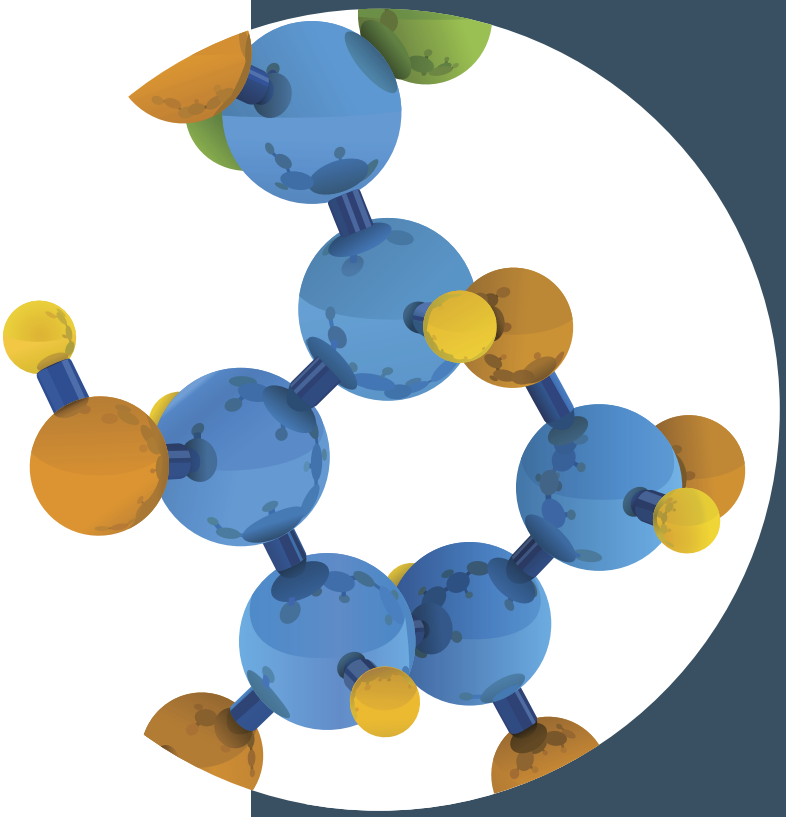
A Mixed Bag

An enquiry into the care of hospital patients receiving parenteral nutrition



NCEPOD

SUMMARY

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An enquiry into the care of hospital patients receiving parenteral nutrition

A report by the National Confidential Enquiry into Patient Outcome and Death (2010)

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SUMMARY

Contents

Introduction

The administration of parenteral nutrition (PN) is a well established technique providing nutritional support to patients who have an inaccessible or non-functioning gut (intestinal failure). As such it is widely used by surgeons, intensivists, paediatricians, neonatologists, oncologists and clinical nutrition specialists. However it is available to all clinicians regardless of specialty or expertise in its use. Whilst PN is undoubtedly a vital piece of the clinician's armoury, and a potential lifesaver, it can also be fraught with potentially fatal complications. Thus it should never be given without appropriate forethought and planning. For PN to be given safely it requires an accurate assessment of the patient's nutritional requirements, appropriate constitution and compounding of the PN, safe intravenous access (with meticulous aseptic insertion technique and subsequent catheter care) and rigorous monitoring of the patient's electrolytes and anthropometric response. Ideally these parameters should be achieved through a co-ordinated team approach of clinicians, dietitians, nutrition nurse specialists and pharmacists; preferably operating within a nutrition team and working with appropriately trained and experienced clinical ward staff. This approach has been broadly reflected by the British Association of Parenteral and Enteral Nutrition through their OFNoSH initiative.[1] However, the extent to which this is practised is unknown. Whilst this and other national guidelines on nutrition have been issued[2] there has as yet been no national review of the use of PN or its complications, and there exists little consensus opinion, at the clinical coalface, on its indications for use or administration. With this in mind the aim of this study was to look at the assessment, administration, catheter care and monitoring of patients nationally receiving PN.

1 – Method and data returns

Study aim

The primary aim of this study was to examine the process of care of patients receiving parenteral nutrition (PN) in hospital in order to identify remediable factors in the care received by these patients.

Objectives

The expert group identified six main thematic areas that would address the overall aim of the study and these will be addressed throughout the following chapters:

- Indication for PN
- Type of PN
- Prescribing PN
- Catheter choice, insertion and care
- Complications
- Nutrition teams

Hospital participation

National Health Service hospitals in England, Wales and Northern Ireland were expected to participate, as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey.

Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Expert group

A multidisciplinary group of experts comprising consultants from gastroenterology, neonatology, paediatrics; nutrition nurse specialists, a dietitian, a pharmacist, a lay representative and a scientific advisor contributed to the design of the study and reviewed the findings.

Study population

Patients of all ages were eligible for inclusion if they received PN as an inpatient between 1st January 2008 and 31st March 2008 inclusive.

Exclusion criteria
The following patient groups were excluded:

- Patients receiving home parenteral nutrition when admitted

Case ascertainment

Patients receiving PN were identified retrospectively via pharmacies. Local Reporters then combined the patient information with details of the discharging clinician and sent this to NCEPOD in a password protected spreadsheet. These data were then imported into a secure database and subsequently up to two patients per consultant were selected at random and included in the study.

Questionnaires and case notes

There were two questionnaires used to collect data for this study, one clinician questionnaire per patient and one organisational questionnaire per hospital.

Clinician questionnaire

This questionnaire was sent to the consultant caring for the patient at the time of discharge. It may have been completed by that consultant or forwarded to a more appropriate member of the team who cared for the patient or had responsibility for the PN care. Information was requested on the indication for PN, patient assessment, PN prescription, venous access and catheter care, metabolic and non metabolic complications.

Organisational questionnaire

This questionnaire collected data on the prescription, manufacture and supply of PN. It also addressed the policies and protocols for each participating hospital with regard to PN and catheter care. Information was collected at the hospital level as it provided a better indication of the facilities available for a patient at the location where they were receiving care.

The organisational questionnaire was sent to the Medical Director or NCEPOD Local Reporter for completion in collaboration with relevant specialty input. Clinician questionnaires were either sent to the NCEPOD Local Reporter for dissemination or directly to the clinician involved. However, whichever method was used, it was requested that the completed questionnaires were returned directly to NCEPOD to maintain confidentiality.

Case notes

For each case to be peer reviewed, photocopies of the following case note extracts were requested:

- Clinical notes
- Nursing notes
- Nutrition notes
- Biochemistry results (LFT, U&E)
- Haematology results (e.g. FBC)
- Fluid balance charts (including urine output)
- Drug charts (including PN prescription chart)
- Nutritional charts
- Observation charts (including TPR, CVP)
- Weight chart
- Urinalysis
- X-ray/CT/ultrasound results
- Any operating notes

Advisor group

A multidisciplinary group of Advisors was recruited to review the case notes and associated questionnaires. The group of Advisors comprised clinicians from the following specialties: gastroenterology, paediatric gastroenterology, paediatric hepatology, intensive care medicine, general surgery, neonatology, paediatrics, clinical biochemistry and metabolic medicine, chemical pathology, dietitians, nutrition nurse specialists and pharmacists.

All questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD. All patient, clinician and hospital identifiers were removed. Neither clinical co-ordinators at NCEPOD, nor the Advisors had access to any identifiable information.

After being anonymised each case was reviewed by one Advisor within a multidisciplinary group. At regular intervals throughout the meeting, the chair allowed a period of discussion for each Advisor to summarise their cases and ask for opinions from other specialties or raise aspects of a case for discussion.

The grading system below was used by the Advisors to grade the overall PN care each patient received.

Good practice: A standard that you would accept from yourself, your trainees and your institution.
Room for improvement: Aspects of ***clinical*** care that could have been better.
Room for improvement: Aspects of ***organisational*** care that could have been better.
Room for improvement: Aspects of both ***clinical and organisational*** care that could have been better.
Less than satisfactory: Several aspects of clinical and/or organisational care that were well below that you would accept from yourself, your trainees and your institution.
Insufficient information submitted to NCEPOD to assess the quality of care.

Quality and confidentiality

Each case was given a unique NCEPOD number so that cases could not easily be linked to a hospital.

The data from all questionnaires received were electronically scanned into a preset database. Prior to any analysis taking place, the data were cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning. Any fields that contained spurious data that could not be validated were removed.

Data analysis

Following cleaning of the quantitative data, descriptive data summaries were produced.

The qualitative data collected from the Advisors' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators and Clinical Researcher to identify the nature and frequency of recurring themes.

Case studies have been used at the end of this report to illustrate particular themes.

All data were analysed using Microsoft Access and Excel by the research staff at NCEPOD.

The findings of the report were reviewed by the Expert Group, Advisors and the NCEPOD Steering Group prior to publication.

Data returns

It can be seen from Figure 1.1 that 5527 patients from 218 hospitals were identified as meeting the inclusion criteria for the study. The study sample reduced to 3305 when the number of patients per consultant was limited to two and those patients where a PN prescription was written but not commenced, excluded. For a further 167 cases, NCEPOD was notified that the questionnaire could not be completed. Reasons for this included the case notes being lost and that the consultant was wrongly identified or had left the Trust. For the remaining 3138 included patients, a clinician questionnaire and/or case notes was received for 1948 cases (62%).

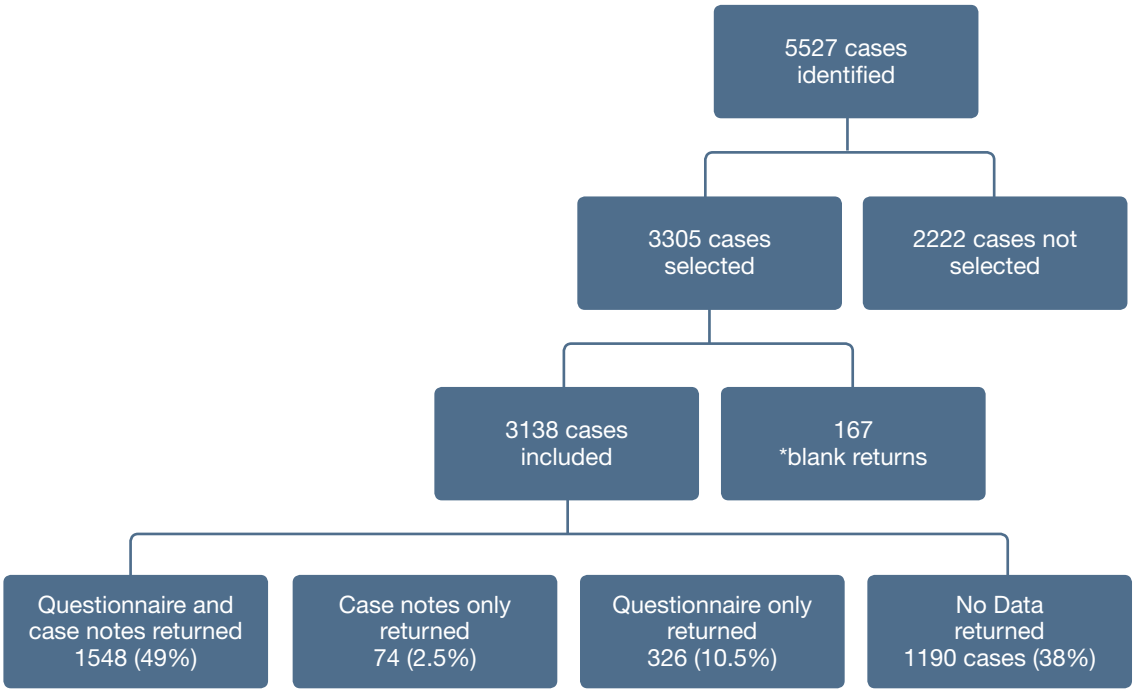

Figure 1.1 Data returns

* *Blank returns were those cases where NCEPOD were informed that the relevant case notes could not be found or the consultant in charge of the patient at the time of their discharge had left the Trust.*

Study sample denominator data by chapter

Within this study the denominator will change for each chapter and occasionally within each chapter. This is because data has been taken from different sources depending on the analysis required. For example in some cases the data presented will be a total from a question taken from the clinician questionnaire only, whereas some analysis may have required the clinician questionnaire and the Advisors' view taken from the case notes. In total 877 adult, 70 paediatric and 264 neonatal cases were assessed by the Advisors. The remainder of the returned case note extracts were either too incomplete for assessment or were returned after the final deadline and last Advisor meeting. The number of clinician questionnaires included in the analysis for each age group was 1332 adults, 248 neonates and 66 paediatric cases.

2 – Adult Parenteral Nutrition

Overall care

From Figure 2.2 it can be seen that the Advisors judged that 171/877 (19%) adult patients had PN care that was considered to represent good practice. Where it was found that there was room for improvement, this predominantly was in clinical care – 295/877 (34%). It was also identified that 209/877 (24%) of patients' PN care was judged deficient in terms of both clinical and organisational factors. In the opinion of the Advisors, care was considered less than satisfactory in 83/877 (9%) of cases.

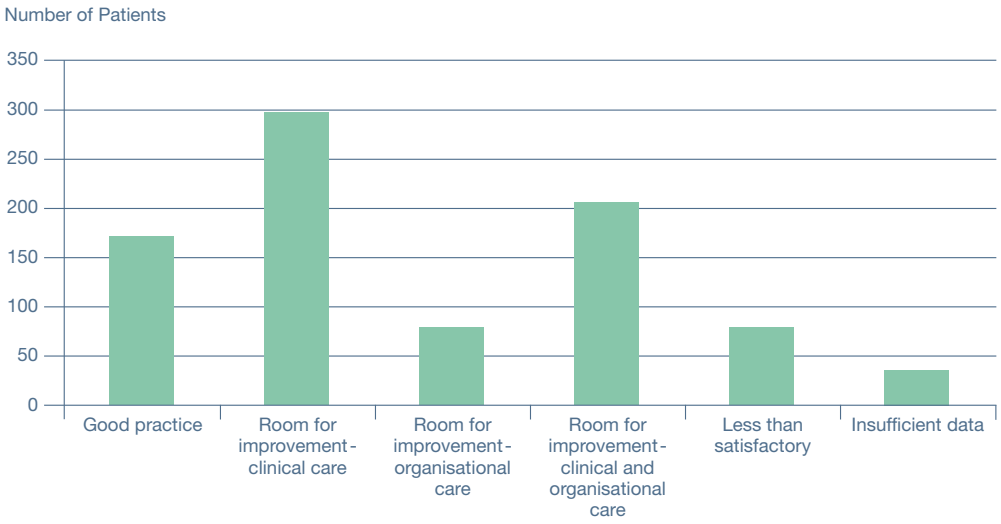

Figure 2.2 Overall of assessment of PN care – Advisors' opinion

Key Findings

- Good practice around PN care was identified in only 19% (171/877) of patients in this study.
- Inadequate consideration was given to enteral nutrition in a third (271/829) of patients in the opinion of the Advisors.
- PN was administered for an inappropriate indication to 29% (232/808) of study patients.
- In the view of the Advisors there was an unreasonable delay in recognition of the need for PN in 16% (128/798) of patients.
- There was an unreasonable delay in starting PN once the need was recognised in 9% (71/782) of patients in this study.
- There were deficiencies in the assessment and monitoring of patients in 54% (399/738) of patients on PN.
- Metabolic complications occurred in 40% (249/634) of patients and in 49% (81/164) these were judged by the Advisors to be avoidable.
- Additional IV fluids were given to 75% (513/681) of patients and in 28% (93/329) of these cases this was judged to be of an inappropriate volume.
- There was poor documentation of nutritional issues.

Recommendations

- PN should only be given when enteral nutrition has been considered, and excluded, as either inappropriate and/or impracticable. However situations may arise where both enteral and parenteral nutrition are necessary. (Consultants)
- Where the possibility exists that a patient may require PN this should be recognised early. Subsequently, should PN become a clinical necessity, this should be rapidly actioned and PN started at the earliest opportunity. However, there is rarely, if ever, an indication to start adult PN out of normal working hours. (Consultants)
- Patient assessment should be robust to ensure that PN is the appropriate nutritional intervention and that adequate PN is administered. The clinical purpose and goal of the PN should be documented. (Consultants)
- Regular documented clinical monitoring, of the patient and PN prescription, should be mandatory. Monitoring should include daily weights (where possible) and documentation of the success of the PN within the overall clinical picture. (Consultants)
- Regular documented biochemical monitoring should be mandatory to ensure avoidable metabolic complications never occur. (Clinical Directors)
- Additional intravenous fluids should only be prescribed where there has been an active assessment of the volume of PN already being administered and there is clear indication that further fluids/electrolytes are required. (Consultants)
- There must be active under/post graduate education about the role of PN, its complications and side effects. (Deaneries)
- All hospitals should have a PN proforma which includes: Indication for PN; Treatment goal; Risk of and precautions taken against re-feeding syndrome; PN prescription; Weight and Biochemical monitoring. (Medical Directors)

3 – Neonatal Parenteral Nutrition

Overall care

The Advisors who assessed the sample of neonates who received PN included in this study were asked to form an opinion on the overall quality of the PN care. The Advisors judged that only 62/264 (23.5%) of patients had PN care that was considered to represent good practice. It was considered that there was room for improvement in clinical care in 107/264 (40.5%), room for improvement in organisational care in 25/264 (9.5%) and room for improvement in both clinical and organisational care in 49/264 (18.6%). In the opinion of the Advisors, care was considered less than satisfactory in 12/264 (4.5%) of cases (Figure 3.2).

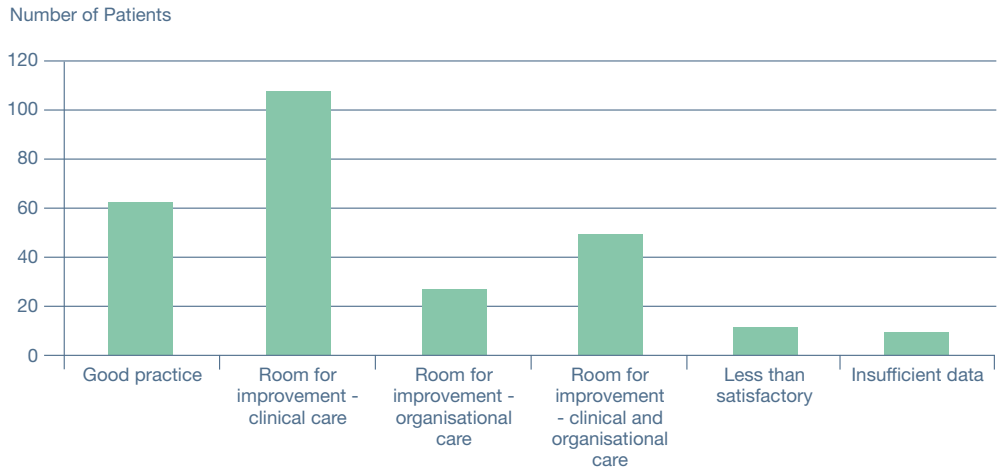

Figure 3.2 Overall of assessment of PN care – Advisors' opinion

Key Findings

- Good practice in PN care was identified in only 24% (62/264) of the neonates in this study.
- There were delays in recognising the need for PN in 28% (71/252) of neonates and a delay in starting PN once the decision to commence PN had been made in 17% (36/210) of the neonates.
- The requirements for PN were only documented in 28% (70/250) of patients.
- In 37% (66/178) of neonates the first PN provided was considered inadequate for the patient's needs.
- While the majority of neonates had an appropriate level of senior review, in 19% (44/226) of cases the monitoring of PN was deemed inadequate. Basic monitoring was not undertaken in many neonates in relation to review of PN constitution, biochemical investigation including glucose and fluid balance.
- In 63 neonates metabolic complications related to PN were identified which were considered avoidable in 25 and managed inappropriately in 12.
- There are guidelines and scientific evidence that in extremely low birth weight neonates' growth outcome is improved if PN is started soon after birth so that the full nutritional value can be achieved early in postnatal life. These are not followed by some neonatal units where there are delays in the introduction and rate of progression of the amino acid and lipid content of PN.
- There was a large variation in neonatal PN practice in relation to nutritional requirements, prescribing, and constituents of PN bags. Furthermore there was not enough attention to detail paid to fluid balance, monitoring and review of PN care. All of which led to complications which were not always recognised by the neonatal team and could have resulted in catastrophic outcomes.

Recommendations

- Careful and early consideration should be given to the need for PN in neonates and once the decision to commence PN is made it should be started without undue delay. (Consultants)
- The first PN given must be appropriate to the neonate's requirements. (Consultants)
- Close monitoring of the patient must be achieved so that metabolic complications can be avoided. (Consultants)
- Neonatal Units should have an agreed policy for nutritional requirements and use a proforma that includes this information which is tailored for each infant and placed in the case notes. (Clinical Directors)
- Hospitals in which neonates are cared for should develop a team approach to ensure safe and effective nutritional support, recognising that this should be a multidisciplinary exercise with sharing of expertise. Depending on the type of institution and availability of personnel, the composition of these teams may vary but could include neonatologists, paediatricians, paediatric surgeons, pharmacists, dietitions and experts in nutrition. This team could also provide support to other clinical areas caring for children and have a role in education and training for those involved in PN care. (Medical Directors)
- There is an urgent need for Neonatal Units across the UK to have a consensus on best PN practice based on current scientific evidence. (Consultant Neonatologists)
- Neonatal units should undertaken regular audit of PN practice which should include the complications of PN. (Clinical Directors)
- The National Institute for Health and Clinical Excellence should develop guidelines on nutritional support for neonates and children in a similar manner to their recommendations for adults. (NICE)

4 – Associated key findings and recommendations

Care of Central Venous Devices and Intravenous Feeding Catheters

Key Findings

- Lack of adequate documentation of catheter site insertion in a third (268/822) of adults and in 26% (63/246) of neonates.
- Position of tip of catheter not documented in 55% (377/692) of adults and 38% (79/209) of neonates.
- Catheter complications occurred in 26% (193/734) of adults and 25% (56/226) of neonates.
- Complications were avoidable in 54% (55/102) of adults and 6/32 of neonates.
- 12% (20/165) of adult complications not managed appropriately in the view of the Advisors.
- 58% (377/646) of adults in this study had a catheter and/or metabolic complication.

Recommendations

- CVC insertion is an invasive procedure with well recognised risks. Insertion should be clearly documented in the case notes including:
  - The designation of the operator
  - The type of CVC
  - A description of the insertion technique
  - The use of imaging
  - Confirmation of the position of the catheter tip

  (Consultants)
- All hospitals must have policies on the management CVCs which should include:
  - Insertion of CVC
  - Care of indwelling CVC
  - Detection and management of complications
  - Monitoring and audit, including adherence to the policies

  (Medical Directors)
- There must be improved education around CVC insertion and management; as well as the recognition and management of CVC complications.
  (Clinical Directors)

4 - ASSOCIATED KEY FINDINGS AND RECOMMENDATIONS

Organisational Data

Key Findings

- 27 hospitals that supplied adult PN as stock to wards and 24 hospitals that supplied neonatal PN as stock to neonatal units did not have a central record of the patient to whom it was administered.
- 62% of hospitals could provide adult PN and 63% of neonatal PN within 6 hours of request.
- 50 adult nutrition teams saw only PN referrals.
- 81% of hospitals had guidelines on initiating PN.
- 81% of hospitals had guidelines on changing and handling PN bags.
- 53% of hospitals did not have a dedicated CVC/PICC catheter insertion service.
- Despite a high proportion of the patients in the study being surgical there was a very low involvement of surgeons in nutrition teams.

Recommendations

- Nutrition teams have an important role in ensuring quality control around the initiation, supply and monitoring of PN. Whilst the data from this study did not show a clear correlation between overall care and the involvement of a nutrition team it was not designed to do so and no adverse inference should be made from this. All hospitals involved with PN should have a multidisciplinary nutrition team involved in both enteral and parenteral nutrition. (Medical Directors)
- All hospitals should keep a central record of where and to whom PN has been supplied. (Medical Directors and Heads of Pharmacy)
- All hospitals should have policies on initiating PN to avoid inappropriate use and safe prescribing. (Medical Directors)
- All hospitals should have a dedicated CVC/PICC service to ensure high-level expertise is practised within this interventional area. (Medical Directors)
- Surgical teams are high volume users of PN. As such they need to engage more in clinical nutrition issues and increase their profile within nutrition teams. (Medical Directors and Clinical Directors)

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