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IMPACTO DA TERAPIA NUTRICIONAL SOBRE INFECÇÃO E PERMANÊNCIA HOSPITALAR EM PACIENTES CIRÚRGICOS: ESTUDO DE COORTE

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“A vida é curta; a arte, longa; a ocasião,

fugaz; a experiência, traiçoeira, e o

julgamento difícil.

Tudo acontece conforme a natureza.”

Hipócrates

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RESUMO

Introdução: A terapia nutricional (TN) em pacientes cirúrgicos é fundamental para o manejo da desnutrição hospitalar, podendo reduzir as complicações pós-operatórias e a ocorrência de desfechos negativos durante a hospitalização. Não há evidências sobre o impacto da TN implementada na prática clínica, como período de jejum pós-operatório (PO) e ingestão de calorias e proteínas, sobre a incidência de infecção e tempo de internação.

Objetivo: Verificar o efeito do jejum PO prolongado e da adequada TN sobre infecção e tempo de internação hospitalar.

Métodos: Trata-se de um estudo de coorte prospectivo realizado em hospital terciário e universitário. Incluiu-se pacientes adultos submetidos à cirurgia eletiva. Excluíram-se aqueles sem condições de submeter-se à avaliação do estado nutricional, admitidos em unidades de cuidados mínimos e de terapia intensiva, com previsão menor ou igual a 72h de internação e para realização de exames. Os dados demográficos e clínicos, as variáveis de exposição e os desfechos de interesse foram coletados por meio dos registros informatizados da assistência. A avaliação do estado nutricional foi realizada na admissão e a cada sete dias até a alta hospitalar ou o óbito. Considerou-se jejum PO prolongado período maior ou igual a 5 dias e internação prolongada quando 1 dia a mais que a média de cada especialidade. O controle de ingestão foi realizado, pelos pesquisadores, seis vezes por semana em formulários específicos do estudo. Considerou-se TN adequada quando ingestão maior ou igual a 75% do prescrito. Realizou-se análise multivariada e um modelo de regressão logística para verificar as associações e ajustar para os fatores de confusão.

Resultados: Os resultados demonstraram que 5,6% dos pacientes analisados ficaram em jejum PO prolongado e 16,2% receberam TN adequada. O jejum PO prolongado foi mais freqüente entre os pacientes da especialidade do aparelho digestivo e proctologia. Após ajuste para variáveis de confusão, verificamos que entre pacientes com jejum PO prolongado o risco para infecção é 2,88 vezes maior (IC95%:1,17–7,16) e o risco para internação prolongada é 4,43 vezes maior (IC95%:1,73–11,35). A TN adequada foi fator de proteção, com redução de 36% (RO=0,36; IC95%: 0,15-0,76) do risco de infecção e de 46% (RO=0,46; IC95%: 0,25-0,84) do risco de internação prolongada.

Conclusão: O jejum PO prolongado foi fator de risco independente para infecção e internação hospitalar prolongada. A maioria dos pacientes recebeu inadequada TN e aqueles com adequada TN apresentaram redução do risco de infecção e tempo de internação prolongada.

Palavras chave: terapia nutricional, desnutrição, jejum, cirurgia, infecção, tempo de internação.

ABSTRACT

Background: Nutrition therapy (NT) in surgical patients is important to the management of hospital malnutrition and may reduce postoperative complications and the occurrence of adverse outcomes during hospitalization. There is no evidence on the impact of NT implemented in clinical practice, such as fasting period postoperatively (PO) and intake of calories and proteins, on the incidence of infection and prolonged length of stay.

Objective: The aim of this study is to determine the effect of prolonged fasting PO and proper NT on infection and prolonged length of stay.

Methods: It is a prospective cohort study conducted in a tertiary, university hospital. Were included adult patients undergoing elective surgery. Those with no conditions for nutritional assessment were excluded, as weel as those admitted in minimal care and intensive care units, with the prediction of a shorter stay (less than 72 hours) or admitted for exams. Demographic and clinical data, the exposure variables, as well as the pertinent endpoints were collected from the electronic records. Nutritional status was assessed upon admission and every seven days until hospital discharge or death. A period equal or longer than 5 days was considered as prolonged PO fasting, and prolonged length of stay when there was 1 extra day as compared to the average of each specialty. Dietary intake control was carried out by researches six times a week. NT was considered adequate if dietary intake was equal to or greater than 75% of the prescribed amount. Data was analyzed using logistic multivariate regression.

Results: The results showed that 5.6% of the patients studied, were in prolonged PO fasting and 16.2% had adequate NT. Prolonged PO fasting was more frequent among the patients of the digestive tract and colorectal surgeries. After adjustment for

confounding variables, we verified that among patients with prolonged PO fasting the risk for infection is 2.88 times higher (CI 95%:1.17–7.16) and the risk for prolonged stay is 4.43 times higher (CI 95%:1.73–11.35). The adequate NT reduced infection risks by 36% (OR=0.36; 95%CI: 0.15-0.76) and reduced the rates of prolonged hospital length of stay by 46% (OR=0.46; 95%CI: 0.25-0.84).

Conclusion: Prolonged PO fasting was an independent risk factor both for infection and prolonged hospital stay. Most patients received inadequate NT, those under adequate NT had reduced infection rates and were less likely to have prolonged hospital length of stay.

Keywords: nutrition therapy, malnutrition, fasting, surgery, infection, lenght of stay.

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LISTA DE ABREVIATURAS

ASPEN	*American Society of Parenteral and Enteral Nutrition*
NRS	*Nutritional Risk Screening*
ASG	Avaliação Subjetiva Global
SENPE	Sociedade Espanhola de Nutrição Enteral e Parenteral
ERAS	*Enhanced recovery after surgery*
NPO	*Nulla per os*
IMC	Índice de massa corporal
TN	Terapia nutricional
PO	Postoperative
BMI	*Body mass index*
COPD	*Chronic obstructive pulmonary disease*
AIDS	*Acquired Immune Deficiency Syndrome*
SNA	*Subjective Nutritional Assessment*
Kg	Kilograms
ICU	*Intensive Care Unit*
NT	*Nutritional therapy*
Cal	*Calories*
Prot	*Protein*

Sumário

1 Introdução

Os pacientes hospitalizados encontram-se, a maioria, gravemente desnutridos ou em risco de desnutrição [1]. A perda de massa corpórea é conseqüência do déficit calórico em relação às necessidades nutricionais do indivíduo, que pode ocorrer em situações de privação da ingestão alimentar propriamente dita ou secundária às enfermidades [3]. O indivíduo em situação de doença apresenta um aumento do processo inflamatório e conseqüentemente maior risco de desnutrição [1].

Sabe-se que a desnutrição está associada a piores desfechos para o paciente como atraso na cicatrização de feridas, aumento de infecção hospitalar e internações de longa permanência, levando a maiores custos para o sistema de saúde [4].

Além disso, o indivíduo que necessita ser submetido a procedimento cirúrgico, estará sujeito a um aumento de estresse, catabolismo e consumo de suas reservas corporais [14].

A terapia nutricional, neste contexto, tem um papel importante, na medida em que pode prevenir ou atenuar as conseqüências do déficit calórico e proteico presente nas enfermidades ou durante procedimentos cirúrgicos [37].

Nos últimos anos, estudos em direção a elucidação do papel da terapia nutricional demonstraram que acelerar a recuperação pós operatória, mediante protocolos, com abreviação do jejum pré operatório e alimentação pós operatória precoce, podem melhorar desfechos clínicos hospitalares [27,28,30].

Apesar da evolução do conhecimento na área do manejo nutricional de pacientes cirúrgicos, apenas estudos transversais avaliaram o impacto da terapia nutricional sobre a evolução clínica hospitalar [46]. Além disso, existem poucas evidências sobre o papel da terapia nutricional, ao longo da hospitalização, sobre desfechos hospitalares.

Visando responder algumas questões neste segmento, o presente estudo objetivou acompanhar prospectivamente, por meio de uma coorte, pacientes submetidos à cirurgia eletiva em um hospital universitário brasileiro, e avaliar a associação entre a terapia nutricional dispensada e a ocorrência de infecção hospitalar e a permanência hospitalar prolongada.

Esta tese originou dois artigos:

- o primeiro, referente à avaliação do tempo de jejum pós-operatório e à associação com infecção e com permanência hospitalar, intitulado: ***Duration of postoperative fasting and its association to infection and prolonged length of stay***;

- o segundo, referente à relação entre terapia nutricional, infecção e permanência hospitalar prolongada, intitulado: ***Decreased calorie and protein intake is a risk factor for infection and prolonged length of stay in surgical patients: a prospective cohort study***.

A estrutura da apresentação deste trabalho segue as normas e os moldes do Programa de Pós-Graduação em Medicina: Ciências Médicas da Faculdade de Medicina da Universidade Federal do Rio Grande do Sul.

2 Revisão da literatura

2.1 Estratégias para localizar e selecionar as informações

Esta revisão da literatura aborda alguns aspectos sobre a terapia nutricional (TN) em pacientes cirúrgicos, assim como o efeito e a associação da desnutrição e da TN sobre desfechos hospitalares.

A estratégia de busca ocorreu a partir das seguintes bases de dados: MEDLINE (*site* PubMed), LILACS, SCIELO e portal *Cochrane*.

As referências bibliográficas dos artigos identificados foram revisadas para localizar outras não contempladas na busca. Também foram utilizados livros texto. Nos *sites* PubMed. LILACS e SCIELO foram realizadas buscas com palavras-chave, que estão divididas nos itens que compõem esta revisão e os dois artigos que contemplem a presente tese.

Usando os termos “malnutrition”, “protein malnutrition”, “protein-energy malnutrition” e “energy malnutrition” foram selecionados 12 artigos originais e 4 de revisão.

Através dos termos “fasting”, “perioperative care” e “surgery” foram encontrados 135 artigos, que, após leitura do título, resumo e manuscrito completo, 35 tratavam especificamente do tema desenvolvido na seção 2.3.1 desta revisão.

E, finalmente, cruzando-se os termos “fasting”, “perioperative care”, “surgery”, “nutrition therapy”, “infection” e “lenght of stay” obtivemos apenas 12 artigos que abordam o tema da seção 2.3.2.

2.2 Desnutrição hospitalar: etiologia e conseqüências

A desnutrição em pacientes hospitalizados é altamente prevalente, atingindo em torno de 20-50% dos pacientes hospitalizados em países industrializados [1] e em desenvolvimento [2,3], sendo essa variação encontrada devido às diferentes formas de diagnóstico, ao tipo de paciente em estudo (cirúrgico ou clínico) e ao caráter da internação (eletiva ou de emergência) [1,4].

Em geral, pacientes desnutridos apresentam maiores morbidade, mortalidade, necessidade de re-internação e cuidados adicionais fora do ambiente hospitalar. Todas essas condições representam um custo elevado para a saúde, justificando a investigação diagnóstica para intervenção precoce do paciente desnutrido [1].

As causas de desnutrição hospitalar são complexas e normalmente se sobrepõem. A ASPEN (*American Society of Parenteral and Enteral Nutrition*) considera perda de peso corporal, presença de doença crônica, aumento de necessidades nutricionais, alterações dietéticas e necessidade de nutrição enteral e/ou parenteral como fatores de risco nutricionais [5].

A doença de base é um fator contribuinte na gênese da desnutrição, portanto, esta deve ser precocemente identificada e manejada [1]. Procedimentos diagnósticos e terapêuticos, menor conhecimento ou interesse das equipes assistentes em avaliar o estado nutricional do paciente e ausência de estratégias para evitar o jejum prolongado também estão entre as causas de desnutrição [6]. A identificação dos pacientes em risco nutricional é fundamental para o início de tratamento adequado [5].

Em 2006, um grupo espanhol, realizou estudo multicêntrico com 796 pacientes de 11 hospitais de níveis secundário e terciário e verificou que, por meio do *Nutritional Risk Screening* (NRS), 28,9% foram rastreados como desnutridos ou em risco nutricional, sendo estes principalmente idosos, com índice de Charlson (comorbidades)

elevado e internação emergencial por condições não-cirúrgicas (p<0,001). O tempo de internação foi significativamente maior para os pacientes rastreados como NRS positivos (10,5 ± 9,5 dias x 7,7 ± 7,8 dias; p<0,001). A mortalidade também foi maior nesses pacientes (8,6% x 1,3%; p<0,001) [1].

Outros estudos [7,8] demonstraram a relação entre o tipo de admissão hospitalar e o risco de desnutrição, concluindo que pacientes internados emergencialmente apresentam maior risco de desnutrição.

Um estudo brasileiro [9], em 2012, avaliou o estado nutricional, através da Avaliação Subjetiva Global (ASG), de 109 pacientes das especialidades de clínica médica, infectologia e oncologia. Os autores concluíram que ocorreram mais complicações infecciosas nos pacientes desnutridos do que nos não-desnutridos (77,8% *versus* 12,3%; p<0,001). Além disso, independente da especialidade de internação, pacientes desnutridos apresentaram maior risco de desenvolver complicações (OR=19,38) e maior risco de morte (OR=3,03).

A Sociedade Espanhola de Nutrição Enteral e Parenteral (SENPE) realizou o estudo PREDyCES [5], multicêntrico, onde 23% dos pacientes apresentavam-se desnutridos à admissão, esta condição foi maior em idosos e em pacientes com neoplasia, doença respiratória ou cardiovascular. Também demonstrou que 9,6% dos pacientes sem desnutrição à admissão receberam alta com desnutrição e 72% dos pacientes desnutridos permaneceram desnutridos na alta hospitalar. Houve associação entre desenvolvimento de desnutrição durante a hospitalização e aumento no tempo de internação (8,0±5,2 dias em pacientes desnutridos na admissão *versus* 15,2±9,2 em pacientes que desenvolveram desnutrição durante a hospitalização).

Para analisar os custos relacionados à desnutrição, foi feito um sub-estudo [5] caso-controle aninhado em uma coorte com nove hospitais participantes do

PREDyCES. Foram analisados 468 pacientes, 24,4% apresentavam-se desnutridos à admissão e 22,6% à alta hospitalar. O tempo de internação de pacientes desnutridos à admissão foi maior, o que refletiu em custos maiores no grupo com desnutrição (€ 6,408 x € 12,237; p<0,001).

No estudo de Álvarez-Hernández et al. [10] a prevalência de desnutrição foi de 40,2% dos pacientes com perda de 7,3% do seu peso corporal. Destes, 67,1% referiram redução da ingestão oral e 53,9% anorexia. Desnutrição foi associada ao sexo masculino (70,7% *versus* 29,3%; p<0,01), ao tempo de internação prolongado (12,0±7,2 *versus* 8,0±5,3 dias; p<0,01) e a neoplasias (24% *versus* 12%; p<0,05). A taxa de mortalidade foi semelhante entre desnutridos e eutróficos (7,9% *versus* 3,6%; p=0,26).

Em pacientes idosos deve-se ainda ter maior atenção ao estado nutricional, pois, tendem a apresentar mais comorbidades, principalmente por doenças cardiopulmonares, e complicações intra-hospitalares, com maior tempo de internação (5,5 dias *versus* 3,7 dias para pessoas com idade de 15 a 44 anos) [11, 12]. As causas de desnutrição hospitalar em pacientes idosos podem resultar de diversos fatores: déficit cognitivo, delirium, anorexia, inapetência, náuseas, constipação, restrição de movimento, falta de próteses dentárias, dificuldade em se alimentar e/ou dietas restritivas [13].

Um estudo [14] observacional, realizado no México, avaliou 769 pacientes com 75,3±7,7 anos, 53,6% apresentaram alterações no seu estado nutricional nas 24 horas após a admissão hospitalar.

A desnutrição ainda é uma condição subdiagnosticada em pacientes admitidos em instituições hospitalares, principalmente pela falta de métodos padronizados de rastreamento que considerem idade e comorbidades do paciente [15].

Na última década, tem-se dado maior atenção ao problema da desnutrição. Em 2009, foi assinada a Declaração de Praga, declarando a desnutrição (e a desnutrição

relacionada à doença de base) como um problema público de saúde e sendo solicitadas medidas pró-ativas para seu combate. Uma de suas ações é a elaboração de um documento para informação de manejo de desnutrição hospitalar (*Coding of Hospitalar Malnutrition*), que visa identificar e unificar os conceitos de desnutrição já descritos no CID-9, além de seus tipos e graus de gravidade [7].

2.3 Jejum perioperatório e terapia nutricional em cirurgia

2.3.1 Jejum perioperatório

O paciente quando submetido a procedimento cirúrgico, uma situação de trauma [16], pode ter indução à resistência insulínica [16,17]. Em resposta ao estresse cirúrgico, o corpo reage alterando o metabolismo para um estado catabólico. O catabolismo pode ser ainda mais agravado pelo estado de jejum pré-operatório [18].

Tradicionalmente, é adotado o jejum a partir da meia-noite na noite anterior da cirurgia. A prescrição de longos períodos de jejum durante o período peri-operatório ainda é amplamente predominante, apesar dos avanços no tratamento cirúrgico e de recomendações de diretrizes [19,20]. Este período de jejum pode ser suficiente para alterar a condição metabólica do paciente, que aumenta a resposta ao estresse perioperatório [21-23]. O jejum aumenta o fluxo de lipídios para dentro da mitocôndria, causando excesso de oxidação e prejudicando a captação de glicose celular [23]. Tempo de jejum pré-operatório prolongado pode agravar a resistência insulínica [24] e incrementar a elevação da glicemia [23]. Além disso, o jejum durante a noite pode causar graus variáveis de desidratação, dependendo da extensão do período de jejum [16].

A prescrição do jejum perioperatorio se dá por conta dos riscos de complicações durante a indução anestésica como aspiração pulmonar do conteúdo gástrico, devido à diminuição da função do esfíncter esofágico e dos reflexos protetores das vias aéreas causadas pela depressão da consciência [25].

Recomendações de diretrizes demonstram que o tempo de jejum peri-operatório pode ser menor do que o atualmente realizado [17,26]. As diretrizes [20,27] recomendam para pacientes sob cirurgia eletiva ingestão de água até duas horas antes da indução anestésica, jejum pré-operatório mínimo de seis horas para alimentos sólidos e bebidas contendo leite, e recomeço precoce, em adultos acordados, de líquidos orais no pós-operatório. No entanto, a implementação dessas recomendações na prática demandam um conjunto de atitudes organizacionais e institucionais entre profissionais e pacientes envolvidos [17,28,29]. É relatado por Khoyratty et al. [30] que entre 200 pacientes avaliados a mediana do jejum pré-operatório foi de 2 a 4 vezes maior que as recomendações de diretrizes, porque a maioria dos pacientes não receberam instruções corretas sobre o jejum.

Programa de recuperação avançada de cirurgias denominado *enhanced recovery after surgery* (ERAS) prevê diminuição do tempo de jejum pré-operatório e da realimentação no pós-operatório e tem evidenciado, por meio de ensaio clínico, recuperação mais rápida da função intestinal, redução de morbi-mortalidade e tempo de internação [31]. O grupo de cirurgia torácica no Reino Unido revisou práticas específicas que podem ser implementadas, como minimização do tempo de jejum, avaliação pré-anestésica, reabilitação pós-operatória e manejo da dor. Estes cuidados podem reduzir morbidade e tempo de internação hospitalar [32]. Além disso, em pacientes idosos com fratura de quadril, tempo de jejum de doze horas ou mais, foi fator de risco perioperatório preditivo de morte [33].

Pacientes incluídos no protocolo ERAS submetidos a cirurgias abdominais eletivas tiveram redução de 4 dias no tempo médio de internação hospitalar (P = 0,002) e de 85,7% na taxa de infecção (P <0,001) [34]. Nos pacientes submetidos à cirurgia colorretal [35] e abdominais eletivas [36] a abreviação do tempo de jejum pré-operatório e realimentação precoce no pós-operatório reduziram tempo de internação e complicações. O estudo de Oliveira et al. [37] demonstrou que a redução do jejum pré-operatório para duas horas em pacientes submetidos à cirurgia de aparelho digestivo não esteve associada com complicações anestésicas (aspiração pulmonar) durante os procedimentos.

Na maioria das unidades cirúrgicas, a preferência pessoal do cirurgião guia o período de jejum [19,38,39,].

Pacientes cirúrgicos de hospitais públicos e universitários foram divididos em grupo A (menores procedimentos) e grupo B (maiores procedimentos) e avaliados diariamente, quanto à ingestão alimentar, por meio de recordatório. 85,5% dos pacientes do grupo A reiniciaram a dieta no primeiro dia pós-operatório e no grupo B houve progressão mais lenta da dieta e 7% ainda estavam sob *nulla per os* (NPO) no quinto dia de pós-operatório [40].

A liberação progressiva de nutrientes, de líquidos claros a alimentos sólidos, tem sido outra questão controversa entre cirurgiões que tradicionalmente acreditam que esta seqüencia deve ser respeitada. Porém, em estudo prospectivo, Sanches et al. [40] randomizaram 165 pacientes que realizaram cirurgia digestiva eletiva, em dois grupos: 1) dieta oral liberada após a eliminação de flatos ou 2) dieta seqüencial (líquidos claros a sólidos) liberada após a eliminação de flatos. Os autores não encontraram nenhuma diferença na incidência de complicações cirúrgicas ou intolerância da dieta entre os dois grupos. E cabe ressaltar que liberar a dieta mais precocemente tende a atingir mais

precocemente a TN adequada. Outro estudo de Jeffery et al. [41], comparando ingestão oral de alimentos sólidos *versus* progressão de líquidos claros a sólidos após cirurgia abdominal, demonstrou que houve incidência similar de complicações em ambos os grupos (7,5% *versus* 8,1%). Os autores defendem o uso do regime sólido como primeira opção a ser oferecida aos pacientes, uma vez que é melhor tolerada, proporciona maior palatibilidade e facilidade de deglutição e diminui o tempo de internação hospitalar.

2.3.2 Terapia nutricional: ingestão de calorias e proteínas

A TN é um componente essencial no manejo terapêutico de pacientes doentes, com vistas a prevenir ou minimizar a desnutrição [42]. Quando a TN for inadequada pode piorar desfechos hospitalares [43].

A ingestão subótima da alimentação durante a hospitalização é um dos fatores etiológicos da desnutrição [44]. Situações inerentes ao paciente, como inapatência, podem determinar inadequada ingestão da TN [40]. O estudo de Leistra et al. [45] demonstrou que preditores negativos para atingir ingestão adequada de calorias e proteínas foram: náusea, câncer, infecções agudas e índice de massa corporal (IMC) maior; enquanto preditores positivos foram: idade maior, doença pulmonar crônica e estar recebendo alimentação enteral.

A ingestão inadequada tem sido relatada por diferentes autores, como Leistra et al. [45], que avaliou 610 pacientes, destes apenas 25,6% tiveram ingestão suficiente de calorias e proteínas. No estudo de Kowanko et al. [46] mais de um terço de pacientes sob cuidado agudo tiveram a ingestão calórica menor que 50% do fornecido de uma dieta hospitalar padrão. Recentemente, Bauer et al. [47] relataram que cerca de 50% dos pacientes ingeriram metade ou menos da sua refeição e estes pacientes apresentaram

quatro vezes maior propensão em ser desnutrido comparado àqueles que ingeriram mais que a metade.

Em um hospital da Suíça, a preocupação com a melhora da qualidade alimentar foi iniciada em 1999, tendo em vista que o desperdício de alimentos pode chegar até 67% do alimento fornecido. Além disso, a partir de um estudo, realizado nessa instituição, que incluiu 1707 pacientes, 57% não tiveram adequada alimentação. Dentre as causas para a subalimentação foi constatado que não é, exclusivamente, pela doença. Análise de regressão logística multivariada identificou outros fatores como IMC elevado, sexo masculino, modificação da prescrição dietética e tempo de internação maior ou igual a 90 dias [48].

Dez anos após a implementação de medidas de qualidade alimentar, como adaptações no cardápio de acordo com as expectativas dos pacientes e suas necessidades energéticas, os autores suecos, na mesma instituição, concluíram que não houve modificação da proporção de pacientes subalimentados. E sim o aumento da cobertura das necessidades protéicas após o consumo de um ou mais suplementos nutricionais [49].

Em estudo semelhante, a ingestão de calorias e proteínas aumentou após a inclusão em grupos de TN, com aconselhamento nutricional individualizado [50]. Na avaliação de Sanches et al. [40] os pacientes que receberam livremente dieta sólida ingeriram mais calorias do que o grupo que recebeu dieta líquida progressivamente (917 calorias *versus* 468 calorias no primeiro dia de alimentação pós-operatória).

Dentre as conseqüências da TN inadequada, pode-se citar o estudo europeu de base populacional transversal, onde foi verificado que a diminuição da ingestão alimentar foi fator de risco independente para mortalidade [51].

2.4 Conclusão

A importância da TN em pacientes cirúrgicos é crucial e tem sido o problema de repetidos estudos ao longo dos últimos anos. Porém, apesar de sua relevância, a desnutrição é, ainda, altamente prevalente entre pacientes cirúrgicos e o manejo desta condição, é negligenciado, em muitos centros cirúrgicos, conferindo risco de piores desfechos.

Parece necessário, entretanto, a condução de estudos clínicos que avaliem o impacto da TN em pacientes cirúrgicos sobre estes desfechos, a fim de guiar condutas terapêuticas e preventivas para melhorar a assistência aos pacientes.

3 Justificativa

Sabe-se que a desnutrição piora desfechos hospitalares e que a inadequada TN pode aumentar o risco de mortalidade, porém estes dados são derivados de estudos transversais. É relatado a prática, ainda presente em hospitais brasileiros, de adoção de longos períodos de jejum pré e pós operatório. No entanto, é desconhecido na literatura o efeito do jejum pós-operatório sob desfechos hospitalares em pacientes cirúrgicos.

Frente aos estudos transversais, até então realizados, quanto ao efeito da TN sub-ótima sob mortalidade e pelo fato de ainda ser desconhecido, o quanto o jejum pós-operatório prolongado aumenta o risco de desfechos intra hospitalares, objetivou-se avaliar, por meio de uma coorte prospectiva, se pacientes submetidos à cirurgia eletiva de um hospital universitário terciário podem ter redução do risco de infecção e de tempo de internação quando implementada adequada TN.

4 Objetivos

4.1 Objetivo principal

Avaliar se a TN ofertada aos pacientes cirúrgicos admitidos no Hospital de Clínicas de Porto Alegre reduz o tempo de internação hospitalar e os episódios de infecção.

4.2 Objetivos secundários

1) Verificar o tempo de duração do jejum pós-operatório;

2) Verificar a quantidade de calorias e proteínas prescritas;

3) Verificar, por meio de controle de ingestão (recordatório alimentar), a quantidade de calorias e proteínas ingeridas;

4) Descrever o percentual de infecção e o percentual de pacientes que tiveram internação prolongada.

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6 Artigos

6.1 Duration of postoperative fasting and its association to infection and prolonged length of stay

Concise Title: Postoperative fasting

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Abstract

Background: Postoperative (PO) fasting can increase protein catabolism and the consumption of lean mass within a few days. Objectives: Verify whether prolonged PO fasting increases the risk for infection and prolonged length of stay. Methods: It is a prospective cohort study, approved by the hospital Ethics in Research Committee. Elective surgery patients were included. Those with no conditions for nutritional assessment were excluded, as well as those admitted in minimal care units, with the prediction of <72h in-hospital stay or admitted for exams. Demographic and clinical data, the exposure variables, as well as the pertinent endpoints were collected from the electronic records. A period equal or longer than 5 days was considered as prolonged PO fasting, and prolonged length of stay when there was 1 extra day as compared to the average of each specialty. Data was analyzed using logistic multivariate regression. Results: 521 patients were analyzed, 5.6% were in prolonged fasting, were more eutrophic, and had more cancer, diabetes, and chronic obstructive pulmonary disease; prolonged PO fasting was more frequent among the patients of the digestive tract and colorectal surgeries, these same patients were more admitted in intensive care, and had more PO surgical complications. After adjustment for confounding variables, we verified that among patients with prolonged fasting the risk for infection is 2.88 times higher (CI 95%:1.17–7.16) and the risk for prolonged stay is 4.43 times higher (CI 95%:1.73–11.35). Conclusion: Prolonged PO fasting was an independent risk factor both for infection and prolonged hospital stay.

Keywords: surgery, fasting, infection, length of stay.

Introduction

Patients who need surgery are subject to mechanisms that may worsen their nutritional status [1]. Many publications in the literature demonstrate that malnourishment is associated to worse in-hospital outcomes [2.3], be it increase in morbidity and mortality, or higher costs [4-6].

The first study that established direct correlation between mortality, postoperative complications, and undernourishment in surgical patients was published by Studley, in 1936 [7].

Studies report prevalence of 20-50% disease-related in-hospital malnourishment [8.9]. A European study evaluated 5,051 patients admitted in European hospitals using NRS-2002, a screening tool, and found 32.6% of patients at risk for malnourishment [10].

The mechanisms related to surgical procedures are: 1) the primary disease that needs surgical intervention and may initially lead to debilitating states or situations related to ingestion, digestion, and changes in absorption, as well as secondary morbid states (cancer, diabetes, obesity, and other organic chronic dysfunctions) [11.12]; 2) the surgery in itself, which leads to an increase in the parameters of organic response to stress and may progress into catabolism increase, consumption of protein mass, and substract mobilization (protein, fat, and carbohydrates) [1.13] and 3) long fasting periods which may lead to a depletion in body reserves, especially protein [14].

The adoption of prolonged pre and postoperative fasting periods are routine in most surgical centers [1]. ‘Nulla per os’ (NPO) after midnight was introduced before modern surgery and Second World War due to the risk of aspiration during anesthetic induction [15]. This technique is considered outdated, its foundations being connected

to the idea that at the moment of anesthetic induction the stomach must be completely empty, thus decreasing the risk for aspiration [16]. Nevertheless, this time is long enough from the metabolic standpoint and may deplete glycogen stores and initiate gluconeogenesis process [17]. With starvation (zero protein absorption) and accelerated protein metabolism, there will be negative nitrogen balance, indicated by kidney excretion of 7 to 15 g per day of gluconeogenesis derived nitrogen (urea). This is equivalent to a daily loss of 300 to 400 g of lean mass a day; therefore, 35% of total lean mass will be consumed in days [17].

The deleterious effect of starvation in patients before surgery was reinforced by Joseph Lister more than 100 years ago. NPO regime became universal in spite of contemporary reports that the emptying of clear liquids from the stomach is much faster [14.18.19].

Prospective studies have demonstrated that reducing preoperative fasting down to two hours with carbohydrate fluids does not lead to any risk of anesthesia-associated aspiration [20-22]. A systematic Cochrane review has confirmed those results. It also demonstrated that gastric residual after regular fasting is similar to two hours fasting with clear fluids [15].

A study conducted in China applied the “Eras Program Attenuates Stress” (ERAS) protocol, where the patient receives carbohydrate-enriched fluid per os until 2 hours before surgery and, within 6 hours after the surgery begins an ingestion of 500cc of water. The patients in the ERAS group presented the least response to postoperative stress and a quick recovery in gastrointestinal function. Postoperative hospital stay was also reduced when compared to the control group [23].

A Brazilian study which also evaluated the results of the implementation of the ERAS protocol with a shorter perioperative fasting period observed the decrease both in length of stay and postoperative morbidity [24].

Elderly patients of elective abdominal surgery submitted to the protocol of shorter preoperative fasting and quicker re-feeding in the postoperative period also had shorter length of stay and less wound infection [25].

It is recognized that surgical and non-surgical patients admitted in the hospital and at risk of undernourishment who receive nutritional intervention have a shorter length of stay, reduction in length of stay related costs, and in complications-related costs [26].

Therefore, health workers must provide adequate nutritional support to surgical patients admitted to the hospital. Nutritional intervention is necessary when oral intake is not possible for a period of 5-7 days [27].

Justification

The effect of postoperative fasting over hospital outcomes of surgical patients is unacknowledged in the literature. The impact of undernourishment over worse outcomes has been reported, as well as the practice of prolonged preoperative fasting periods, still seen in Brazilian hospitals. Therefore, the objective is to assess whether a prolonged postoperative fasting period increases the risk for infection and prolonged hospital stay, in a cohort of patients submitted to elective surgery in a tertiary teaching hospital, adjusting the potential confounders such as age, nutritional status, and surgery size.

Methods

Study design

Prospective observational study developed in a tertiary, high complexity teaching hospital. Each of the subjects signed the informed consent, and the study was approved by the hospital's Ethics and Research Committee. (report n 110307).

Population studied

Patients of elective surgery from the following specialties: digestive tract, general surgery, ophthalmology, otorhinolaringology, colon and rectal surgery, thoracic surgery, urology, and vascular surgery were selected from August 1st 2011 to October 25th 2012, at the Hospital de Clínicas de Porto Alegre (HCPA), Rio Grande do Sul, Sothern region of Brazil. The electronic records of the hospital were used to identify eligible patients. The patients who did not have conditions for nutritional assessment were excluded, as well as those admitted to the minimal postoperative care unit, with a plan of less than 72 hours in-hospital stay, as well as those admitted for exams. The population studied represented a convenience sample (determined by the availability of the researcher during the study period). The patients who, after inclusion in the study were transferred from the ward to intensive care did not have their nutritional status assessed during that period; nevertheless, they were followed until hospital discharge.

Data collection and variables of interest

The data analyzed were extracted from the records of the care provided by the health practitioners via HCPA electronic system.

Demographic data, clinical characteristics, variables of interest, and endpoints were prospectively collected by the researchers in templates on the day of admission or up to 48 hours before the surgical procedures, until the day of hospital discharge or death, according to the conceptual model (Figure 1). The clinical characteristics, operative complications, hospital infection, and the days of postoperative fasting were collected daily from the patients' records (electronic and paper).

After inclusion in the study, the patients were assessed for nutritional status by means of: measuring weight and height, arm and calf circumferences, and triceps skin fold, as well as bioimpedance for the assessment of body composition (lean and fat mass). Nutritional status was classified according to the body mass index (BMI). At every 7 days this evaluation was repeated according to the same protocol.

The endpoint infection was collected from the notification by the Infection Control Committee in the electronic system. The endpoint prolonged length of stay was collected as the duration (in days) of hospital stay and it was defined as prolonged when it lasted one extra day as compared to the average for each specialty. The variable of interest exposure for the study was postoperative fasting period. Postoperative fasting was counted according to the days that the patient fasted after surgery. We adopted as prolonged postoperative fasting a period longer than 5 days. The fasting period was no longer considered when enteral or parenteral nutrition was introduced. Co variables were old age (60 years or more), cancer, surgery classified according to duration, being considered as small when up to one hour and 30 minutes, medium when between 1 hour and 31 minutes and 3 hours, and large when longer than 3 hours. Admission to intensive

care, and surgical postoperative complications (needing or not new surgical intervention) such as wound dehiscence or leakage were also considered as co variables.

Statistical analysis

The statistical analysis was done using PASW version 18. Continuous variables with normal distribution were expressed as mean ± standard deviation, and categorical data were expressed as absolute figures or percentages. Comparisons between groups were performed using the chi-square test and Fisher's exact test for categorical variables and Student t-test or Wilcoxon test for continuous variables. Multivariate analysis used a logistic regression model to calculate the odds ratio and adjusted for confounding factors. A two-sided P value less than 0.05 was considered statistically significant. The variables in the logistic regression model were selected from a univariate analysis, considering $p<0.20$.

Results

Patients' characteristics

1,047 patients were selected as potentially eligible during the study period. 383 did not confirm eligibility because they were minor than 18 years of age or had pacemakers on (thus hindering electric impedance impossible), had had gastroplasty, or were admitted directly to the operating theatre. As a consequence, 664 patients were included, of which 143 did not have surgery during hospital stay; therefore 521 subjects remained for analysis (Figure 2).

Medical and demographic characteristics of the sample studied are listed in Table 1. Patients who had prolonged fasting periods had a higher percentage of cancer, diabetes, and chronic obstructive pulmonary disease. According to the classification of nutritional status by body mass index (BMI), there are more undernourished, overweight, and obese patients in the group that did not have prolonged fasting, while patients with prolonged fasting are more eutrophic. Patients with prolonged fasting were usually from digestive tract or colorectal surgeries, were more often admitted to intensive care, and had more surgical postoperative complications.

Postoperative fasting and incidence of infection and prolonged hospital stay

Table 2 presents the incidence of infection (%) according to each of the variables of exposure studied. In a univariate analysis, the endpoint infection was significantly associated to the variables: prolonged postoperative fasting (OR=8.4; CI95%: 3.87 – 18.75), large surgery, advanced age, undernourishment, contaminated surgery, and postoperative complications, with OR ranging from 6.76 to 1.50 (3rd column on Table 2). After adjusting for those variables by means of multivariate analysis, we verified that the risk for infection in patients in prolonged fasting was 2.88 times higher (CI95%: 1.17 – 7.16). All variables included in the model, except cancer, contributed to a higher risk for infections with OR varying from 4.26 to 1.20 (5th column in Table 2).

Table 3 depicts the incidence of prolonged hospital stay (%) according to the variables of exposure studied. In univariate analysis the endpoint prolonged hospital stay was significantly associated to the variables: prolonged postoperative fasting (OR=8.22; CI95%:3.68 – 20.21), large surgery, cancer, diabetes, chronic obstructive pulmonary disease, and postoperative complications, with OR ranging from 3.26 to 1.78

(3rd column in Table 3). After adjusting for these variables by means of multivariate analysis, we verified that the risk for prolonged hospital stay in patients with prolonged fasting was 4.43 times higher (CI95%: 1.73 – 11.35). All variables included in the model, except undernourishment and contaminated surgery, contributed to a risk for prolonged hospital stay with OR varying from 2.08 to 1.00 (5th column in Table 3).

Discussion

Adult surgical patients in the hospital present high levels of undernourishment and are subject to higher risk for postoperative complications and therefore to negative in-hospital outcomes [4.6].

Pre and postoperative fasting instituted more than 50 years ago has been questioned for the last decade. Some authors have verified that reducing the preoperative fasting period may improve post-surgical outcomes of adult patients [23-25].

The present study demonstrated that surgical patients on prolonged postoperative fasting, longer than 5 days, had higher risk for infection, the other confounding variables being adjusted. The factors also significantly associated to infection in our study were large surgeries, contaminated surgeries, and the presence of surgical postoperative complications. Likewise, in a review study, risk factors for surgical complication (wound deheiscence) were infection and obesity [28], and in the study by Poveda et al., the size of the surgery was also associated to infection [29].

The patients who were under prolonged fasting also presented higher risk for prolonged hospital stay, even after adjusting for the other variables. Postoperative complication was also significantly associated to prolonged stay, likewise, in a

retrospective cohort study, the patients submitted to colorectal laparoscopy presented less complications and shorter length of stay [30].

Such findings confirm the need for early nutritional intervention in the postoperative period to minimize the occurrence of such outcomes [31].

A study conducted in elderly surgical patients demonstrated that the implementation of a protocol reducing preoperative fasting from 15 to 4 hours and postoperative food introduction in up to 5 days lead to a decrease in the number of days in the hospital, as well as in infection rates [25].

Other authors have also described the association between receiving early and sufficient nutritional intervention (60% of target in proteins and calories) to a reduction in length of stay, as well as hospital costs, in adult surgical patients [32.33].

In this study we observed that prolonged postoperative fasting is more frequent among digestive tract surgery and colorectal surgery patients. This practice, traditionally adopted, is based on the fear of causing postoperative complications if feeding begins before the return of intestinal function [34]. A review of 15 studies comparing 1,352 patients of elective colorectal surgery concluded that early feeding was safe. The complication rate was 12.5% in 935 patients fed early, with no increase in the risk for leaks, aspiration pneumonia or bowel obstruction [35].

This gap in the literature on the effects of fasting over clinical outcomes may be elucidated by this study, were we could demonstrate that prolonged fasting is significantly associated to infection and prolonged hospital stay.

Even so, clinical practice demands randomized controlled studies, evidence based, for effective evaluation on the effects of calorie and energy deficits over medical outcomes. The poor methodological quality in the perioperative nutritional intervention studies is a result of ethical dilemmas, and the inexistence of randomization, control

group, and convenience sample, may be considered as a limitation for this study that might have lead to the inclusion of different types of patients.

Conclusion

The incidence of prolonged postoperative fasting was high and represented an independent risk factor, after adjusting for confounding variables, for infection as well as prolonged hospital stay.

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Table 1. Sample demographic and clinical characteristics

Clinical variables	All	Prolonged fasting		P
		No	Yes	
	(n=521)	(n=492)	(n=29)	
Age in years	60.0 ± 13	59.9 ± 13	62.5 ± 13	0.28
Gender (male)	324 (62.2)	304 (61.8)	20 (69)	0.43
Schooling (years of school)				0.74
None	41 (7.9)	39 (7.9)	2 (6.9)	
Up to 8 years	380 (72.9)	359 (73)	21 (72.4)	
More than 8 years	100 (19.2)	94 (19.1)	6 (20.7)	
Clinical comorbidities				
Cancer	315 (60.5)	291 (59.1)	24 (82.8)	0.01
Diabetes	72 (13.8)	63 (12.8)	9 (31)	0.006
Ischemic Heart Disease	31 (6)	30 (6.1)	1 (3.4)	0.55
COPD	19 (3.6)	16 (3.3)	3 (10.3)	0.04
Heart failure	11 (2.1)	11 (2.2)	-	0.41
Kidney disease	11 (2.1)	10 (2)	1 (3.4)	0.6
AIDS	9 (1.7)	9 (1.8)	-	0.46
BMI				0.002
Undernourished	22 (4.2)	22 (4.5)	-	
Eutrophic	210 (40.3)	189 (38.4)	21 (72.4)	
Overweight	182 (34.9)	175 (35.6)	7 (24.1)	
Obesity	107 (20.5)	106 (21.5)	1 (3.4)	
SNA				0.24
Nourished	447 (86)	425 (86.6)	22 (75.9)	
Moderately undernourished	56 (10.8)	51 (10.4)	5 (17.2)	
Severely undernourished	17 (3.3)	15 (3.1)	2 (6.9)	
Weight (kg)	73.6 ± 15.3	73.9 ± 15	68.3 ± 13.5	0.057
Lean mass (Kg)	48.5 ± 13	48.6 ±13	47 ± 12	0.51
Specialty				<0.001
Urology	188 (36.1)	187 (38)	1 (3.4)	
Digestive tract	104 (20)	84 (17.1)	20 (69)	
Colorectal	81 (15.5)	76 (15.4)	5 (17.2)	
Others	148 (28.4)	145 (29.5)	3 (10.3)	
ICU admission	46 (8.8)	35 (7.1)	11 (37.9)	<0.001
Surgical postoperative complication	104 (20)	83 (16.9)	21 (72.4)	<0.001

Values expressed as mean ± standard deviation or n (%). COPD – Chronic obstructive pulmonary disease, AIDS – Acquired Immune Deficiency Syndrome, BMI – Body Mass Index, SNA – Subjective Nutritional Assessment, Kg – Kilograms, ICU – Intensive Care Unit.

Table 2. Crude and adjusted odds ratio for the variables of conceptual model exposure for the endpoint infection.

		Infection			
Variable	%	Crude OR (CI 95%)	P	Adjusted RO (CI 95%)	P
Fasting > 5 days					
Yes	58.6	8.4 (3.87 – 18.75)	<0.001	2.88 (1.17 – 7.16)	0.02
No	14.4	1.0		1.0	
Surgery size					
> 3 hours	28.3	4.14 (2.13 -8.58)	<0.001	2.66 (1.20 – 6.20)	0.01
1h31 to 3 hours	14.3	1.75 (0.89 – 3.64)	0.11	1.89 (0.88 – 4.28)	0.10
Up to 1h30	8.7	1.0		1.0	
Elderly					
Yes	19.3	1.50 (0.94 – 2.44)	0.09	1.20 (0.70 – 2.08)	0.49
No	13.7	1.0		1.0	
Cancer					
Yes	19.7	1.69 (1.04 – 2.82)	0.03	0.75 (0.41 – 1.38)	0.36
No	12.6	1.0		1.0	
SNA at admission					
Undernourished	35.3	3.14 (1.05 – 8.57)	0.02	2.24 (0.57 – 8.15)	0.22
Moderately undernourished	28.6	2.30 (1.19 – 4.29)	0.01	1.22 (0.53 – 2.69)	0.62
Well nourished	14.8	1.0		1.0	
Potential contamination					
Contaminated	30.0	4.67 (1.85 – 11.1)	0.001	3.41 (1.21 – 9.14)	0.01
Potentially contaminated	25.8	3.79 (2.27 – 6.51)	<0.001	2.29 (1.27 – 4.18)	0.006
Clean	8.4	1.0		1.0	
PO contamination					

Yes	43.7	6.76 (4.10 – 11.2)	<0.001	4.26 (2.44 – 7.44)	<0.001
No	10.3	1.0		1.0	

SNA – Subjective Nutritional Assessment , PO – postoperative.

Table 3. Crude and adjusted odds ratio for the variables of conceptual model exposure for the endpoint prolonged length of stay.

Prolonged length of stay					
Variable	%	Crude OR (CI 95%)	P	Adjusted OR (CI 95%)	P
Fasting > 5 days					
Yes	72.4	8.22 (3.68 – 20.2)	<0.001	4.43 (1.73 – 11.3)	0.002
No	24.2	1.0		1.0	
Surgery size					
> 3 hours	41.4	2.08 (1.26 – 3.46)	0.004	1.50 (0.83 – 2.69)	0.17
1h31 to 3 hours	18.2	0.65 (0.39 – 1.09)	0.10	0.55 (0.31 – 0.95)	0.03
Up to 1h30	25.4	1.0		1.0	
Cancer					
Yes	29.8	1.47 (0.98 – 2.23)	0.05	1.14 (0.70 – 1.85)	0.57
No	22.3	1.0		1.0	
Diabetes					
Yes	37.5	1.78 (1.04 – 2.99)	0.02	1.67 (0.89 – 3.11)	0.10
No	25.2	1.0		1.0	
COPD					
Yes	47.4	2.54 (0.99 – 6.45)	0.04	1.44 (0.53 – 3.90)	0.47
No	26.1	1.0		1.0	
SNA admission					
Undernourished	29.4	1.21 (0.38 – 3.35)	0.71	0.74 (0.22 – 2.44)	0.62
Moderately undernourished	37.5	1.75 (0.96 – 3.11)	0.05	1.30 (0.65 – 2.60)	0.44
Well nourished	25.5	1.0		1.0	
Contamination potential					

Contaminated	26.7	1.19 (0.47 – 2.71)	0.68	0.76 (0.30 – 1.91)	0.56
Potentially contaminated	31.3	1.49 (1.0 – 2.23)	0.04	0.81 (0.50 – 1.30)	0.39
Clean	23.4	1.0		1.0	
PO complication					
Yes	47.6	3.26 (2.07 – 5.12)	<0.001	2.08 (1.21 – 3.57)	0.007
No	21.8	1.0		1.0	
Age	----	1.01 (0.99 – 1.02)	0.19	1.00 (0.98 – 1.01)	0.84

COPD – Chronic obstructive pulmonary disease; SNA – Subjective Nutritional Assessment; PO – postoperative.

1) Baseline – Pre operative

Demographic and socio economic variables: age, gender, schooling.

Comorbidity variables, type of disease, and nutritional status: presence of comorbidities (diabetes, arterial hypertension, congestive heart failure, and chronic obstructive pulmonary disease), diagnosis of cancer at admission, weight, height, subjective nutritional assessment, and body composition (anthropometry and bioimpedance).

Variables at admission: preoperative length of stay, type of diet, number of hours of fasting.

2) Intermediate phase – Trans-operative

Variables of surgery characteristics: surgery performed, type of anesthesia, potential for contamination, ASA, surgery size.

3) Final phase – Postoperative

Variables during hospital stay: postoperative length of stay, type of diet, days of fasting.

Variables of nutritional status: weight, height, subjective nutritional assessment, body composition (anthropometry and bioimpedance).

Variables on surgical complications: anastomotic deheiscence or surgical site infection, reoperation, clinical deterioration.

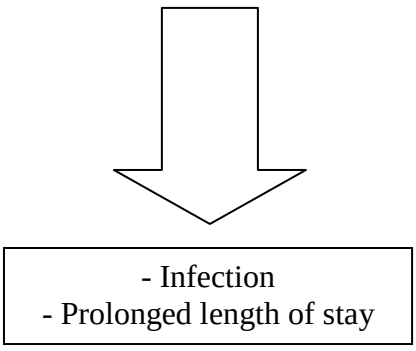

Figure 1. Conceptual model

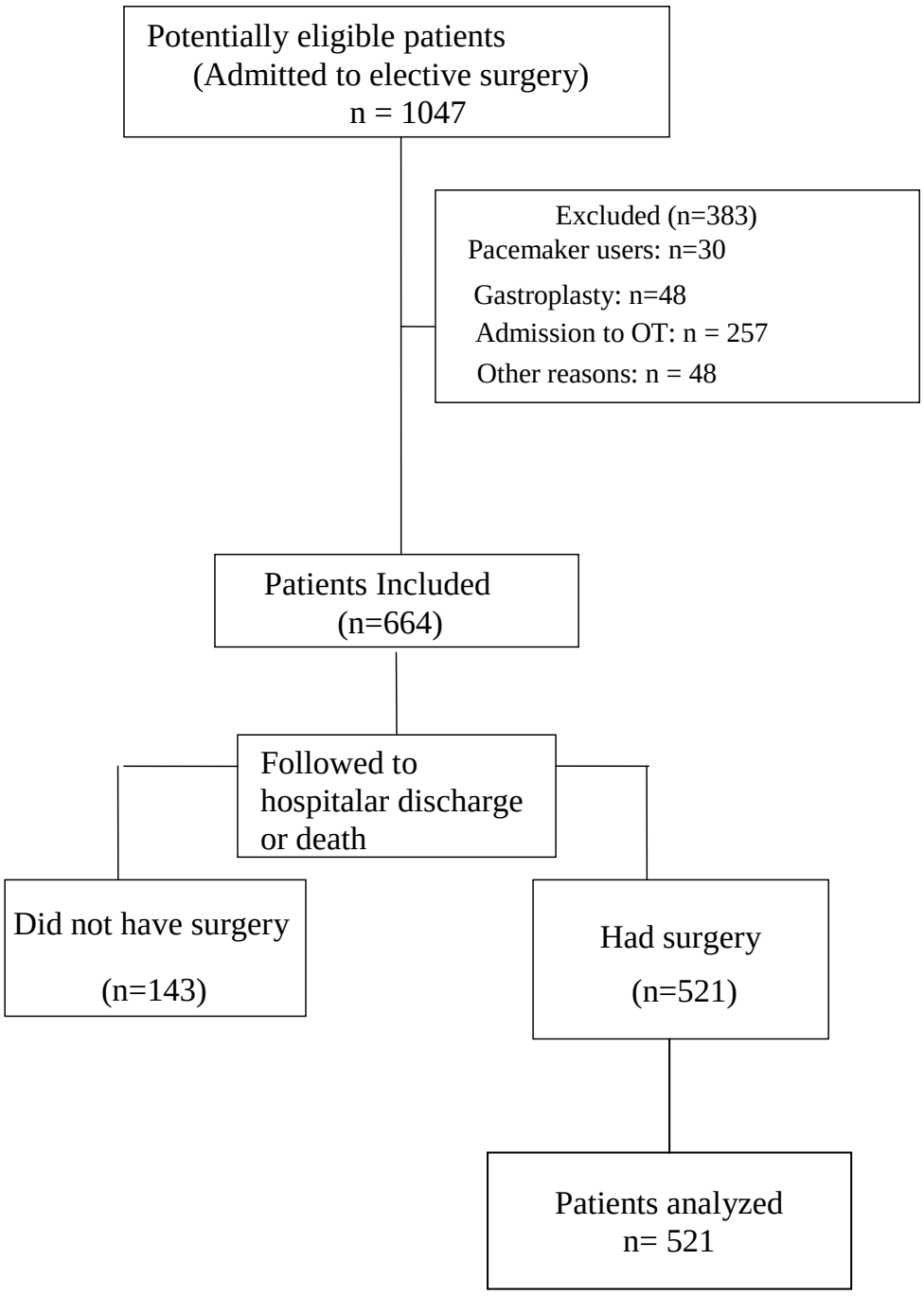

Figure 2. Study algorithm

OT- operating theater

6.2 Decreased calorie and protein intake is a risk factor for infection and prolonged length of stay in surgical patients: a prospective cohort study

Short title: Calorie and protein intake in surgical patients

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Abbreviation list

Nutritional therapy: NT

Hospital de Clínicas de Porto Alegre: HCPA

Abstract

Background: Cross-sectional studies have shown that decreased calorie and protein intake is a risk factor for mortality. Objectives: To assess the effect of nutritional therapy on infection risk and prolonged length of stay. Methods: Prospective cohort study, approved by the institutional Research Ethics Committee. The sample consisted of adult patients undergoing elective surgery. Nutritional status was assessed upon admission and every seven days until hospital discharge or death. Demographic and clinical data, as well as information regarding independent and outcome variables, were collected from patient report forms. Dietary intake assessment was conducted by researchers six times a week, using instruments developed for the study. Nutritional therapy was considered adequate if dietary intake was equal to or greater than 75% of the prescribed amount, and length of stay was considered prolonged when patients remained in the hospital for at least one day longer than the average stay for each type of surgery. Data was analyzed using logistic multivariate regression. Results: Of the 519 patients analyzed, 16.2% had adequate nutritional therapy. Most of these patients were men with ischemic heart disease and acquired immunodeficiency syndrome. After adjusting for confounding variables, adequate nutritional therapy reduced infection risks by 36% (OR=0.36; 95%CI: 0.15-0.76) and reduced the rates of prolonged hospital length of stay by 46% (OR=0.46; 95%CI: 0.25-0.84). Conclusion: Although most patients did not have adequate nutritional therapy, those under adequate nutritional therapy had reduced infection rates and were less likely to have prolonged hospital length of stay.

Keywords: Nutrition Therapy, Surgery, Infection, Length of Stay.

Introduction

Malnutrition can be defined as a "cellular imbalance between supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions"[1]. The prevalence of malnutrition is high in the hospital setting, with rates sometimes estimated to be as high as 50% in hospitalized adults[2].

Nutritional depletion in hospitalized patients can be caused by the combination of many different factors, such as the underlying disease, comorbidities, ingestion difficulties, medication side effects, physical inactivity[3,4] and a lack of focus on nutritional therapy (NT) by health care workers[5,6].

One of the most important factors in the etiology of malnutrition is suboptimal dietary intake during hospitalization[7]. Although adequate dietary intake is essential for the clinical management of malnutrition, Kowanko et al.[8] found that over one third of patients in acute care consume less than 50% of the calories provided in a standard hospital diet. In a recent study, Bauer et al. (2011)[9] also found that approximately 50% of patients reported to eating half or less of their meals, and these patients were four times more likely to be malnourished than patients who ate more than half of the meals offered.

Some possible consequences of hospital malnutrition are prolonged hospital stays, increased mortality rates and an increased risk of complications such as hospital infections, falls and wound healing problems[1,10,11].

Although NT is essential for the effective treatment of malnourished patients[18], Hiesmayr et al. (2009)[13] studied a European population and found that decreased dietary intake was an independent risk factor for mortality. However, this was a one-day cross sectional study, and did not assess long term outcomes.

Given the importance of NT in treating hospital malnutrition, the present study aimed to assess the effect of NT on infection risk and length of hospital stay in a prospective cohort of patients undergoing elective surgery.

JUSTIFICATION

There are scarce of studies of the effect of NT on hospital outcomes, so the present study aimed to assess a cohort of patients undergoing elective surgery in a university hospital, investigating the impact of NT on infection risk and length of hospital stay.

Methods

Study design

An observational prospective cohort study was conducted in a tertiary university hospital. Written informed consent was provided by each participant, and the study was approved by the university Research Ethics Committee under protocol number 110307.

Study population

Patients undergoing elective digestive, general, ophthalmological, ear-nose-throat, proctological, thoracic, urological and vascular surgery were recruited between August 1st, 2011 and October 25th, 2012 from the Hospital de Clínicas de Porto Alegre (HCPA), in the state of Rio Grande do Sul in Southern Brazil. Eligible patients were identified through the hospital's electronic database. Exclusion criteria consisted of: not being in a condition to undergo nutritional assessment, post-surgical admission into the minimal care unit or the intensive care unit, predicted hospital stays of less than 72 hours, admission for diagnostic exams only and no surgical procedures during hospitalization. Participants were recruited by convenience sampling (according to the availability of the research during the research period). Nutritional state and adherence to NT were not assessed in patients transferred to the intensive care unit (ICU) after inclusion in the study, but upon leaving the ICU, patients were followed-up and assessed until hospital discharge.

Data collection and variables of interest

Data was collected from computerized patient records in the HCPA. Demographic and clinical data, as well as information related to the variables of interest and patient outcomes were prospectively collected starting at hospital admission or up to 48 hours before surgery, until hospital discharge or death. Data regarding clinical characteristics, surgical complications and hospital infection was collected daily from (paper and electronic) patient report forms. The trained researchers who conducted the present study assessed the patients' dietary intake through nutritional interviews. Nutritional interviews during the hospital stay were conducted daily, from Monday to Friday, except for holidays. Patients responded to the interview by themselves or with the help of the researcher. The interview consisted of standardized questions formulated for the study, regarding patients' dietary intake in the previous day, percentage of food consumed in hospital meals (less than 25%, 25%, 50%, 75% or 100%), and consumption of food from outside the hospital. Information about the enteral and parenteral diet (when applicable) prescribed for each patient were obtained from (electronic and paper) patient report forms.

After inclusion in the study, patients underwent nutritional assessments involving measurements of height and weight, arm and calf circumference, triceps skinfold thickness and bioelectrical impedance to assess body composition (fat and lean mass). Nutritional state was classified according to World Health Organization criteria for body mass index (BMI), which involves a different categorization system for adult and elderly patients (over 60 years old). This assessment protocol was repeated every 7 days.

Hospital infections were identified through electronic notifications sent to the Hospital Infection Control Committee. The length of hospital stay (in days) was also

investigated. The length of hospitalization was considered prolonged when patients remained in the hospital for at least one day longer than the mean length of postoperative hospitalization for each type of surgery. The independent variable of interest was the NT received by patients, considered in terms of its calorie and protein content. NT was considered adequate when the patient consumed at least 75% of the calories and proteins prescribed. Covariates consisted of age, subjective nutritional assessment, BMI upon hospital admission, surgery size, surgery contamination risk, postoperative complications and cancer.

Statistical analysis

The statistical analysis was done using PASW version 18. Continuous variables with normal distribution were expressed as mean ± standard deviation, and categorical data were expressed as absolute figures or percentages. Comparisons between groups were performed using the chi-square test and Fisher's exact test for categorical variables and Student t-test or Wilcoxon test for continuous variables. Multivariate analysis used a logistic regression model to calculate the odds ratio and adjusted for confounding factors. A two-sided P value less than 0.05 was considered statistically significant. The variables in the logistic regression model were selected from a univariate analysis, considering $p<0.20$.

Results

Patient characteristics

A total of 1074 potentially eligible patients were identified for the study. Of these patients, 383 did not meet eligibility criteria and were excluded for wearing pacemakers (n=30) [and being therefore ineligible for bioelectrical impedance], undergoing gastroplasty (n=48), being directly admitted into the surgical ICU (n=257), among other reasons (n=48). A total of 664 patients were included in the study, and since 143 did not undergo surgery and 2 could not undergo dietary assessment, the final sample was composed of 519 patients.

Clinical and demographic characteristics of the sample are displayed in Table 1. Patients with adequate calorie consumption were mostly male and had a higher incidence of ischemic heart disease and acquired immunodeficiency syndrome. There were no significant group differences on nutritional state, type of surgery, ICU admissions and postoperative complications.

Calorie and protein intake

Out of the 519 patients assessed, the mean amount of calories and proteins prescribed and consumed was higher in patients who received adequate NT (consumed more than 75% of the amount prescribed) [Table 2].

Most patients received oral feeding, while 10.4% received enteral nutrition, 6.0% received both oral and enteral nutrition, and 0.8% received parenteral nutrition. No significant relationships were found between the number of patients consuming more than 75% of the prescribed calories and proteins and the different routes of feeding.

Calorie and protein intake and its association to infection and prolonged length of stay

The univariate analysis (Table 3) suggested that infection rates were lower in patients who consumed more than 75% of the calories and proteins prescribed (OR=0,37; 95%CI: 0.16-0.73). However, infection rates were higher in patients undergoing major (OR=4,14; CI95%: 2.13-8.58) or contaminated surgery (OR=4.07; 95%CI: 1.85-11.1), in patients who were malnourished (OR=3.14; 95%CI: 1.05-8.57), had cancer (OR=1.69; 95%CI: 1.04-2.82) or presented postoperative complications (OR=6.76; 95%CI: 4.10-11.2). A univariate analysis also found that the rate of prolonged length of stay (Table 4) was higher in patients undergoing major (OR=2.08; 95%CI: 1.26–3.46) or contaminated surgery (OR=1.49; 95%CI: 1.0–2.23), patients who had diabetes (OR=1.78; 95%CI: 1.04–2.99) and chronic obstructive pulmonary disease (OR=2.54; 95%CI: 0.99–6.45) and individuals who presented postoperative complications (OR=3.26; 95%CI: 2.07-5.12). However, lower rates of prolonged length of stay were found in patients who consumed more than 75% of the calories and proteins prescribed (OR=0.51; 95%CI: 0.28-0.88).

A multivariate analysis showed that the consumption of more than 75% of the prescribed calories and proteins had a protective effect on infection risk, decreasing it by as much as 36% (OR=0.36; 95%CI: 0.15-0.76) (Figure 1A). A multivariate analysis also found that major (OR=2.93; 95%CI: 1.44-6.20), medium-sized (OR=2.21; 95%CI: 1,13-4,51) and potentially contaminated surgery (OR=2.19; 95%CI: 1,32-3,66), as well as postoperative complications, significantly increased infection risk (Figure 1A).

Multivariate analyses showed that consuming over 75% of the prescribed calories and proteins was a protective factor against prolonged hospital length of stay,

reducing the probability of prolonged hospitalization by 46% (OR=0.46; 95%CI: 0.25-0.84) [Figure 1B]. The multivariate analysis also showed that the risk of prolonged length of stay in patients who underwent major surgeries and had postoperative complications was 2.4 (95%CI: 1.4-4.3) and 3.1 (95%CI: 1.85-5.02) times higher, respectively, than in patients not exposed to these factors (Figure 1B).

Discussion

The present prospective cohort study aimed to analyze the NT offered to patients hospitalized for elective surgery, and to assess whether decreased calorie and protein intake during hospitalization, among other factors, is associated with an increase in the risk of specific hospitalization outcomes. Most (83.3%) patients in the study consumed less than 75% of the prescribed calories and proteins, and only 16.2% had an adequate calorie-protein intake. A retrospective study[14] found that only 25% of patients consumed enough calories and proteins by the fourth day of hospitalization. In a 10-year comparative prospective study of hospitals in Switzerland, the authors found that the proportion of undernourished patients remained unchanged (69 vs. 70%) after the implementation of a nutritional program[15].

The mean calorie and protein intake by patients with inadequate NT was less than half (48%) the prescribed amount. Similar results were obtained in a study by Hiesmayr et al.[13], who found that 64% (n=3673) of patients consumed less than half of their meals, and in the Nutrition Care Day study[7], which found that 90% of patients consumed ≤50% of their meals.

Patients with adequate calorie-protein intake (over 75% of the prescribed amount) had a decreased risk of certain unfavorable outcomes, such as a 36% reduction in infection risk and 46% reduction in the probability of prolonged length of stay, after adjusting for confounding variables. The study by Hiesmayr et al.[13] also found that reduced food consumption was an independent risk factor for mortality during hospitalization. On the other hand, increased calorie and protein intake led to improved quality of life in a randomized study comparing two groups of patients under nutritional risk[16].

The rate of infection in surgery patients at a university hospital was estimated to be 6% by Medeiros et al.[17]. However, the infection rates found in the present study (22.1%) was similar to that obtained (23.6%) in a study by Villas Boas and Ruiz[18]. The present study also found that the risk of infection was 2.9 times higher in patients who underwent major surgery. A Brazilian study[19] has found that improved pain control and reduced surgical trauma contribute to reduced hospital length of stay after major thoracic surgery, and, in agreement with present findings, suggested that the risk of prolonged hospitalization after major surgery was 2.4 times higher than after other types of surgery. Other studies have also suggested that the risk of prolonged hospitalization is 3.1 times higher in patients with postoperative surgical complications (fistula, evisceration and surgical wound dehiscence)[20,21].

Some authors[22,23] have also found associations between malnutrition, moderate or severe nutritional risk and prolonged length of stay. However, in the present study, nutritional state was not associated with prolonged length of stay or infection rates after adjusting for confounding variables.

The present study is distinct from others in the literature in that NT was considered adequate when calorie and protein intake was at least 75% of the prescribed amount, while other studies generally consider nutritional needs and total energy expenditure[24]. However, since analyses in the present study were adjusted for comorbidities and clinical characteristics, this classification did not influence results.

Decreased calorie and protein intake was observed regardless of the route of feeding (oral, enteral or parenteral). These results were corroborated by other study[25] which have found that enteral feeding does not ensure that caloric needs are met, especially in patients undergoing intensive therapy[26]. Parenteral nutrition may be better

able to meet caloric needs[27], but this could not be verified in the present study, as few patients (0.8%) were fed through this route.

The taste of hospital food, limited meal choices and meals served too early were some of the reasons cited by patients for the decreased calorie and protein intake while in the hospital. Disease or treatment factors did not appear to influence calorie intake[24]. The present study did not aim to assess the causes for the reduced food intake, as there is significant variability in the duration of pre and post-operative fasting between the surgical specialties. Furthermore, recent practices such as decreasing the length of fasting and providing preoperative dietary counseling[28,29] have not yet been implemented in the Brazilian health system. Studies of the Enhanced Recovery After Surgery (ERAS) pathway show that these practices can help reduce hospital lengths of stay after abdominal surgery by as much as 25% with no adverse effects[30].

The prospective study design ensured that data regarding both independent and outcome variables were collected. While convenience sampling may have led to selection bias, the inclusion of patients in different stages of disease and treatment may have led to a representative assessment of patients undergoing surgery in the hospital studied. Other possible limitations may have been that patients received different diets, and that the consumption of food from outside the hospital was not taken into account, which may have led to an underestimation of patients' calorie and protein intake.

Even in light of these limitations, the present study was successful in assessing the effects of hospital NT on hospitalization outcome, and found that adequate NT (consumption of >75% of prescribed nutrients) has a protective effect over infection rates and prolonged length of hospital stays.

Conclusion

Although most patients did not have an adequate calorie and protein intake, those under adequate NT had a reduced risk of infection and were less likely to have prolonged length of hospital stays. These findings suggest that efforts must be made to ensure that patients receive and consume sufficient calories and proteins during hospitalization.

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Table 1. Clinical and demographic sample characteristics

Clinical Variables	Total sample (n=519)	Consumed more than 75% of the diet prescribed		P
		Yes (n=84)	No (n=435)	
Age, years	60.0 ± 13	60.1 ± 12	60.0 ± 13	0.95
Sex (male)	323 (62.2)	65 (77.4)	252 (59.3)	0.002
Education (years of schooling)				0.80
None	41 (7.9)	7 (8.3)	34 (7.8)	
Less than 8 years	378 (72.8)	63 (75.0)	315 (72.4)	
More than 8 years	100 (19.3)	14 (16.7)	86 (19.8)	
Clinical Comorbidities				
Cancer	315 (60.7)	49 (58.3)	266 (61.1)	0.62
Diabetes	72 (13.9)	9 (10.7)	63 (14.5)	0.36
Ischemic Heart Disease	30 (5.8)	10 (11.9)	20 (4.6)	0.009
COPD	19 (3.7)	3 (3.6)	16 (3.7)	0.96
Heart Failure	11 (2.1)	2 (2.4)	9 (2.1)	0.85
Renal disease	10 (1.9)	-	10 (2.3)	0.16
AIDS	9 (1.7)	5 (6.0)	4 (0.9)	0.001
BMI				0.93
Malnourished	22 (4.2)	3 (3.6)	19 (4.4)	
Eutrophic	209 (40.3)	32 (38.1)	177 (40.7)	
Overweight	181 (34.9)	30 (35.7)	151 (34.7)	
Obese	107 (20.6)	19 (22.6)	88 (20.2)	
SNA				0.72
Well nourished	445 (85.9)	74 (88.1)	371 (85.5)	

Moderately malnourished	56 (10.8)	7 (8.3)	49 (11.3)	
Severely malnourished	17 (3.3)	3 (3.6)	14 (3.2)	
Weight (kg)	73.6 ± 15.4	74.5 ± 14.9	73.5 ± 15.5	0.58
Lean mass (kg)	48.5 ± 12.8	49.7 ± 12.6	48.3 ± 12.9	0.35
Type of surgery				0.08
Urologic	187 (36.0)	39 (46.4)	148 (34.0)	
Digestive	104 (20)	12 (14.3)	92 (21.1)	
Proctological	81 (15.6)	10 (11.9)	71 (16.3)	
General surgery	46 (8.9)	3 (3.6)	43 (9.9)	
Thoracic	36 (6.9)	7 (8.3)	29 (6.7)	
Other	65 (12.5)	13 (15.5)	52 (12.0)	
ICU admission	46 (8.9)	5 (6.0)	41 (9.4)	0.30
Postoperative surgical complications	104 (20.0)	16 (19.0)	88 (20.2)	0.80

Values presented as mean ± standard deviation or n (%) COPD - Chronic Obstructive Pulmonary Disease; AIDS - Acquired Immunodeficiency Syndrome; BMI - Body Mass Index; SNA - Subjective Nutritional Assessment; Kg - Kilograms; ICU - Intensive Care Unit

Table 2. Calories and proteins prescribed and consumed among patients who did and did not receive adequate nutritional therapy.

		Adequate nutritional therapy		p
	Total sample (n=519)	Yes (n=84)	No (n=435)	
Cal prescribed/day	1620 ± 537	1786 ± 495	1587 ± 540	0.002
Cal intake/day	875 ± 494	1484 ± 476	758 ± 404	0.001
Prot. prescribed (g/day)	61 ± 21	68 ± 19	59 ± 21	0.001
Prot. intake (g/day)	33 ± 19	56 ± 16	28 ± 15	0.001

Cal - calories; prot - protein.

Table 3. Infection rates and crude odds ratio in patients grouped according to the presence of clinical features.

Features	Incidence of infection		OR (95%CI)
	feature present	feature absent	
Cal. and prot. intake > 75%	10.7%	24.4%	0.37 (0.16-0.73)
Major surgery	28.3%	14.3%	4.14 (2.13-8.58)
Elderly	19.3%	13.7%	1.50 (0.94-2.44)
Cancer	19.7%	12.6%	1.69 (1.04-2.82)
Malnutrition	35.3%	14.8%	3.14 (1.05-8.57)

Contaminated surgery	30.0%	8.4%	4.67 (1.85-11.1)
PO Complications	43.7%	10.3%	6.76 (4.10-11.2)

Cal - calories; prot - protein; PO - postoperative.

Table 4. Rates of prolonged hospitalization and crude adjusted odds ratio in patients grouped according to the presence of clinical features.

Features	Prolonged length of stay		OR (95%CI)
	feature present	feature absent	
Cal. and prot. intake > 75%	21.4%	34.5%	0.51 (0.28-0.88)
Major surgery	41.4%	25.4%	2.08 (1.26-3.46)
Diabetes	37.5%	25.2%	1.78 (1.04-2.99)
COPD	47.4%	26.1%	2.54 (0.99-6.45)
Contaminated surgery	31.3%	23.4%	1.49 (1.0-2.23)
PO Complications	47.6%	21.8%	3.26 (2.07-5.12)

Cal - calories; prot - protein; COPD - Chronic Obstructive Pulmonary Disease; PO - postoperative.

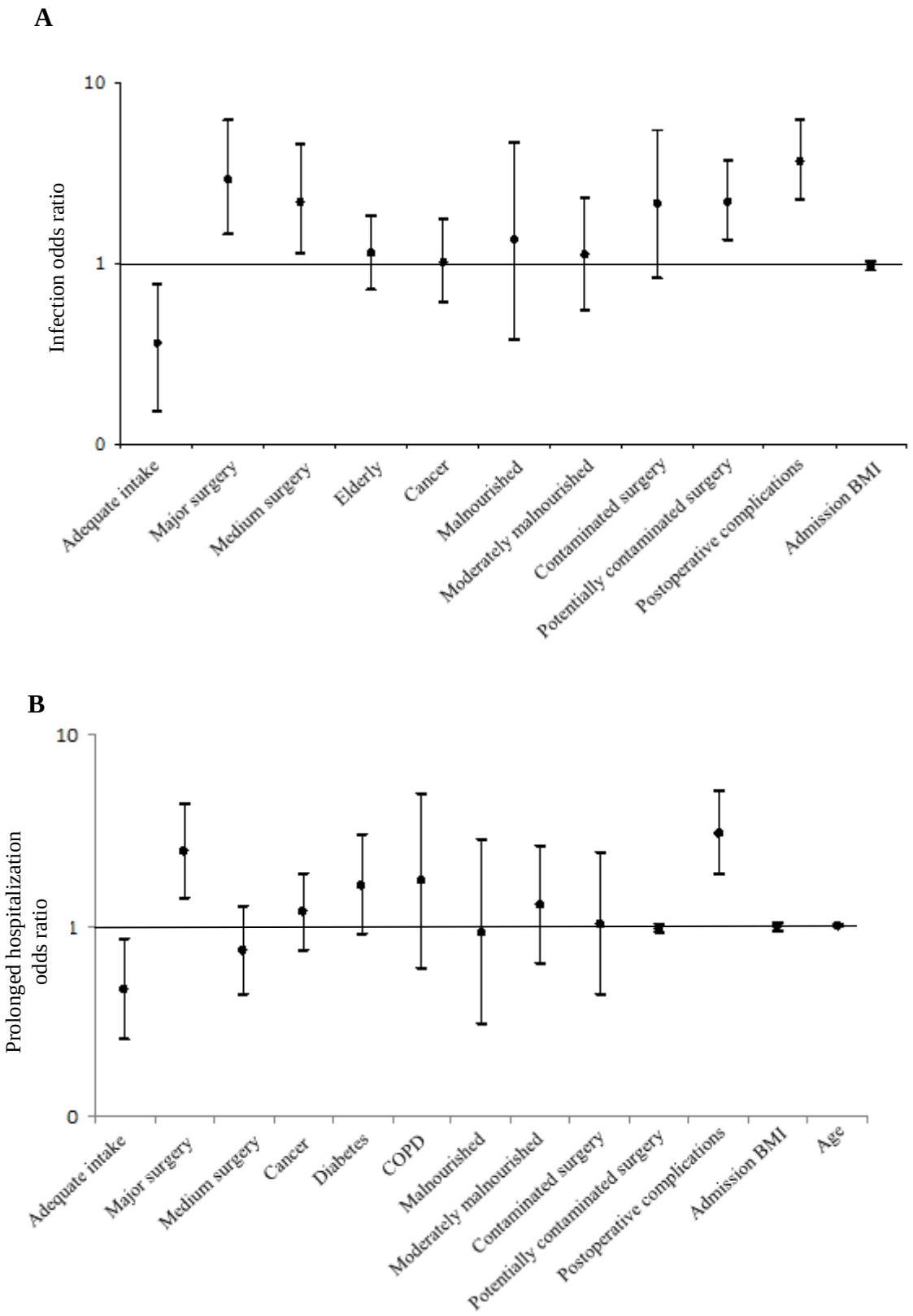


Figure 1. Adjusted multivariate odds ratio for infection outcome (**A**) and prolonged hospitalization (**B**).

Figure 1 legend

A:

BMI: body mass index

B:

COPD: Chronic Obstructive Pulmonary Disease

BMI: body mass index

7 Considerações finais

A avaliação e acompanhamento de pacientes submetidos à cirurgia eletiva possibilitou o estudo de como a TN é implementada no nosso meio. Também verificamos, entre os pacientes estudados, os fatores de risco para infecção e tempo de internação hospitalar prolongada.

Demonstramos que aspectos da TN em pacientes cirúrgicos, como jejum pós-operatório prolongado é fator de risco independente para infecção e tempo de internação hospitalar prolongada. Por outro lado, a adequada ingestão de calorias e proteínas foi fator de proteção para a ocorrência destes desfechos.

Este estudo reforça a importância da TN na evolução dos pacientes durante a hospitalização. Os achados podem auxiliar as equipes assistentes no manejo pós-operatório e visa sinalizar às equipes multiprofissionais que esforços devem ser implementados a fim de garantir adequada ingestão e oferta calórico-protéica nas instituições.

O estudo desta tese integra uma linha de pesquisa da Comissão de Suporte Nutricional e do Serviço de Nutrologia do Hospital de Clínicas de Porto Alegre, onde este grupo procura associar a pesquisa à assistência envolvendo uma equipe multidisciplinar e gerando novos conhecimentos para embasar o manejo da TN.

8 Apêndices

8.1 Ficha de avaliação e acompanhamento

Nome:			**Registro:**	**Leito:**
Idade:		**(M) (F)**	**Equipe médica:**	
Escolaridade:		**Data cirurgia:**		
Admissão:	**Inclusão:**	**Data do desfecho:**	**( ) Alta ( ) Óbito ( ) Nº de Dias**	
Motivo admissão:				
Internação na CTI nesta hospitalização		**(S) (N) Nº dias: ____**		

Índice Charlson			Complicações no pós operatório
(1) IAM	(1) DPOC	(3) D. fígado neo-mod	Sepse ( )
(1) Demência	(1) Úlcera péptica	(6) Tu metastático (6) SIDA	Reoperação ( )
(1) D. tec. Conjuntivo	(2) D. renal neo-mod		Outras:
(1) ICC	(2) Neoplasia	TOTAL: ( )	Descrever:
(1) DM s/ compl.	(2) DM c/ comp		
(1) D. cerebral vascular	(2) Leucemia		
(1) D. vasc. Perif.	(2) Hemiplegia		
(1) D. cronica fígado ou cirrose	(2) Linfoma		

Avaliação Admissão (1)	**Data:**	**Avaliação (2) - 7 dias após adm.**	**Data:**
PA(kg):	PU (Kg)	PA(kg):	PU (Kg)
Altura (cm):	AF:	Altura (cm):	AF:
IMC (kg/m^2):	Resistência (Ω):	IMC (kg/m^2):	% GC:
DCT:	Reactância (Ω):	DCT:	% MM:
CB:	% GC:	CB:	Resist(Ω):
CP:	% MM:	CP:	Reac(Ω):
CMB:	LC (litros):	CMB:	LC (litros):
TMB:		TMB:	
ANSG ( ) Nutrido		ANSG ( ) Nutrido	
( )Supeita/Moderada		( )Supeita/Moderada	
( )Desnutrição Grave		( )Desnutrição Grave	
Avaliação (3) - 14 dias após adm.	**Data:**	**Avaliação (4) - 21 dias após adm.**	**Data:**
PA(kg):	PU (Kg)	PA(kg):	PU (Kg)
Altura (cm):	AF:	Altura (cm):	AF:
IMC (kg/m^2):	Resistência (Ω):	IMC (kg/m^2):	Resist(Ω):
DCT:	Reactância (Ω):	DCT:	Reac(Ω):
CB:	% GC:	CB:	% GC:
CP:	% MM:	CP:	% MM:

CMB:	LC (litros):	CMB:	LC (litros):
TMB:		TMB:	
ANSG ( ) Nutrido		ANSG ( ) Nutrido	
( )Supeita/Moderada		( )Supeita/Moderada	
( )Desnutrição Grave		( )Desnutrição Grave	

Medicamentos	**Admissão**	**7 dias**	**14 dias**	**21 dias**

8.2 Ficha de avaliação da prescrição da terapia nutricional

Nome:____Prontuário:___________Nº:____

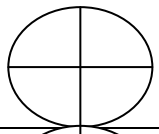
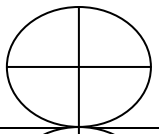
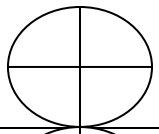
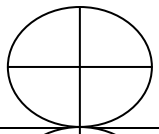
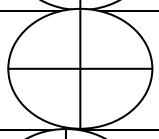
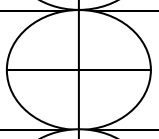
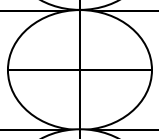
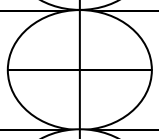
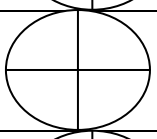
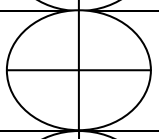
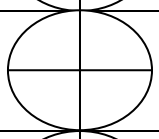
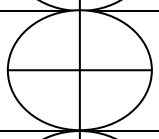
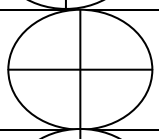
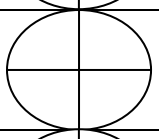
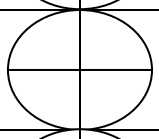
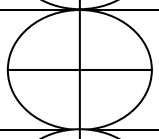
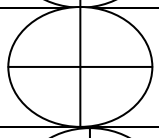
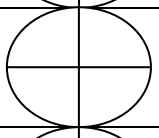
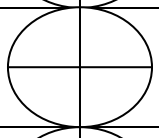
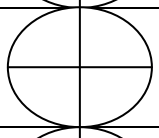
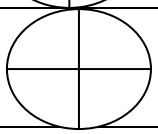
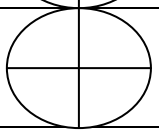
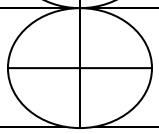
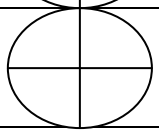
	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
TN	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP
Cal totais/dia				
gProt total/dia				

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
TN	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP
Cal totais/dia				
gProt total/dia				

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
TN	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP
Cal totais/dia				
gProt total/dia				

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
TN	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP	Via administração: (__) VO (__) NE (__) NP
Cal totais/dia				
gProt total/dia				

8.3 Ficha de avaliação da aceitação da terapia nutricional via oral Nº:_____
Nome:_____ Prontuário:_____

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
Café manhã				
Lanche manhã				
Almoço				
Lanche tarde				
Janta				
Ceia				

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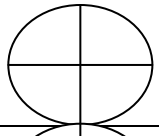
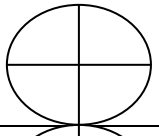
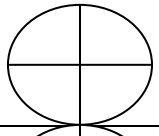
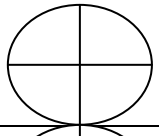
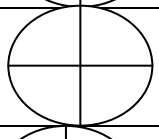
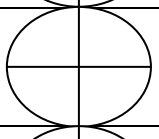
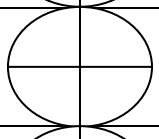
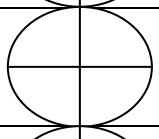
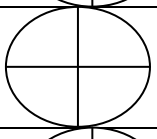
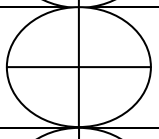
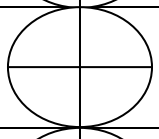
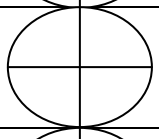
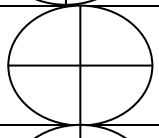
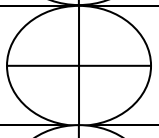
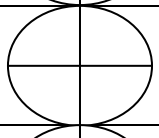
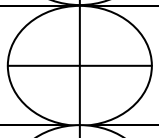
Café manhã				
Lanche manhã				
Almoço				
Lanche tarde				
Janta				
Ceia				

8.4 Ficha de avaliação da aceitação da terapia nutricional enteral Nº:_____

Nome:_____ Prontuário:_____

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
1ª NE				
2ª NE				
3ª NE				
4ª NE				
5ª NE				
6ª NE				
Total Volume Kcal e ptn				

	Data:__/__/____	Data:__/__/____	Data:__/__/____	Data:__/__/____
1ª NE				
2ª NE				
3ª NE				
4ª NE				
5ª NE				
6ª NE				
Total Volume Kcal e ptn				

9 Anexos

9.1 Termo de Consentimento Livre e Esclarecido

Você está sendo convidado(a) a participar da pesquisa: Terapia Nutricional e seu Impacto sobre Permanência Hospitalar e Infecção em uma coorte de pacientes cirúrgicos do HCPA. O objetivo é estudar quanto o uso da terapia nutricional pode contribuir para a diminuição do tempo de permanência e infecção durante a internação e melhora do estado nutricional. Dentre os benefícios deste estudo é avaliar se a oferta de terapia nutricional aos pacientes cirúrgicos internados no HCPA está adequada às suas necessidades nutricionais básicas e o impacto disso na recuperação pós-operatória, tempo de internação e no estado nutricional ao longo da hospitalização.

Os seguintes procedimentos serão realizados para medir esses parâmetros: 1) realização de bioimpedância elétrica no dia da internação hospitalar e a cada 7 dias; 2) avaliações antropométricas como peso, altura e dobras cutâneas no dia da internação hospitalar e a cada 7 dias; 3) responder um questionário com 5 perguntas sobre o seu estado de saúde no dia da internação hospitalar e a cada 7 dias; 4) consulta aos seus dados clínicos e demográficos no prontuário eletrônico e de papel diariamente. Estes procedimentos (descritos abaixo detalhadamente) não causam prejuízos à sua saúde, podem causar um desconforto mínimo, porém sem maiores riscos.

A avaliação da bioimpedância elétrica será realizada com o senhor(a) deitado(a) sobre uma superfície não metálica, com o leito e sua cabeceira paralelos ao solo, os braços afastados do tronco num ângulo de aproximadamente 30º e as pernas afastadas entre si num ângulo de aproximadamente 45º. Após será realizada uma limpeza da pele com gaze embebida em álcool, dois eletrodos serão fixados sobre a mão e dois sobre o pé do mesmo lado do corpo sobre a pele íntegra e com pelo menos 5 centímetros de afastamento entre si. Os eletrodos chamados distais serão posicionados sobre o meio da superfície dorsal da mão e do pé. Os eletrodos considerados proximais serão fixados medialmente em seu pé.

O seu peso corporal será obtido, utilizando-se a balança eletrônica com capacidade máxima de 300 kg e precisão de 50g. Para a verificação do peso, o senhor(a) será pesado vestindo o avental padrão do hospital, e descalço; permanecendo em pé, no centro da balança. Posteriormente será descontado o peso do avental.

A sua altura será verificada, utilizando-se estadiômetro, comprimento de 205cm e escala de precisão de 1cm. Para a obtenção da altura, o senhor(a) estará descalço com avental, permanecendo em pé sobre uma plataforma, com os pés unidos, com o peso igualmente distribuído em ambos os pés, os braços pendentes ao lado do corpo, colocando as superfícies posteriores dos calcanhares, as nádegas e a região occipital em contato com a escala de medida: a cabeça será posicionada de modo que a linha da visão fique perpendicular ao corpo.

A dobre cutânea triciptal será mensurada no ponto médio da parte superior do braço não dominante. Para a medição, o senhor(a) ficará com o braço paralelo ao tronco e relaxado. Segura-se então a prega formada pela

pele e pelo tecido adiposo com os dedos polegar e indicador da mão esquerda a 1cm do ponto marcado; a prega será pinçada com o adipômetro, exatamente, no local marcado e mantida entre os dedos até o término da aferição.

A circunferência braquial será efetuada no ponto médio, por uma fita métrica, estando o cotovelo flexionado a 90º. O ponto médio será marcado na parte lateral do braço, no qual foi posicionada a trena, com comprimento de 2cm, tolerância de, aproximadamente, 0,10mm e 1m , estando o braço estendido ao longo do corpo, com a palma da mão voltada para a coxa, tomando-se o devido cuidado para evitar compressão da pele ou folga.

O pesquisador irá tratar a sua identidade com padrões profissionais de sigilo. Os resultados do exame permanecerão confidenciais. Você não será identificado(a) em nenhuma publicação que possa resultar deste estudo.

Você será esclarecido(a) sobre a pesquisa em qualquer aspecto que desejar. Você é livre para recusar-se a participar, retirar seu consentimento ou interromper a participação a qualquer momento. A sua participação é voluntária e a recusa em participar não irá acarretar qualquer penalidade ou prejuízos na assistência prestada.

A participação no estudo não acarretará custos para você e não será disponível nenhuma compensação financeira adicional.

Eu, _____ fui informado(a) dos objetivos da pesquisa acima de maneira clara e detalhada e esclareci minhas dúvidas. Sei que em qualquer momento poderei solicitar novas informações e modificar minha decisão se assim o desejar. Em caso de dúvidas poderei chamar a pesquisadora responsável Drª Elza Daniel de Mello no telefone (51) 9955 0853 e/ou com a enfermeira Michelli Assis no telefone (51) 3359 8199 ou (51) 98035029 ou na sala 635, 6º andar do HCPA. Pode também entrar em contato diretamente com o Comitê de Ética em Pesquisa do Hospital de Clínicas de Porto Alegre localizado na Rua Ramiro Barcelos, nº2350, 2º andar, sala 2227, Fone: (51) 3359 8304, onde o projeto está registrado sob o número 11-0307.

Declaro que concordo em participar desse estudo. Recebi uma cópia deste termo de consentimento livre e esclarecido e me foi dada a oportunidade de ler e esclarecer as minhas dúvidas.

_____

Nome Assinatura do paciente/responsável Data

Grau de parentesco_____

_____

Nome Assinatura do pesquisador Data

Hospital de Clínicas de Porto Alegre

Grupo de Pesquisa e Pós-Graduação

9.2 Termo de Compromisso para Utilização de Dados

Título do Projeto

Terapia nutricional e seu impacto sobre estado nutricional permanência hospitalar, morte e infecção em uma coorte de pacientes cirúrgicos do HCPA	**Cadastro no GPPG 11-0307**

Os pesquisadores do presente projeto se comprometem a preservar a privacidade dos pacientes cujos dados serão coletados em prontuários e bases de dados do Hospital de Clínicas de Porto Alegre. Concordam, igualmente, que estas informações serão utilizadas única e exclusivamente para execução do presente projeto e que as informações somente poderão ser divulgadas de forma anônima.

Porto Alegre, 04 de agosto de 2011.

Nome dos Pesquisadores	**Assinatura**
Michelli Cristina Silva de Assis	
Carla Rosane de Moraes Silveira	
Elza Daniel de Mello	
Mariur Gomes Beghetto	

9.3 Avaliação Nutricional Subjetivo Global (ANSG)

A- HISTÓRIA

1. Peso

- Peso Habitual: Kg
- Perdeu peso nos últimos 6 meses: ( ) Sim ( ) Não
- Quantidade perdida: Kg
- % de perda de peso em relação ao peso habitual : %
- Nas duas últimas semanas: ( ) continua perdendo peso ( ) estável ( ) engordou

2. Ingestão alimentar em relação ao habitual

- ( ) sem alterações ( ) houve alterações
  Se houve alterações, há quanto tempo: dias
  Se houve, para que tipo de dieta:
  ( ) sólida em quantidade menor ( ) líquida completa
  ( ) líquida restrita ( ) jejum

3. Sintomas gastrointestinais presentes há mais de 15 dias

- ( ) Sim ( ) Não
  Se sim,
  ( ) Vômitos ( ) Náuseas
  ( ) Diarréia (mais de 3 evacuações líquidas/dia) ( ) Inapetência

4. Capacidade funcional

- ( ) sem disfunção ( ) disfunção
  Se disfunção, há quanto tempo: dias
  Que tipo: ( ) trabalho sub-ótimo ( ) em tratamento ambulatórial ( ) acamado

5.Doença principal e sua correlação com necessidades nutricionais

- Diagnóstico principal:
- Demanda metabólica: ( ) baixo stress ( ) stress moderado ( ) stress elevado

B- EXAME FÍSICO:

(para cada item dê um valor: 0=normal, 1=perda leve, 2=perda moderada, 3=perda importante)
( ) perda de gordura subcutânea (tríceps e tórax)
( ) perda muscular (quadríceps e deltóides)
( ) edema de tornozelo
( ) edema sacral
( ) ascite

C- AVALIAÇÃO SUBJETIVA:

( ) Nutrido
( ) Moderadamente desnutrido ou suspeita de desnutrição
( ) Gravemente desnutrido