TABLE OF CONTENTS

INTRODUCTION .................................................. 3

PERSONNEL ..................................................... 3

I. OVERVIEW OF THE NUTRITION SUPPORT SERVICE
   A. Overview ............................................... 4
   B. Goals .................................................... 4
   C. Organizational Structure ............................. 4

II. CLINICAL SERVICES
   A. Description .......................................... 6
   B. Activity ................................................ 6
   C. Major Accomplishments .............................. 7
   D. Goals .................................................... 7

III. EDUCATION
   A. Description ........................................... 8
   B. Activity ................................................ 8
   C. Major Accomplishments, Presentations, & Activity
      .......................................................... 8
   D. Goals .................................................... 10

IV. QUALITY IMPROVEMENT
   A. Description ........................................... 10
   B. Major Accomplishments .............................. 10
   C. Activity ................................................ 10
   D. Goals .................................................... 11

V. SCHOLARLY ACTIVITY
   A. Description ........................................... 11
   B. Recent Scholarly Activity .......................... 12
      Clinical Protocols ...................................... 12
      Recent Publications .................................... 12
      Professional Organizational Activities ............ 12
   C. Goals .................................................... 13

VI. FINANCIAL SUMMARY ....................................... 13
   A. TPN Utilization ........................................ 13
   B. Indirect Calorimetry Revenue ....................... 13

VII. RESOURCES .................................................. 14

VIII. SUMMARY .................................................. 14

IX. APPENDICES ................................................ 14
INTRODUCTION:

Malnutrition increases the risk of mortality and morbidity in hospitalized patients. Nutritional support is an essential component of multimodality patient care. Appropriate and timely nutritional intervention can aid with positive patient outcomes including decreasing the risk of malnutrition-associated morbidity and mortality. One principal goal of the Nutrition Support Service is to insure the cost-effective provision of appropriate nutrition therapy. The multidisciplinary Nutritional Support Service (NSS) can also assist the physician in prescribing an optimal nutrition support regimen. In addition, the Nutrition Support Service can monitor the effectiveness of these therapies in order to minimize associated complication.

PERSONNEL:
Core Team Members:

Deborah Auer Flomenhoft, MD
Assistant Professor of Internal Medicine and Pediatrics
Divisions of Gastroenterology
Medical Director & Attending, Nutrition Support Services

Willem J.S. De Villiers, MD, PhD
Professor of Medicine
Division of Digestive Diseases and Nutrition
Medical Director, Nutrition Support Service

Andrew Bernard, MD
Associate Professor of Surgery
Section of Trauma and Critical Care
Attending, Critical Care & Nutrition Support Service

Paul A. Kearney, M.D., Professor of Surgery
Chief, Section of Trauma and Critical Care
Medical Director, Trauma ICU and SICU
Past Medical Director, Nutrition Support Service (1989-2004)

Barbara Magnuson Woodward, PharmD, BCNSP
Clinical Pharmacist, Coordinator, Critical Care - Nutrition Support Service
Associate professor, UK College of Pharmacy

Amy Peppard, MHA, RD, LD, CNSC
Clinical Dietitian, Nutrition Support Services

Meghan Jewell, RD, LD, CNSC
Clinical Dietitian, Nutrition Support Service

Bud Nave, R.T.,

Additional Attending Physicians
Phillip Chang, M.D.
Elizabeth Holt, MD
I. OVERVIEW OF THE NUTRITION SUPPORT SERVICE:

A. Overview

Due to the prevalence of malnutrition in hospitalized patients and the relationship between malnutrition and morbidity and mortality, the University of Kentucky Hospital established the Nutrition Support Service (NSS) in 1988. The purpose of the NSS is to provide consultation to primary medical and surgical services regarding the delivery of parenteral and enteral nutrition support to patients who are actually or potentially nutritionally compromised due to disease-state or injury. The NSS also functions in an advisory capacity to establish hospital guidelines regarding the preparation, administration, and monitoring of nutritional therapies.

B. Goals of NSS

The general goals of the NSS are to positively impact patient care, improve outcomes, and establish evidence based protocols and guidelines so patients will benefit from parenteral and enteral nutrition support, minimize potential complications from these therapies, and to insure the cost-effective application of nutrition therapy within the Hospital. The specific goals of the NSS are as follows:

1. Recommend timely, cost-effective and appropriate nutrition and drug related therapies based upon the patient's condition, nutritional assessment, therapeutic plan, and prognosis.
2. Recommend only indicated nutritional laboratory monitoring in an attempt to reduce expensive inappropriate laboratory monitoring.
3. Reduce morbidity and mortality by decreasing the incidence of mechanical, metabolic, septic, and gastrointestinal complications related to parenteral and enteral nutrition.
4. Perform ongoing quality assurance monitoring to evaluate current practices related to nutrition support and to monitor the effectiveness of nutrition support within the hospital.
5. Systematically collect and review data related to parenteral and enteral nutrition utilization and cost effectiveness. Attempt to reduce costly waste of both parenteral and enteral formula.
6. Provide nutrition support related education to health care personnel, patients, and care givers when appropriate
7. Participate in nutrition support related product evaluation to improve patient care and decrease cost.
8. Participate in scholarly activities related to nutrition support.

C. Organizational Structure of NSS:

The NSS is a multidisciplinary team. A description of the responsibilities of each NSS team member during 2010 is listed below. The NSS organizational chart is shown in Appendix 1.

The Physician-Directors assume responsibility for all aspects of the NSS. Specific responsibilities are:

1. Serve as a liaison to inform other attending physicians regarding appropriate route and formula for nutrition support
2. Serve as an attending physician for the NSS and help formulate a nutritional plan for patients based on the individuals' disease state, metabolic status, and degree of stress
3. Coordinate formal conferences and bedside rounds
4. Supervise educational programs for staff and monitor quality assurance programs
5. Serve as a member of the hospital nutrition committee
The Clinical Pharmacist, Coordinator and Clinical Specialist assume responsibility for the administrative responsibilities and the pharmacological management of NSS patients. Specific responsibilities are as follows.

1. Directs all administrative functions for the Nutrition Support Service, in conjunction with the Physician Director. Includes the following administrative activities:
   - Maintains patient census and NSS productivity
   - Acts as liaison between Hospital Administration and the Nutrition Support Service
   - Acts as a liaison between the Department of Pharmacy Services and the NSS
   - Writes and distributes the NSS annual report
   - Assists with the development and implementation of quality assurance programs
   - Conducts an ongoing Drug Utilization Evaluation (DUE) of appropriateness of total parenteral nutrition (TPN) indications and usage, reported annually
   - Conducts ongoing QA for TPN waste, distributes annual TPN waste
   - Serves as a pharmacy member of the Nutrition Committee

2. Performs the following patient care related activities:
   - Notifies NSS of new TPN patients
   - Assesses patient's concurrent pharmacotherapy for drug compatibility with EN or TPN
   - Formulates a nutritional plan for individual patients based upon nutritional assessment, disease state, metabolic status, and degree of stress or injury
   - Monitors pertinent clinical data on NSS patients and provide appropriate recommendations for electrolyte, mineral, vitamin or other additives for TPN or EN
   - Participates in the nutritional care of home TPN patients consulted by the NSS

3. Performs the following educational activities:
   - Designs and conducts educational programs for patients, health care professionals, staff, interns, and students and participates in all nutrition related conferences
   - Conducts lectures as assigned by the College of Pharmacy core curriculum
   - Serves as clinical preceptor for pharmacy residents and Pharm.D. students
   - Participates in clinical research and the development of research protocols

The Clinical Dietitians assume responsibility for the clinical nutrition management of NSS patients. Specific responsibilities are as follows.

1. Performs the following patient care related activities:
   - Formulates a nutritional plan for individual patients based upon nutritional assessment, disease state, metabolic status, and degree of stress or injury.
   - Provides recommendations for nutrition therapy based upon initial and ongoing assessments and reports any complications associated with EN or TPN.
   - Participates in the nutritional care of home TPN patients consulted on by the NSS.
   - Participates in clinical nutrition research and the development of research protocols within the assigned patient care setting.

2. Performs the following educational activities:
   - Teaches, precepts, and assists with educational programs for medical staff, dietetic interns, nutrition graduate students, pharmacy students and pharmacy residents.
   - Participates and coordinates nutrition-related conferences with health-care providers

3. Performs the following administrative activities:
   - Assists with developing and updating policies and protocols related to nutrition.
   - Participates in NSS Team meetings
Participates in the ongoing QA monitoring programs for the NSS
Acts as a liaison between the NSS and the Dietetics/Nutrition Department
Member of the Hospital Nutrition Committee (meets quarterly)
Member of the Enteral Product Formulary sub-committee (meets PRN)

The part-time (0.4FTE) **Respiratory Technician** performs indirect calorimetry measurements (metabolic cart studies) on all NSS patients. Specific responsibilities are as follows:

1. Performs and evaluates indirect calorimetry procedure for NSS patients while evaluating and monitoring the patient’s response to indirect calorimetry study
2. Communicates results of indirect calorimetry measurements to members of the health care team
3. Maintains the function, operation, and cleanliness of the metabolic cart
4. Acts as liaison between Respiratory Care and the NSS

**II. CLINICAL SERVICES**

**A. Description**

The Nutrition Support Service (NSS) is a consult service that provides nutritional assessment and recommendations for nutritional management of hospitalized patients requiring specialized nutritional support. The NSS, under the direction of a Medical Director, is comprised of a clinical pharmacist coordinator, two clinical dietitians, and a part-time respiratory therapist. Attending physician coverage for the NSS is shared between the Division of General Surgery, Section of Trauma and Critical Care, and the Department of Medicine, Division of Gastroenterology. Selected faculty provides attending physician coverage for consult rounds, which are conducted twice weekly or more as needed.

**B. Activity**

Consultations are provided for all adult patients receiving TPN as part of their inpatient care. The NSS also monitors and provides consultations for all patients in the Trauma, Neurosurgery, Surgical, Burn, and the Medical ICU’s. Consultations for any other patient are available upon request. Consultation rounds are conducted as needed for complex patients. The NSS typically evaluates patients within 48 hours of ICU admission but by at least 72 hours of ICU admission. Patients receiving either EN or TPN can be presented to the attending physician. The NSS dietitians consult and monitor all patients that receive standard or specialized oral diets in all five ICU’s and conducts direct patient counseling/education when necessary. NSS performs cooperative QA projects with the ICU nursing staff which may lead to educational/research/patient care improvement opportunities.

**The NSS provided consults for 2,003 patients during 2010.** (Appendix 2) compared to 393, 502, 595, 729, 794, 807, 983, 1418, 1,373, 1,605, 1,667, 1,729, 2,004, 1,965, 1,924, 1753, 1,865 from 1992 – 2009, respectively. The increase in consultations is a direct reflection of an increase in ICU patient turnover and an increased number of patient care beds monitored by the NSS. Consultation by service and unit is provided in Appendix 3 & 4. Assessment of caloric expenditure by indirect calorimetry is also provided by the Respiratory technician on the NSS for select ventilated ICU patients receiving EN or TPN per physician order. The metabolic cart became dysfunctional in March 2009. The new cart was in place by April 2010. The service provided **144** indirect calorimetry measurements during 2010 (**309** indirect calorimetry measurements during 2007). The cart became totally dysfunctional in April 2009. After several meetings with the hospital administration, it was decided in November to replace the metabolic cart as this is the “gold standard” for nutritional assessment, especially in the critically ill population.
C. Accomplishments in 2010:

1. Widen the scope of the Nutrition Services:

   Both NSS dietitians are trained to place feeding tubes, in order to assist nursing and facilitate overall nutrition support for adult hospitalized patients. The new Cortrak feeding tube system was implemented in August, 2010. Prior to Cortrak, all feeding tubes were placed using a two-step method. First, the tube was placed to 35-40cm and a chest x-ray was obtained to verify that the feeding tube was in the esophagus instead of the lung. Once esophageal placement was confirmed, the tube was then advanced to a final premeasured length for post-pyloric placement. Finally, an abdominal x-ray was performed to verify appropriate placement. Utilizing the of Cortrak eliminated the need for the two-step method. Amy Peppard and Meghan Jewell placed over 172 documented feeding tubes in 2011. They trained many nurses how to use the Cortrak feeding tube system, which involved observing the nurses successfully place three feeding tubes using Cortrak.

2. Maintain Clinical Services:

   The NSS provided 2,003 initial patient assessment consults, including 173 TPN patient consults. This is a large increase in patient numbers, over double the 807 patients monitored in 1997. The NSS monitored 11,302 patient care days, (avg 45 patients/day). This increase is not all due to a rise in the number of TPN patients, but rather several factors. The NSS now provides mandatory consults for five intensive care units, an increase from several years ago. Patient turnover is rapidly increasing to minimize over-all healthcare costs, resulting in more patients with shorter ICU stays. The number of patients receiving TPN increased nearly 350% from 2002. Nearly all were for appropriate indications, reflecting a dramatic increase in acuity of patients assessed and monitored by the team. The NSS facilitated at least 15 patients for discharge on TPN for appropriate formulas and monitoring parameters. The addition of a second RD will facilitate optimal patient care.

3. Amino Acid Shortage Challenge:

   Baxter Pharmaceuticals announced a national-wide parenteral amino acid shortage starting in September, 2010. This shortage lead to a 50% decreased allocation from Baxter of the stock solution, Travasol. Baxter offered an allotment of a premixed TPN, Clinimix with 15% dextrose and 5% amino acids. While the Clinimix can accommodate some of our patients, it is not optimal for most of our malnourished patients requiring high amino acids doses for wound healing. The NSS has been creative with the TPN compounding to avoid wide-spread of “under nutrition” for our TPN patients. The duration of the shortage is still not know.

4. Maintain Low TPN Waste:

   Because each TPN bag is expensive and labor intensive to prepare, deliver, monitor, and administer, the NSS works diligently to control its waste. During 2010, only 10 of 2,304 TPN bags (0.4%) were returned unused to the pharmacy. This compares to 493 of 7,351 TPN bags (6.7%) in 1991. The reduction in waste from 1991 represents significant hospital cost-savings. (See QA section).

D. Goals for clinical activity in 2011:

1. Continue consultative services for cost-effective nutrition and related recommendations for all patients in the TICU, MICU, SICU, NSICU, Burn ICU, and all adult patients receiving TPN. Continue to individualize nutritional/metabolic therapies for patients receiving total parenteral
and/or enteral nutrition by measurement of oxygen consumption using indirect calorimetry and associated laboratory tests.

2. Continue feeding tube placement by the dietitians.
3. Facilitate compliance with standard of care for patients receiving TPN or EN by continued utilization of the enteral and parenteral nutrition order forms and ongoing staff education.
4. Facilitate transition for optimal care for home TPN patients in an effort to decrease readmission by providing continuous home consulting services.
5. Continue to expand multi-disciplinary educational programs related to clinical practices of providing nutrition support or drug therapy related to nutrition support.
6. Participate in the revision or development of pertinent algorithms.
7. Continue to develop hospital-wide practice guidelines related to delivery of nutritional therapies and to promote compliance with the established enteral formulary. Participate with the ICU team to develop nutrition ICU related protocols for provision

III. EDUCATION

A. Description

The NSS assists in developing educational programs pertaining to nutrition support related topics for faculty, housestaff, pharmacy, nursing, and allied health professionals.

B. Activity

The current education activities of the service are as follows:

1. Conduct formal lectures at the College of Pharmacy. Lectures include: enteral and parenteral nutrition, nutritional requirement in various disease states, fluids and electrolytes, OTC nutritional products, drug and nutrient interactions, and gastrointestinal diseases.

2. Precept Pharmacy Practice and Specialty residents and PY4 PharmD students from the College of Pharmacy for nutrition support rotation. Precept dietetic interns and clinical nutrition graduate students during required NSS clinical rotation. Conduct lectures to clinical nutrition graduate students and dietetic interns on nutrition support related topics. Topics included: indirect calorimetry, enteral nutrition, parenteral nutrition, basic pharmacology, drug nutrient interactions, and nutrition support in multi-system organ failure.

3. Present selected topics in nutrition support to medical house-staff (ICU medical residents) and nursing units as requested or identified as a need by the NSS.

C. Major Accomplishments: Educational Accomplishments, Presentations, & Activities in 2010

Revised the Nutrition Support Handbook and posted to the NSS website.

http://www.hosp.uky.edu/pharmacy/nss/default.html

NSS presented a Nutrition Support Overview to SGB resident orientation, monthly.

NSS overview in Medical House Staff Orientation Introduction to the NSS, June 2010

NSS team jointly precepted 2010:
- 6 Dietetic Interns (2wk rotations)
- 4 Pharmacy Practice Residents (1month rotation)
- 2 Specialty Residents - critical care, oncology, (1month rotation)
- 15 College of Pharmacy students PY4 (1month rotation)
Meghan Jewell, RD, LD, CNSC


Amy Peppard, MHA, RD, LD, CNSC:

Presented “Basic Nutritional Assessment Part II – A Dietitian’s Perspective.” (1 hr lecture). PHR 923, College of Pharmacy PY1. February 2010.

Barbara Magnuson, Pharm.D, presented:

College of Medicine PHA 824, Medical Pharmacology 1hr lecture, April 2010

CNU/NS 601, Nutrition and Chronic Disease, Nutrition Graduate class, Howard Glautert, coordinator. 2hr lecture, November 2010

Three lectures: to Dietetic Intern Class, November 2010.
- "General Pharmacology"
- “Drug Nutrient Interaction & Drug Administration via Enteral Access Devises”
- "TPN Review”

Advisor to Critical Care Pharmacy Practice Resident
Advisor to 2 Critical Care Pharmacy Resident Research Project

Lectures conducted at the UK College of Pharmacy:

- PHR 923 (PY1), Nutrition, Health Promotion, and Disease Prevention: 2 lecture hours: Enteral Access devices and Drug Administration, Enteral Formulas – Feb 2010
- PHR 973 PY3 Critical Care Elective: 2hr lectures – Nutrition Support in Adult Trauma Patients. March, 2010
- PHR 910 (PY1) Introductory to Pharmacy Careers discussion 1hours, October 2010

D. Education Goals for 2011:

The major educational goal for the NSS is to develop and improve hospital-wide education regarding the timing, route, and indications for adult nutritional support. Specific educational goals for the service are as follows:
1. Continue to provide nutrition support related education to multidisciplinary personnel and evaluate the need for additional educational programs.
2. Continue to conduct lectures and precept students from the College of Pharmacy, College of Allied Health, and for the Dietetic Internship Program, etc.
3. Continue to precept pharmacy students, residents, dietetic interns, and masters students.

IV. QUALITY IMPROVEMENT:

A. Description

The NSS coordinates nutrition support related quality assurance. The quality assurance program provides a systematic way to assess the cost-effective application of nutrition and nutrition related therapies. Through this program, the performance of the NSS can be assessed and areas for improvement can be identified. Educational programs and policies can then be developed in areas of need as deemed necessary through the Hospital Nutrition Committee. Less quality assurance projects were completed due to the decrease in NSS staff.

B. Major Accomplishments in 2010:
1. TPN waste was very low for 2010 despite increased TPN usage.
2. Percentage of Appropriate TPN Indications was very high in 2010.

C. Activity for 2010:

1. TPN Waste

The NSS pharmacist monitors the daily waste of unused TPN bags, documents the reason for return/waste and categorizes them by nursing unit location. (Threshold 5%)

Findings:

For 2010, the pharmacy manufactured 2,304 adult TPN bags (approximately 192 bags/month). A total of 10 (<0.4%) adult TPN bags were returned unused to the pharmacy. The results are below the threshold of 5% that was established as an acceptable level by the Department of Pharmacy in 1992.

The waste represents an approximate cost of $1,488 to the Department of Pharmacy. (Cost of a 2-liter bag of adult TPN is $148.84) In 1991, 493 wasted TPN bags cost the department $34,421 (cost at the time of waste). This reduction represents cost-savings of over $30,000 compared to 1991. Other associated cost-savings i.e. decreased catheter placement with physician charges, decrease catheter related infections and its associated drug therapy costs, and other costs that could not be directly assessed. The primary reasons for wasted TPN in 2010 were patients expired, PICC line dysfunction/infected/removed, discontinuation of therapy after the 2:00PM preparation time, and patient discharged without timely pharmacy notification.

Action:
The Nutrition Support Service will continue to monitor the TPN waste and report the results to the Hospital Nutrition Committee.

2. Appropriate Indications for TPN Use:

Appropriate use of TPN is evaluated upon initiation of therapy and monitored on a monthly basis. "The Guidelines for Appropriate TPN Use" (SEE APPENDIX 5) serve as the criteria for appropriate TPN utilization. The reported results are for monitoring during 2010. (Threshold 85%) SEE APPENDIX 5.

Findings: Appropriate TPN Initiation – 96.5%, Total Appropriate Utilization – 99.2%
155 patients were initiated on TPN therapy for 2010. Several patients were readmitted on TPN due to home PICC line complications, infections, or gut failure for a total of 173 TPN patient initiations. All 173 initiatives were evaluated for appropriateness based on the UKMC Nutrition Committee approved Guidelines. Fifty-two (30.1%) patients had absolute indications and 115 (66.4%) had relative indications for a total of 96.5% appropriate indications.

The number of patients receiving TPN has over tripled from 2002 with 48 TPN patients. Nearly all were for appropriate indications, reflecting a dramatic increase in acuity of patients assessed and monitored by the NSS team. The 98% appropriate use is dramatically up from past years 1999 – 2002 with 85%, 82%, 86%, and 85%, appropriate use respectively. Threshold has been established at 85%. The increase in TPN patient numbers in 2006 - 2009 is a direct reflection of increase in patient acuity admitted to the ICU services. These TPN numbers are still very low compared to 18 years ago, a decline from 1991 with 937 patients.

The NSS facilitated at least 15 patients for discharge on TPN for appropriate formulas and monitoring parameters.

Only 6 of 173 patient initiations did not meet TPN criteria guidelines. These 6 patients only used 19 of the 2,304 total days of TPN therapy (0.8%). This results in a 99.2% total appropriate daily use of TPN. The NSS only consults once the TPN is ordered. If the TPN is started without an appropriate indication, the NSS contacts the physician and documents alternate recommendations. The 99.2% appropriate utilization directly reflects the effectiveness of the NSS. The NSS avoided TPN therapy for at least 14 documented patients, likely more undocumented, that TPN was ordered but an alternative nutrition route was recommended as more appropriate.

Action:
The initiation of TPN meets the established threshold. This will be reported to the Hospital Nutrition Committee and Pharmacy MUE committee. Educational efforts by the NSS, such as sponsoring visiting professors to speak to the medical staff, have improved this area of practice significantly over the past ten years. Because the NSS is a consult service and does not order or preapprove parenteral and/or enteral nutrition therapies, this aspect of care can only be impacted by ongoing educational programs to attending and housestaff physicians on the appropriate use of TPN.

D. Goals for 2011:
The major goal for the NSS quality assurance program is to continue the monitoring and development of quality assurance indicators related to the indication, timing, route, and complications for adult nutritional support. Additionally, the program should facilitate the development of patient service, management, or educational activities by addressing identified problems. Specific quality assurance goals for the service are as follows: QA monitoring will be accomplished according to time available by current staff.

1. Continue to monitor the various aspects of care as outlined in Section C.
2. Continue monitoring appropriate TPN prescribing based on the guidelines. Distribute the monitoring results annually to the Nutrition Committee.

V. SCHOLARLY ACTIVITY:

A. Description

The Nutrition Support Service assists with the development and implementation of clinical research protocols pertaining to nutritional support. However, since the main goal of the NSS is to provide clinical services and education, involvement in scholarly activities is limited. Additionally, time constraints and staff turnovers have precluded a more active role in this area.
B. Recent Scholarly Activity:

1. Recent Clinical Protocols:

Ruf K, Magnuson B, Incidence and Clinical Consequences of Refeeding Hypophosphatemia in Critical Illness, IRB approved, data collection in progress

Hypocaloric Considerations in Patients Requiring Acute or Chronic Enteral Nutrition, Magnuson B, Peppard A, Flomenhoft D. Nutrition Clinical Practice Submitted for publication, June 2011.

2. Recent Publications:


3. Professional Organizational Activities:


Amy Peppard, MHA, RD, CNSC attended ASPEN Nutrition Week, February 2009.


Barbara Magnuson, Pharm.D and Paul Kearney, MD both KYSPEN past-presidents and served on the board of directors since 1994.
C. Goals for 2011:

The major goal for the clinical research program of the NSS is to improve the organization of clinical research activities while increasing the number of manuscripts and abstracts generated from clinical research. Specific research goals for the next calendar year are as follows only as time permits:

1. Conduct a presentation or poster for a Nutrition, Pharmacy, or other medical conference.
2. Submit an abstract or article for publication to a Dietetic, Nursing, Pharmacy, or Medicine journal.
3. Participate in at least one clinical research or QA project relating to nutrition support.
4. Actively participate in ASPEN meetings and KYSPEN chapter meetings
5. Continue to represent UK with presentation of nutrition related topics to health care professionals outside of the Medical Center

VI. 2010 FINANCIAL SUMMARY

A. TPN Utilization

During the 2010 calendar year, the pharmacy prepared 2,304 TPN bags for adult patients. TPN utilization began to dramatically decrease in October 1991. The decrease in utilization coincided with the intensive educational efforts by the NSS to promote the benefits of safe and cost-effective enteral nutrition.

TPN utilization declined during 1992 and has remained fairly low through 2010. A financial summary is included for 2010. The below Table outlines the cost associated with preparation of a 2.0 liter TPN bag (avg. size adult TPN) and 250ml bag of 20% lipids. The table shows a comparison of costs and charges for TPN preparation in 2010.

<table>
<thead>
<tr>
<th>TPN</th>
<th>COST/UNIT*</th>
<th>2010 COST</th>
<th>CHARGE/UNIT ***</th>
<th>2010 PATIENT CHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,304</td>
<td>$157.50**</td>
<td>$362,880</td>
<td>$453</td>
<td>@ $1,043,712</td>
</tr>
</tbody>
</table>

* The average TPN volume prepared per adult patient at UK is 2L per day, ranging from 0.5 to 4.0 liters per day.
** Cost of 2L TPN (amino acid, dextrose solutions, IV bag, label, tubing for Baxta machines, labor of preparation, etc...) plus the cost of daily 250ml 20% lipids.
*** Approximate Patient TPN charge for 2L TPN + lipids (amino acid, dextrose solutions, lipids, IV bag, label, tubing for Baxta machines, labor of preparation, etc...). Costs and charges reported by Pharmacy Services 12/10.

B. Indirect Calorimetry Revenue

The NSS generates revenues through the performance of indirect calorimetry measurements. During the 2010 calendar year, 144 indirect calorimetry measurements were performed. In 2007, studies generated approximately $115,578 in patient charges. The revenue is credited to the Respiratory Therapy Services as they provide a part-time respiratory therapist this service. The metabolic cart became totally dysfunctional in April 2009. A replacement was in operation by April 2010.
VI. RESOURCES

The clinical pharmacist coordinator is a 0.75 FTE (part-time) position. The critical care pharmacy specialists and residents provide clinical coverage and assistance when needed. May 2000, the nurse position was eliminated by hospital administration. In May 2001-2008, the NSS staff was only a part-time pharmacist and a dietitian to consult and monitor @ 45 patients daily including house-wide TPN coverage. In May 2008, a second full time dietitian was added to the NSS team. Salaries are paid by their respective department/services. As the UKHC expands to Pavilion A with more ICU beds, the NSS will be limited on the expansion of patients feasible to assess and monitor. With the RD’s placing feeding tubes, the NSS should expand by at least 2 RD’s to meet the patient care needs for UKHC.

Daily census report is generated from data management.

Physician Support: The faculty coverage provided by the Division of General Surgery, Section of Trauma and Critical Care and Division of Gastroenterology is sufficient to meet minimal program goals.

VII. SUMMARY

This report provides a comprehensive overview of the University of Kentucky Hospital Nutrition Support Service. Considerable progress has been made in the development of the service. This effort has required the cooperation of Hospital Administration, Dietetics and Nutrition, the Departments of Surgery, Nursing, Pharmacy, and Medicine. The major goal of the service is to maintain the current level of nutrition support services with plans for expansion to provide more consultative services to home patients receiving parenteral or complicated enteral nutrition therapies. Maintenance of program stability requires the continued support and commitment of resources from Hospital Administration.

VIII. APPENDICES

1. NSS Organizational Chart for 2010
2. Guidelines for Appropriate TPN Use in Adult Patients
3. 2010 Appropriateness DUE for Initiation of TPN & TPN Waste

Appendix #1

Nutrition Support Service Organizational Chart

2010
APPENDIX #2

UK HEALTH CARE GUIDELINES FOR APPROPRIATE TPN USE IN ADULTS

INDICATIONS FOR ADULT TPN:

Inability to absorb nutrients via the GI tract resulting from one of the following conditions:

a) Massive small bowel resection (>70% of small intestine)
b) Short-gut syndrome from previous disease
c) ACTIVE inflammatory disease of the intestine in which malabsorption is present or bowel rest is indicated for at least 5-7 days:
   E.g. Radiation enteritis
         Ischemic enteritis
         Crohn's disease
         Ulcerative colitis

2. BMT with resulting Graft Versus Host Disease of the gut.

3. Moderate to SEVERE ACUTE pancreatitis requiring bowel rest of > 5-7 days. (Defined as three or more of Ranson's early objective signs of severity of acute pancreatitis).

4. Enterocutaneous fistulas:
   a) When bowel rest is indicated for at least 5-7 days (including pre and post-operative periods).
   b) High output enterocutaneous fistula that is or has been stimulated by enteral nutrition.
   c) Colocutaneous fistula requiring at least 5-7 days of bowel rest.

5. Enteral feeding access not possible due to one of the following conditions:
   a) Obstructing lesions of the aerodigestive tract e.g. pharynx, esophagus
   b) Gastric outlet obstruction

RELATIVE INDICATIONS FOR ADULT TPN:

1. Inability to absorb nutrients via the GI tract resulting in severe diarrhea.
2. High dose chemotherapy, radiation, and/or BMT resulting in mucositis or poor oral intake.
3. Major Surgery with moderate stress when return of gastrointestinal function is not anticipated for 5-7 days.
4. Early post-operative small bowel obstruction or patients presenting with mechanical bowel obstruction when return of gastrointestinal function is not expected for 5-7 days.
5. Severe head injury (Glasgow Coma Scale of 3-10) where post-pyloric enteral access could not be achieved within 48 hours of injury.
6. Gastrointestinal hemorrhage (upper or lower) when bowel rest and observation are desirable for 5-7 days.

THE TERMINAL PATIENT:

Total parenteral nutrition is a form of medical treatment. Its use should be decided after considering the benefits and burdens as measured scientifically and clinically as well as assessed in light of the patient's wishes and values. Total parenteral nutrition should not be instituted or continued in patients who have an untreatable terminal illness, when life expectancy is less than three months. There is no evidence to suggest that it increases survival, quality of life, or reduces suffering. In fact, attendant complications associated with TPN may outweigh any derived benefit.

REFERENCES:

APPENDIX #3

- 173 TPN initiation evaluations in 2010
  - 52 of 173 (30.1%) absolute indications
  - 115 of 173 (66.5%) relative indications
  - Total 96.5% appropriate indications
  - 2,285 of 2,204 (99.2%) TPN bags with appropriate TPN utilization.

- 6 of 180 TPN patients (3.5%) did not meet the TPN criteria (Threshold has been established at 85%)
  - Used 19 of the 2,304 total TPN bags (0.8%)

- At least 12 patients that were ordered TPN but recommended an alternative route for nutrition support prior to the TPN being initiating. This drug avoidance can significantly impact drug costs, associated hospital costs, and possibly complication costs.

- The NSS facilitated at least 15 patients for discharge with Home TPN for appropriate formulas and monitoring parameters

- 10 adult TPN bags were returned unused to the pharmacy (0.4% waste) See QA section for details.
  - Approximate cost of @ $1,500 to the Department of Pharmacy.
  - Other associated cost-savings i.e. decreased catheter placement with physician charges, decrease catheter related infections and its associated drug therapy costs, and other costs that could not be directly assessed. The primary reasons for wasted TPN in 2009 were patients expired, PICC line disfunction/infected/removed, discontinuation of therapy after the 2:00PM preparation time, and patient discharged and pharmacy not notified.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>INITIATION</th>
<th>INDICATIONS</th>
<th>NOT</th>
<th>%</th>
<th>Approp TPN</th>
<th>Total TPN</th>
<th>% Wasted</th>
<th>Avoided</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
<td>ABSOLUTE</td>
<td>RELATIVE</td>
<td>INDICATED</td>
<td>APPROPRIATE</td>
<td>Use</td>
<td>Use</td>
<td>Use</td>
<td></td>
</tr>
<tr>
<td>Jan</td>
<td>10</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>100%</td>
<td>190</td>
<td>190</td>
<td>100.0</td>
<td>3/1</td>
</tr>
<tr>
<td>Feb</td>
<td>19</td>
<td>8</td>
<td>10</td>
<td>1</td>
<td>100%</td>
<td>202</td>
<td>207</td>
<td>98.0</td>
<td>1/2</td>
</tr>
<tr>
<td>March</td>
<td>11</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>91%</td>
<td>164</td>
<td>166</td>
<td>99.0</td>
<td>2/1</td>
</tr>
<tr>
<td>April</td>
<td>14</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>86%</td>
<td>136</td>
<td>143</td>
<td>95.00</td>
<td>2/1</td>
</tr>
<tr>
<td>May</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>86%</td>
<td>188</td>
<td>189</td>
<td>99</td>
<td>2/0</td>
</tr>
<tr>
<td>June</td>
<td>14</td>
<td>5</td>
<td>9</td>
<td>0</td>
<td>100%</td>
<td>135</td>
<td>135</td>
<td>100.0</td>
<td>2/2</td>
</tr>
<tr>
<td>July</td>
<td>18</td>
<td>4</td>
<td>14</td>
<td>0</td>
<td>100%</td>
<td>183</td>
<td>184</td>
<td>99</td>
<td>0/1</td>
</tr>
<tr>
<td>August</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>?</td>
<td>100%</td>
<td>159</td>
<td>159</td>
<td>100.0</td>
<td>?/1</td>
</tr>
<tr>
<td>Sept</td>
<td>12</td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>100%</td>
<td>203</td>
<td>203</td>
<td>100.0</td>
<td>?/1</td>
</tr>
<tr>
<td>Oct</td>
<td>16</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>100%</td>
<td>298</td>
<td>298</td>
<td>100.0</td>
<td>?/1</td>
</tr>
<tr>
<td>Nov</td>
<td>19</td>
<td>3</td>
<td>16</td>
<td>0</td>
<td>100%</td>
<td>218</td>
<td>218</td>
<td>100</td>
<td>1/2</td>
</tr>
<tr>
<td>Dec</td>
<td>23</td>
<td>6</td>
<td>16</td>
<td>1</td>
<td>97%</td>
<td>209</td>
<td>212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>173</td>
<td>52</td>
<td>115</td>
<td>6</td>
<td>97%</td>
<td>2285</td>
<td>2304</td>
<td>99.2</td>
<td>10/10</td>
</tr>
</tbody>
</table>