** The Cochrane Database of Systematic Reviews

Lynch, C.R., and Fang, J.C. (2004) **Prevention and management of Complications of Percutaneous Endoscopic Gastrostomy (PEG) Tubes** Practical Gastroenterology Nov;Series 22

McClave, S. and Chang, W.K. (2004) **Review Article: Complications of Enteral Access** Gastrointestinal Endoscopy (2004 ASGE Meeting May, New Orleans, Louisiana, Vol 58 (5)(Pages 739-750)

National Health and Medical Research Council (2007) **Clinical Guidelines for Acute Stroke Management** National Stroke Foundation (Pages 31-32)

Paillaud, E., Bories, P.N., Merlier, I., Richardet, J.P., Jeanfaivre, V., and Campillo, B. (2002) **Prognosis Factors of Short and Long-term Survival in Elderly Hospitalised Patients after Percutaneous Endoscopic Gastrostomy** Gastroenterology Clinical Biology 26:443-7

Plonk, W.M. (2005) **To PEG or Not To PEG** Practical Gastroenterology July (16-26,31)

Schrag, S.P., Sharma, R., Jaik, N.P., Seamon, M.J., Lukaszczyk, J.J., Martin, N.D., Hoey, B.A. and Stawicki, S.P. (2007) **Complications Related to Percutaneous Endoscopic Gastrostomy (PEG) Tubes. A Comprehensive Clinical Review** Journal of Gastroenterology and Liver Disease 16; 4 (Pages 407-418)

Schurink, C.A., Tuynman, H., Scholten, P., Arjaans, W., Klinkenberg-Knol, E.C., Meuwissen, S.G., and Kuipers, E.J. (2001) **Percutaneous Endoscopic Gastrostomy: Complications and Suggestions to Avoid Them** European Journal of Gastroenterology and Hepatology Jul:13(7);819-23

Sharma, V.K., and Howden, W. (2000) **Meta-analyses of Randomized, Controlled Trials of Antibiotic Prophylaxis Before Percutaneous Endoscopic Gastrostomy** The American Journal of Gastroenterology 95;11 (Pages 3133-3136)

Sheehan, J.J., Hill, A.D., Fanning, N.P., Healy, C., McDermott, E.W., O'Donoghue, D.P., and O'Higgins, N.J. (2003) **Percutaneous Endoscopic Gastrostomy: 5 years of Clinical Experience on 238 Patients** Irish Medical Journal Oct:96(9);265-7

Young, M., Bidner, O., McNabb, N., and Duggan, A. (2006) **Managing Patients with a PEG Tube** Medicine Today Sept:7(9);58-60

Appendix 1

HUNTER NEW ENGLAND
NSW HEALTH

Data Collection Tool for Retrospective medical File Audits

Data Collection Audit Notes
SECTION 1
Patient Demographics

1.ID Number

2. Admission Status
Is this the patient's first admission to Manning Hospital?
Yes = 1
No = 2

3. If the patient has been previously admitted, have they been readmitted within 28 days of the prior admit?
Yes = 1
No = 2
N/A = 3

4. For those patients readmitted, group into admission bands based on days;
Within 24 hrs
1 – 7 Days
8 – 14 Days
15 – 21 Days
22 – 28 Days
29 – 35 Days
36 – 42 Days
43 – 49 Days
50 – 56 Days
>56 Days
Document n/a if patient had not been readmitted

5. Age
In years

6. Age in Age Bands
0 – 9 Years
10 – 19 Years

20 – 29 Years
30 – 39 Years
40 – 49 Years
50 – 59 Years
60 – 69 Years
70 – 79 Years
80 – 89 Years
90 – 99 Years

7. Gender
Male = 1
Female = 2

8. Length of Stay

9. Length of Stay in banded groups
Day Stay
1 – 7 Days
8 – 14 Days
15 – 21 days
22 – 28 Days
29 – 35 Days
36 – 42 Days
43 – 49 Days
50 – 56 Days
57 – 63 Days
64 – 70 Days
71 – 77 Days
78 – 84 Days
85 – 91 Days
92 – 98 Days
99 - 105 Days
106 – 112 Days
113 – 119 Days
120 – 126 Days

10. Was the patient admitted directly for a PEG complication/issue?
Yes = 1
No = 2

11. What was the patients presenting diagnosis as per medical record coding? (For subsequent presenting diagnosis, place in next column, 66 if not applicable)

12. What was the patient's principle procedure during admission as per medical record coding?
Code as 66 if not applicable
For subsequent presenting diagnosis, place in next column

13. What were the other diagnosis as listed by medical records for the patient?

Code as 66 if not applicable

14. Indication for PEG/Gastrostomy tube

1 = Dysphagia 2 CVA
2 = Dysphagia 2 Head/Neck/Oesophageal Ca
3 = Head Injury
4 = Neurodegenerative Disorder (e.g. Motor Neuron Disease)
5 = Neurological Disability/Dysfunction (e.g. Cerebral Palsy)
6 = Other

15. Co-Morbidities/Risk Factors of PEG/Gastrostomy tube complication

- As per diagnosis sheet from medical records, medical, surgical and Dietetic notes in medical file, and referral letter from GP if available

- Record 1 for YES if patient has risk factor
- Record 2 for NO if patient does not have risk factor

RF1 = Diabetes (Both Type 1, Type 2, IGT)
RF2 = Advanced Malignancies (anaplastic, invasive and metastatic)
RF3 = Prior Gastric Resection/Abdominal Surgery (incl. cholecystectomy, Colectomy, AAA, Trauma)
RF4 = Alcoholism/Cirrhosis/Ascites
RF5 = Atherosclerosis (High Cholesterol)
RF6 = Immunosuppression
RF7 = Age >75 (incl. patients who turned 75 during admit)
RF8 = Dementia/Severe Functional Impairment
RF9 = Obesity (BMI > 30kg/m^2)
RF10 = Malnutrition/FTT (as documented in notes by Medical/Dietetic Staff, incl. poor weight gain/Low BMI <18.5kg/m^2)
RF11 = Oral Infection/Thrush
RF12 = Active lung infection/chest infection/pneumonia
RF13 = CCF
RF14 = Hyperglycaemia (BGLs >10mmol/L)
RF15 = Febrile day prior to PEG Insertion
RF16 = Pressure Areas

16. What is the total number of risk factors?

17. Medications

- Record 1 if patient is on medication (Yes)
- Record 2 if patient is not on medication (No)

a = Antibiotics (Penicillin, Cephalosporins, Tetracyclines, Macrolides, Quinolones, Aminoglycosides)
b = Oral Hypoglycaemic Agents
c = Insulin (Actrapid, Apidra, Humalog, Humulin, Hypurin Isophane, Hypurin Neutral, Lantus, Levemir, Mixtard, Novomix, Novorapid, Protophane)

d = Nilstat/Daktarin/Mouth Wash/Hydrogen Peroxide/Xylocaine/Bonjela
e = Anticoagulants (Warfarin/Clopidogrel-Plavix/ Iscover/Clexane/Heparin/Aspirin/Persantin/Cardiprim)
f = Bulking Agents (Metamucil/Normacol Plus/Nucolox)
g = NSAIDs (Voltaren, Diclohexal, Meloxicom/Mobic, Celebrex, Indocid/Indomethacin/Neurofen)
h = PPI (Omeprazole/Omepral/Acimax/Losec/Meprazol/Probitor, Somac, Zoton, Pariet, Nexium/Pantoprazole)
i = Fast and Slow Release medications (Oxycodone IR/SR, Oxycontin SR, Morphine Sulphate Tablets IR/SR, Nfedipine/Adalat Oros SR, Persantin SR, Imdur)
j = Asasantin/Dipyridonole
k = Fosamax, Actinel

18. Total number of medications listed patient was prescribed
Document number
Document as n/a if information not available

19. Was the patient weighed on admission to Manning Hospital (within 24hrs)?
Yes = 1
No = 2

20. Was the patient weighed during the admission to Manning Hospital?
Yes = 1
No = 2

21. What is the total number of times the patient was weighed during the entire admission to Manning Hospital?

SECTION 2
Patients with an Existing PEG/Gastrostomy tube or PEG/Gastrostomy tube Site at Admission

22. Is the PEG/Gastrostomy tube insitu on admission?
Yes = 1
No = 2

23.If No, what was the reason?
1 = PEG/Gastrostomy tube removed accidently
2 = PEG/Gastrostomy tube infection
3 = Gastroenteritis
4 = Vomiting
5 = Other (Document Reason)
6 = Dislodged
7 = Removed accidently
66 = Not applicable

24. What brand PEG/Gastrostomy tube is insitu on admission?
Has the correct brand of the tube been documented on admission?
Yes = 1
No = 2

25. Was the size of the PEG/Gastrostomy tube documented on admission?
Yes = 1
No = 2

26. Was the size of the PEG/Gastrostomy available in the old notes/old medical record?
Yes = 1
No = 2

27. Was the serial number of the PEG/Gastrostomy documented on admission?
Yes = 1
No = 2

28. Was the serial number of the PEG/Gastrostomy available in the old notes/old medical record?
Yes = 1
No = 2

29. Was the date placed of the PEG/Gastrostomy documented on admission?
Yes = 1
No = 2

30. Was the date placed of the PEG/Gastrostomy available in the old notes/old medical record?
Yes = 1
No = 2

31. Has the patient had the PEG/Gastrostomy tube for less than 1 year?
    Yes = 1
    No = 2

32. Has the patient had the PEG/Gastrostomy placed in the last 28 days?
    Yes = 1
    No = 2

33. For patients who had a PEG/Gastrostomy placed in the last 28 days, document in day bands
    < 24 Hours
    1 – 7 Days
    8 – 14 Days
    15 – 21 Days
    22 – 28 Days
    Document 3 if PEG placed >28days

34. Where was the PEG/Gastrostomy tube placed?
    1 = Manning Rural Referral Hospital
    2 = Private Hospital
    3 = Tertiary Hospital
    4 = Unknown
    5 = Another Rural Hospital

35. Was the location of the tube insertion (PEG/Gastrostomy) documented on admission?
    Yes = 1
    No = 2

36. Was the location of the tube insertion (PEG/Gastrostomy) available in the old notes/old medical record?
    Yes = 1
    No = 2

37. Did the patient have another tube inserted during the admission?
    Yes = 1
    No = 2

SECTION 3
PEG/Gastrostomy Tube Placed During Admission

21. While admitted to MRRH was the patient on any oral intake prior to PEG/Gastrostomy tube placement?

1 = Yes
2 = No
3 = Minimal (i.e. spoonfuls)

22. While admitted to MRRH was the patient on Nasogastric feeds prior to PEG/Gastrostomy tube placement?

1 = Yes
2 = No
3 = No, however on NG feeds at cluster hospital, nil Dietitian involvement

23. How many days post admit did NG feeds commence?

Document in days
Document n/a if not applicable

24. Were there any problems with Nasogastric feeding to disrupt regime pre/post estimated feeding goal being reached?

- Record 1 if YES, patient had documented problem with NG feeding in corresponding problem column
- Record 2 if NO, patient did not have documented problem with NG feeding in the corresponding problem column
- Record 66 if not applicable

P1 = Tube(s) pulled out/dislodged
P2 = Vomiting/Nausea
P3 = Diarrhoea
P4 = Tube blockage
P5 = Other (Document Reason)

25. Number of total problems identified with NG feeding which disrupted regime

Document number
Document n/a if not applicable

26. Days from admission to identification that patient required PEG/Gastrostomy tube

Document number of days
Document with MINUS if identification occurred pre admission
Document n/a if information not available

27. Days from admission to consultation for PEG placement

Document number of days
Document with MINUS if identification occurred pre admission
Document n/a if information not available

28. Days from PEG/Gastrostomy identification to consultation for placement
    Document number of days
    Document n/a if information not available

29. No. of times PEG/Gastrostomy procedure cancelled/delayed
    1 = 0
    2 = 1
    3 = 2
    4 = 3
    5 = 4
    6 = 5 and >
    Document 99 if information not available/not clear

30. Reason for PEG/Gastrostomy procedure cancellation
    1 = Patient medically unwell
    2 = Emergency cases on day of planned procedure
    3 = Procedure not booked
    4 = Other; No reason documented in file
    66 = Not applicable as patient did not have cancellation

31. Time of PEG/Gastrostomy procedure from surgery commencement to surgery completion as per operation record
    Record time in minutes

32. What was the patient's total fast time for the PEG procedure?
    Record time in minutes
    Record n/a if information not clear/not available

33. Days from patient being identified to require PEG/Gastrostomy tube to placement
    Record in days
    Record n/a if information not available/not clear

34. Days from patient consultation for PEG/Gastrostomy placement to tube placement
    Record in days
    Record n/a if information not available/not clear

35. Type of PEG/Gastrostomy tube BRAND placed
    Wilson Cook = 1
    Cook = 2
    Unknown = 3
    Foleys Catheter = 4

36. Description of PEG/Gastrostomy tube placed
    Flow 20 Percutaneous Endoscopic Gastrostomy Set = 1
    Not known = 2
    PEG tube = 3
    Foleys Catheter 20 FRG = 4

37. Size of PEG/Gastrostomy tube placed
    Flow-20-Pull-I-S = 1
    Not known = 2
    20 FR G Foley Catheter = 3

38. Serial No. of PEG/Gastrostomy tube placed
    Document serial no. of tube
    Document 99 if information not available

39. Type of procedure
    1 = Endoscopy (Gastroscope)
    2 = Minilaparotomy

40. Who conducted the procedure?
    1 = Physician
    2 = Gastroenterologist
    3 = Surgeon

41. Did the patient receive antibiotics pre or post PEG/Gastrostomy tube insertion?
    1 = Yes
    2 = No already on antibiotics for another infection
    3 = No
    4 = Post procedure for unknown/non documented cause

42. Time from PEG/Gastrostomy placement to first tube access
    Record time in minutes
    Record n/a if not available or patient died prior to access

43. What was the tube first accessed with?
    1 = Water
    2 = Saline
    3 = Glucose/Dextrose
    4 = Enteral Feed
    5 = Not clear
    6 = Patient died prior to tube access

44. What was the initial regime?
    1 = Flush
    2 = Continuous
    3 = Bolus
    4 = Not clear
    5 = Patient died prior to tube access

45. Time from PEG/Gastrostomy placement to enteral feeding commencement
    Record time in minutes
    Record n/a if not available or patient died prior to EN commencement

SECTION 4
PEG/Gastrostomy Tube Management During Admission

38. Were there any problems with PEG/Gastrostomy feeding to disrupt regime pre/post estimated feeding goal being reached?

- Record 1 if YES, patient had documented problem with PEG/Gastrostomy feeding in corresponding problem column
- Record 2 if NO, patient did not have documented problem with PEG/Gastrostomy feeding in the corresponding problem column
- Record 66 if information not applicable

P1 = Tube(s) pulled out/dislodged/fell out
P2 = Vomiting/Nausea
P3 = Diarrhoea
P4 = Tube blockage
P5 = Other (Document Reason)

39. What is the total number of problems with PEG/Gastrostomy feeding which disrupted feeding goal being reached?

Document number

40. Symptoms of any PEG/Gastrostomy tube site complications as documented in medical entries by medical, surgical, nursing, allied health or pharmacy staff?

- Record 1 if YES, patient's medical record documents symptom in the corresponding symptom column
- Record 2 if NO, patient's medical record does not document symptom in the corresponding symptom column
- 66 if information not clear/available

1 = Swelling/Oedema (resulting from an excessive accumulation of serous fluid in the tissues of the body[1])
2 = Local Erythema/Redness (redness or inflammation of the skin or mucus membrane that is the result of dilation and congestion of superficial capillaries[1]). Not including PINK as this is seen as normal
3 = Bleeding
4 = Pain/Tenderness/Discomfort (responding with a sensation of pain to pressure or touch that would not normally cause discomfort[1])
5 = Excoriation (an injury to a surface of the body caused by trauma, such as scratching, abrasion, or a chemical or thermal burn[1])
6 = Exudate/Discharge/Oozing (fluid, cells, or other substances that have been slowly exuded, or discharged, from cells or blood vessels through small pores or breaks in cell membranes, e.g. pus and serum[1])
7 = Odour
8 = Leaking of enteral feed/water flushes/Leaking Site
9 = Skin Breakdown/Maceration (the softening and breaking down of skin resulting from prolonged exposure to moisture. Prolonged exposure causes softening of the keratin, redness, oozing and scaling[1]). Terms such as crusty, mucky, sloughy, moist, grotty, and gunky placed within this symptom
10 = Rash (a skin eruption[1])

11 = Hardness/Tense Abdomen/Distended Abdomen
12 = Ulceration (the process of ulcer formation[1])
13 = Leaking tube
14 = Blocked tube
15 = Other (Document)

41. What is the total number of symptoms of PEG/Gastrostomy tube complication as documented in the medical notes by medical, surgical, nursing, allied health or pharmacy staff?
Document number

42. How many days from admission to the first symptom being documented?
Document in days
Document 66 if not applicable

43. Did the patient get a diagnosis of a PEG/Gastrostomy tube complication?
Yes = 1
No = 2

44. If diagnosed with a complication, what was the diagnosis? (include second diagnosis)
1 = Buried Bumper
2 = Tube migration
3 = Peritonitis/Intraperitoneal Leakage (inflammation of the peritoneum[1])
4 = Periostomal Wound/Site Infection
5 = Localized Cellulitis (a diffuse, acute infection of the skin and subcutaneous tissue characterised most commonly by local heat, redness, pain and swelling, and occasionally by fever, malaise, chills and headache[1])
6 = Necrotizing Fasciitis (inflammation of the connective tissue that may be caused by streptococcal or other types of infection, an injury or an autoimmune reaction[1])
7 = Abscess Formation (a cavity containing pus and surrounded by inflamed tissue, formed as a result of suppuration in a localized infection[1])
8 = Pressure Necrosis (localised tissue death that occurs in groups of cells in response to disease or injury[1])
9 = Ulceration (the process of ulcer formation[1])
10 = Granulation (any soft pink fleshy projections that form during the healing process in a wound that does not heal by first intention. It consists of many capillaries surrounded by fibrous collagen. Overgrowth of granulation tissue causes proud flesh to grow above the skin[1])
11 = Stoma Leak
12 = Injury to Internal Organs
13 = Fistula (an abnormal passage from an internal organ to the body surface or between two internal organs[1])
14 = Tube Extubation
15 = Pulmonary Aspiration/Pneumonia/Aspiration Pneumonia (an acute inflammation of the lungs, often caused by inhaled pneumo-cocci of the species *Streptococcus pneumoniae,* as well as other bacteria, viruses, fungi, and rickettsiae[1])
16 = GI Bleed/Haemorrhage

17 = Wound Infection (+ Antibiotics)
18 = Wound Infection (no Antibiotics)
19 = Digestive (ileus, vomiting, reflux)
20 = Oesophageal Injury
21 = Perforation (a hole or opening made through the entire thickness of a membrane or other tissue or material[1])
22 = Endocarditis (inflammation of the endocardium and heart valves[1])
66 = Pt did not get diagnosed with problem

45. Was the diagnosis a Major or Minor Complication?
    Major = 1
    Minor = 2
    Not applicable = 66

46. Were there any policies/protocols/procedures on PEG/Gastrostomy tube management filed into the patients medical record?
    1 = Yes
    2 = No

47. Was the PEG/Gastrostomy tube removed during the admission?
    1 = Yes
    2 = No

48. How many days from admission to PEG/Gastrostomy tube removal?
    Document in days
    Document 66 if not applicable

49. How many days from first symptom to PEG/Gastrostomy tube removal?
    Document in days
    Document 66 if not applicable

50. What was the reason for removal?
    1 = PEG/Gastrostomy tube removed accidently
    2 = PEG/Gastrostomy tube infection
    3 = Intended removal
    4 = Other (Document Reason)
    66 = Not applicable

51. Were swabs taken from the PEG/Gastrostomy site prior to admission?
    Yes = 1
    No = 2

52. Were swabs taken from the PEG/Gastrostomy site during the admission?
    Yes = 1
    No = 2

53. How many swabs did the patient have during the admission?

54. How many days apart were the swabs taken from the PEG/Gastrostomy site? (Document subsequent days between swabs in next columns)

Document in day numbers
Document 66 if not applicable

55. How many days from the first symptom to the first swab of the PEG/Gastrostomy area?

Document in day numbers
Document 99 if swabbed pre admit, nil information available
Document 66 if not applicable

56. How many days from admission to the first swab of the PEG/Gastrostomy area?

Document in day numbers
Document 99 if swabbed pre admit, nil information available
Document 66 if not applicable

57. Was there daily documentation in the medical notes of care of the PEG/Gastrostomy tube, including at least 2 of the following;

a. Daily 360 rotation of tube
b. Movement of disc
c. Cleaning of tube site
d. Drying of tube site post shower/bath
e. Water flushes
f. In/out play of tube
g. Measurement of tube

- Record 1 if YES, patient's medical record includes daily documentation of care
- Record 2 if NO, patient's medical record does not include daily documentation of care
- Record 66 if not applicable/not avaialable

SECTION 5
Separation Information

58. Residence of patient prior to admission
    1 = Home
    2 = Another Hospital
    3 = Hostel
    4 = NH
    5 = Group Home
    7 = Respite
    8 = Rehab

59. Where was the patient discharged to?
    1 = Home
    2 = Another Hospital
    3 = Hostel
    4 = NH
    5 = Group Home
    6 = Death
    7 = Rehab
    8 = Respite

60. Did the patient die during the admission?
    Yes = 1
    No = 2

61. How many days from patient admission to death?
    Document in number of days
    Document 66 if not applicable

62. How many days (or months) from PEG placement to death?
    Document in number of days
    Document 66 if not applicable

63. Cause of patient Death
    1 = PEG/Gastrostomy related
    2 = Death caused by original presenting problem
    3 = Death caused by new presenting problem (not PEG)
    4 = Other (Document)
    66 = Not applicable

Appendix 2

HUNTER NEW ENGLAND
NSW HEALTH

11th August 2008

Nutrition and Dietetics
Manning Rural Referral Hospital
York St., Taree 2430
Ph (02) 6592 9336
Fax (02) 6592 9817

Percutaneous Endoscopic Gastrostomy (PEG)/Gastrostomy Tube Complications
Participant Information Sheet

Dear Colleague,

You are invited to take part in a study investigating Percutaneous Endoscopic Gastrostomy (PEG)/Gastrostomy tube complications at Manning Rural Referral Hospital. You have been selected as a possible participant in this study because you are part of the multidisciplinary team who manages this patient type.

The aim of the survey is to gain a snapshot of the demographics of Manning Rural Referral Hospital staff that care for a PEG/Gastrostomy tube patient, investigate the knowledge and training of staff in relation to PEG/Gastrostomy tubes, and obtain feedback on the PEG/Gastrostomy management practices of staff. The survey also allows staff to provide feedback on individual challenges and barriers in managing a patient with a PEG/Gastrostomy tube.

By participating, you will be contributing to the study on how PEG/Gastrostomy tube management can be improved at MRRH, not only for the staff who are providing care, but also the patients who present to the hospital with PEG/Gastrostomy tubes, or who have a tube placed during the admission.

Participation in this research is entirely voluntary. Only those people who give consent via the return of questionnaires will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you in any way.

If you agree to participate, you are asked to complete the attached questionnaire which should take approximately 10 minutes. There will be no payment for taking part, however you may wish to take a break and use the included tea and coffee bags to have a cup while answering the questions.

Returned surveys will remain anonymous and the data will be stored securely for 5 years and be disposed of by shredding and/or erasure. It is anticipated that summary findings will be presented at local hospital meetings, reported to relevant Area Health Service departments, presented at relevant scientific meetings and published in scientific journals. No individuals will be identified in reports, presentations or publications of this research project.

This research has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health (Reference Number 08/05/21/4.08). Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Professional Officer (Research Governance and Ethics), Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 4921 4950, email Hnehrec@hnehealth.nsw.gov.au.

If you have any questions, please feel free to contact the researcher, Michelle Murray on 6592 9336, or email Michelle.Murray@hnehealth.nsw.gov.au

Thank you for considering this invitation.

Michelle Murray
Project Researcher/Dietitian

Appendix 3

HUNTER NEW ENGLAND
NSW HEALTH

Manning Rural Referral Hospital
Percutaneous Endoscopic Gastrostomy Tubes
Staff Survey

This short questionnaire is designed to ascertain individual feedback on the care and management of Percutaneous Endoscopic Gastrostomy (PEG), & Gastrostomy, tube patients at Manning Rural Referral Hospital.

For each question, please circle the answer that most closely reflects your views, or where applicable list answers in the spaces provided. Please note that Section 2 of the survey is for Nursing Staff only.

SECTION 1 (Please circle your answer)

1. Your current job title

    a. Doctor

    b. Allied Health/Pharmacy

    c. Registered Nurse/Nurse Unit Manager

    d. Enrolled Nurse/Endorsed Enrolled Nurse

    e. Clinical Nurse Specialist/Educator/Consultant

    f. Other (Please list job title)_____

2. Years of experience in your current profession?

    a. 0 – 5 yrs

    b. 6 – 10 yrs

    c. 11 – 15 yrs

    d. 16 – 20 yrs

    e. More than 20 yrs

3. In the last year, have you been involved in the care and management of a patient who has a PEG/Gastrostomy tube?

    a. No

    b. Yes

4. How would you rate your overall level of KNOWLEDGE of the required care of someone who has a PEG/Gastrostomy tube

    a. None

    b. Poor

    c. Adequate

    d. Above Average

    e. Excellent

5. Have you attended an educational conference or session on PEG/Gastrostomy tubes in the last 5 years?

    a. No

    b. Yes - Please describe (e.g. seminar, in-service provided by hospital)_____

    _____

6. Do you refer to a procedure manual or guide when caring for a patient who has had a PEG/Gastrostomy tube inserted?

    a. No - I know sufficient to not need to

    b. No - There is no material available

    c. No - The current material doesn't meet my needs

    d. Yes - But the current guide is inadequate

    (Please write name of guide_____

    e. Yes - And the current guide is adequate

    (Please write name of guide)_____

7. What are the three main challenges that you face when caring for someone with a PEG/Gastrostomy tube? (Please list)

    1. _____

    _____

    2. _____

    _____

    3. _____

    _____

8. What signs and symptoms do you look for which may indicate that the patient is experiencing, or at risk of a PEG/Gastrostomy tube complication? (Please list)

    _____

    _____

    _____

    _____

    _____

    _____

    _____

SECTION 2 (To be Completed by Nursing Staff Only)

9. Do you use lotions/creams on the PEG/Gastrostomy site when nursing someone with a NON-INFECTED tube site?

    a. No

    b. Yes (Please list)_____

_____

10. Do you use lotions/creams on the PEG/Gastrostomy site when nursing someone with an INFECTED tube site?

    a. No

    b. Yes (Please list)_____

_____

11. Do you use dressings on the PEG/Gastrostomy tube site when nursing someone with a NON-INFECTED tube site?

    a. No

    b. Yes (Please list)_____

_____

12. Do you use dressings on the PEG/Gastrostomy tube site when nursing someone with an INFECTED tube site?

    a. No

    b. Yes (Please list)_____

_____

13. What daily routine nursing care do you provide specifically to a patient with a PEG/Gastrostomy tube? (Please list)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

14. Do you document in your nursing entries in the medical notes about the routine PEG/Gastrostomy tube and site care that you have completed with the patient during your shift?

    a. No

    b. Yes

SECTION 3 (All Staff to Complete)

15. Any other comments that you would like to add?

_____

_____

_____

_____

_____

_____

_____

_____

Thank you for completing this survey, your answers and comments will provide valuable feedback to the study.

When completed, return the survey to Michelle Murray (Dietitian) via internal mail (envelope included), by Monday 1st September