ALEXANDRE SANCHES LARANGEIRA

EFEITO DA MUDANÇA DE MODELO DE TRIAGEM PARA ADMISSÃO NA UNIDADE DE TERAPIA INTENSIVA NO DESFECHO DE PACIENTES GRAVES

Londrina
2022

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Tese de Doutorado apresentada ao Programa de Pós-Graduação em Ciências da Saúde, Centro de Ciências da Saúde, Universidade Estadual de Londrina, como requisito parcial para a obtenção do título de Doutor.

Orientador: Profa. Dra. Cintia Magalhães Carvalho Grion.

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LARANGEIRA, A.S. **Efeito da mudança de modelo de triagem para admissão na unidade de terapia intensiva no desfecho de pacientes graves.** 2022. Tese (Doutorado em Ciências da Saúde) – Universidade Estadual de Londrina, Londrina. 2022.

RESUMO

Introdução: Considerando o desequilíbrio entre a demanda e a disponibilidade de leitos de unidade de terapia intensiva (UTI) e profissionais com formação especializada, é necessário escolher quem será admitido. Estabelecer critérios para triar pacientes é uma forma de gerenciar os recursos e racionalizar a decisão do profissional responsável pela triagem. A base da triagem do paciente grave é o prognóstico, que pode ser avaliado por meio de escores de gravidade, de disfunções orgânicas e de quantidade de trabalho da equipe. **Objetivo:** Analisar o efeito da implementação de novo modelo de priorização e triagem para admissão em unidade de terapia intensiva no desfecho de pacientes graves. **Métodos:** Foi realizado um estudo longitudinal retrospectivo, envolvendo pacientes adultos admitidos em UTI de hospital universitário no período de janeiro de 2013 a dezembro de 2017. Foram excluídos os pacientes com tempo de permanência menor que 24 horas e as readmissões na UTI durante a mesma internação hospitalar. O desfecho primário foi considerado estado vital na saída do hospital. Os escores avaliados no estudo foram o *Acute Physiology and Chronic Health Evaluation* (APACHE II), *Sequential Organ Failure Assessment* (SOFA) e *Therapeutic Intervention Scoring System* (TISS 28). Os pacientes foram divididos em dois grupos de acordo com o período do estudo. Foram considerados período pré mudança do modelo de triagem os anos de 2013 a 2014 (período 1). Até o final do ano 2014 o protocolo institucional para triagem e admissão em UTI era fundamentado no critério cronológico (primeiro a chegar, primeiro a receber tratamento). Os anos de 2015 a 2017 foram considerados período pós mudança do modelo de triagem (período 2). A partir do início do ano 2015 foi implantado um modelo de priorização baseado na diretriz da *Society of Critical Care Medicine*, que leva em consideração a gravidade e a possibilidade de recuperação do paciente. O nível de significância utilizado foi de 5% e as análises foram realizadas utilizando-se o programa *SPSS Statistics for Windows* versão 19. **Resultados:** Foram analisados 3.283 pacientes, sendo que 1.227 foram admitidos no período 1 e 2.056 no período 2. Os pacientes admitidos no período 2 do estudo eram mais velhos, com menor proporção de doenças crônicas, tinham valor médio do escore APACHE II e do escore TISS 28 maiores comparados aos pacientes do período 1. O diagnóstico de sepse foi maior no segundo período do estudo. Foi observado aumento do número de admissões ao longo do período de estudo. No período 2 os pacientes apresentaram uma tendencia a permanecer menor tempo internados na UTI e no hospital e tiveram menor mortalidade na saída da UTI e do hospital. **Conclusões:** A mudança do modelo de triagem, de um modelo cronológico para um modelo de priorização resultou em melhora do desempenho de uma unidade de terapia intensiva, com aumento do número de admissões, redução da taxa de mortalidade hospitalar, além de uma tendência de redução do tempo de permanência hospitalar.

Palavras-chave: cuidados críticos; triagem; admissão do paciente; unidades de terapia intensiva; ocupação de leitos.

LARANGEIRA, A.S. **Effects of changing the triage model for admission to the intensive care unit on the outcome of critically ill patients.** 2022. Tese (Doutorado em Ciências da Saúde) – Universidade Estadual de Londrina, Londrina. 2022.

ABSTRACT

Introduction: Considering the imbalance between the demand and availability of intensive care unit (ICU) beds and professionals with specialized training, it is necessary to choose who will be admitted. Establishing criteria for screening patients is a way to manage resources and rationalize the decision of the professional responsible for the triage. The basis for triage of critically ill patients is the prognosis, which can be assessed through prognosis scores, organ dysfunction, and burden of health care work. **Objective:** To analyze the effect of implementing a new prioritization and triage model for admission to the intensive care unit on the outcome of critically ill patients. **Methods:** A retrospective longitudinal study was carried out, involving adult patients admitted to the ICU of a university hospital from January 2013 to December 2017. Patients with a length of stay less than 24 hours and readmissions to the ICU during the same hospitalization were excluded. The primary outcome was considered vital status on discharge from the hospital. The scores evaluated in the study were the Acute Physiology and Chronic Health Evaluation (APACHE II), Sequential Organ Failure Assessment (SOFA) and Therapeutic Intervention Scoring System (TISS 28). Patients were divided into two groups according to the study period. The years from 2013 to 2014 (period 1) were considered before the change of the triage model. Until the end of 2014, the institutional protocol for triage and admission to the ICU was based on chronological criteria (first come, first served). The years 2015 to 2017 were considered the period after the change in the triage model (period 2). From the beginning of 2015, a prioritization model based on the Society of Critical Care Medicine guideline was implemented, which considers the severity and probability of the patient's recovery. The significance level used was 5% and the analyzes were performed using the *SPSS Statistics for Windows* versão 19. **Results:** A total of 3,283 patients were analyzed, 1,227 of which were admitted in period 1 and 2,056 in period 2. Patients admitted in period 2 of the study were older, with a lower proportion of chronic diseases, had mean APACHE II score and score TISS 28 higher compared to patients from period 1. The diagnosis of sepsis was higher in the second period of the study. An increase in the number of admissions was observed over the study period. In period 2, patients had a tendency to remain in the ICU and hospital for a shorter time and had lower mortality at ICU and hospital discharge. **Conclusions:** Changing the screening model from a chronological model to a prioritization model resulted in an improvement in the performance of an intensive care unit, with an increase in the number of admissions, a reduction in the hospital mortality rate and a tendency of reduction in the hospitalar length of stay.

Key words: critical care; triage; patient admission; intensive care units; bed occupancy.

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LISTA DE SIGLAS

APACHE	*Acute Physiology and Chronic Health Evaluation*
ATS	*American Thoracic Society*
CAAE	Certificado de Apresentação de Apreciação Ética
CEP-UEL	Comitê de Ética em Pesquisa Envolvendo Seres Humanos da Universidade Estadual de Londrina
CFM	Conselho Federal de Medicina
CVC	Cateter venoso central
DP	Desvio padrão
DVA	Droga vasoativa
HR	Razão de risco proporcional; *hazard ratio*
HU	Hospital Universitário de Londrina
IC 95%	Intervalo de confiança 95%
IRA	injúria renal aguda
ITQ	Intervalo interquartílico; *interquartile range*
MS	Ministério da Saúde
N	Número
NP	Nutrição parenteral
PIC	Pressão intracraniana
PO	Pós-operatório
SCCM	*Society of Critical Care Medicine*
SOFA	*Sequential Organ Failure Assessment*
SPSS	*Statistical Package for the Social Sciences*
SUS	Sistema Único de Saúde
TISS	*Therapeutic Intervention Scoring System*
UCI	Unidade de Cuidados Intermediários
UEL	Universidade Estadual de Londrina
UTI	Unidade de terapia intensiva
VM	Ventilação mecânica

SUMÁRIO

1 INTRODUÇÃO

O cuidado ao paciente grave em leito de terapia intensiva requer recursos humanos e financeiros. A demanda crescente por leito especializado exige que o sistema de saúde se organize para contemplar o atendimento ao paciente com qualidade e de forma racional. Existem fatores epidemiológicos que determinam a demanda pelos leitos de unidade de terapia intensiva (UTI), como o envelhecimento populacional, gravidade de pacientes hospitalizados e avanço de tratamentos que exigem monitorização pelo especialista. O conhecimento sobre o uso dos leitos permite melhor planejamento ao gestor e consequente otimização de recursos.(1,2)

O envelhecimento é um dos maiores responsáveis pela demanda de leito especializado, considerando o aumento da expectativa de vida da população. No mundo, atualmente existem 727 milhões de pessoas com 65 anos ou mais. A expectativa é que este número ultrapasse 1,5 bilhão em 2050.(3) Existem fatores que determinam o prognóstico desta população na UTI, como critérios anteriores à admissão: fragilidade, funcionalidade e comorbidades. Este grupo de pacientes, pelas particularidades da fisiologia, responde de forma diversa aos insultos agudos, diferentemente de jovens. Na ocasião da alta do leito especializado, este grupo exige cuidados de reabilitação e reinserção em seu meio social.(4-6) Idosos admitidos na terapia intensiva têm maior benefício do que os não admitidos.(7-8) No Brasil, o envelhecimento populacional também se reflete na idade média dos pacientes admitidos em UTI, que é de 62 anos.(9)

Em situações em que a demanda por leitos é superior à disponibilidade deles, como em catástrofes e pandemias, a organização para triagem de admissões é mandatória. Estabelecer critérios para triar pacientes é uma forma de, além de gerenciar os recursos, racionalizar a decisão do profissional responsável por encaminhar esses pacientes à UTI. A alocação de recursos envolve o conhecimento sobre doença aguda, fatores de risco para mortalidade, sobrevida a longo prazo, probabilidade de recuperação e princípios éticos. A sistematização da triagem do paciente deve ser abordada com a equipe assistente em sua totalidade, paciente e família. Os protocolos de priorização e triagem devem ser estabelecidos para garantir o uso dos recursos de forma ética e com o melhor aproveitamento em termos de recuperação e sobrevida aos pacientes.(10-14)

A base da triagem do paciente grave é o prognóstico, que pode ser avaliado por meio de escores de gravidade, de disfunções orgânicas e de quantidade de trabalho da equipe. Escores prognósticos são desenvolvidos em populações de pacientes graves a partir de variáveis clínicas prévias à admissão e da situação da doença

aguda. Esses escores discriminam pacientes, entre outros desfechos, especialmente em grupos de sobreviventes e não sobreviventes.(15) O escore *Acute Physiology and Chronic Health Evaluation* (APACHE II) foi desenhado considerando variáveis clínicas e laboratoriais das primeiras 24 horas de admissão do paciente em leito especializado, além de quadro mórbido prévio.(16) O *Sequential Organ Failure Assessment* (SOFA) é um escore de disfunção orgânica que leva em consideração exames laboratoriais e parâmetros clínicos para avaliar sistemas.(17) O *Therapeutic Intervention Scoring System* (TISS 28) avalia a gravidade do paciente a partir da quantidade de intervenções e cuidados pela equipe de enfermagem.(18)

Mesmo com a padronização da gravidade do paciente através de escores, estabelecer quais pacientes se beneficiam da admissão em leito especializado é um desafio ao intensivista. Os estudos nesse sentido objetivam verificar quais pacientes apresentam impacto estatístico na sobrevida após o insulto agudo. Tal análise indica o perfil do indivíduo com maior benefício de uso dos recursos. A instrumentalização dos critérios é superior à observação clínica, uma vez que minimiza fatores de confusão que podem existir durante a seleção de pacientes para o leito de UTI.(19-21) O prognóstico do paciente também é modificado quanto maior for o tempo de espera para admissão em leito especializado, uma vez que cada hora de espera por um leito de UTI aumenta em 1,5% a mortalidade. (22)

Nos Estados Unidos da América, houve o aumento de 92% dos custos com Medicina Intensiva de 2000 a 2010, o que representou o total de 108 bilhões de dólares. A diária em UTI representa 4300 dólares. Mais de 5 milhões de pacientes naquele país são admitidos anualmente em leitos especializados. Estima-se que o número de leitos de UTI aumentou de 88.235 para 103.900 leitos de 2000 a 2010.(23)

No Brasil, estima-se que 24% dos estabelecimentos de saúde apresentem UTI, totalizando cerca de 8% dos leitos hospitalares. Enquanto o estado de São Paulo representa aproximadamente 24% dos estabelecimentos com UTI do país, o estado de Roraima contempla aproximadamente 0,2%. A maior parte (44%) dos estabelecimentos com UTI está em serviço privado, enquanto 77% dos atendimentos configuram pacientes do Sistema Único de Saúde (SUS). Para cada 10.000 habitantes no país, existem 2 leitos de UTI. Existem cerca de 11.500 médicos intensivistas, 2500 enfermeiros intensivistas e 4500 técnicos de enfermagem especialistas em terapia intensiva no território nacional.(24)

Em 1997, a *American Thoracic Society* (ATS) publicou diretrizes para o uso de leitos de UTI, considerando discussões sobre vontade do paciente, alocação de recursos financeiros e humanos e disponibilidade de leitos quando a demanda supera a oferta de leitos. Na ocasião, a orientação consistia em admitir pacientes no leito

especializado por ordem cronológica, considerando o princípio de *first-come, first-served,* assim como não dar alta para os pacientes até que houvesse condições clínicas para tanto.(25)

Conforme surgiram evidências sobre prognóstico de doentes graves, foram escritas orientações para padronizar critérios para admitir pacientes. Para orientar o clínico a discriminar melhor quais seriam os pacientes "*too well to benefit*" e "*too sick to benefit*", em 1999 a *Society of Critical Care Medicine* (SCCM) publicou um *guideline* para agrupar pacientes em grupos de prioridades, que são:

1) Prioridade 1: pacientes em estado crítico, instáveis, que precisam de tratamento intensivo e monitoramento que não podem ser fornecidos fora da UTI. Normalmente esses tratamentos incluem suporte ventilatório, como a infusão contínua de drogas vasoativas. Os pacientes de prioridade 1 geralmente não têm limites para a extensão da terapia que devem receber;

2) Prioridade 2: pacientes que requerem monitoramento intensivo e podem potencialmente precisar de intervenção imediata. Em geral, nenhum limite terapêutico é estipulado para esses pacientes. Os exemplos incluem pacientes com condições crônicas que desenvolvem doença clínica ou cirúrgica aguda grave;

3) Prioridade 3: pacientes instáveis que estão gravemente enfermos, mas têm uma probabilidade reduzida de recuperação devido à doença subjacente ou à natureza de sua doença aguda. Os pacientes de Prioridade 3 podem receber tratamento intensivo para aliviar a doença aguda; no entanto, podem ser estabelecidos limites aos esforços terapêuticos, como ausência de intubação ou ressuscitação cardiopulmonar e

4) Prioridade 4: são pacientes que geralmente não são adequados para admissão na UTI ("*too well to benefit"* ou *"too sick to benefit"*). A admissão desses pacientes deve ser individual, em circunstâncias incomuns e a critério do diretor da UTI.(26)

Em 2016, a SCCM atualizou o documento com base em 15 anos de publicações sobre o tema, incluindo uma quinta prioridade e organizando os grupos em níveis de atenção em:

1) <u>UTI</u>

a) Prioridade 1: Pacientes gravemente enfermos que requerem suporte de vida para falência de órgãos, monitoramento intensivo, e terapias oferecidas apenas em ambiente de UTI. O suporte de vida inclui ventilação invasiva, terapias de substituição renal contínuas, monitoramento hemodinâmico

invasivo para direcionar intervenções hemodinâmicas agressivas, oxigenação por membrana extracorpórea, bombas de balão intra-aórtico e outras situações que requerem cuidados intensivos (por exemplo, pacientes com hipoxemia grave ou em choque);

b) Prioridade 2: Pacientes, conforme descrito acima, com probabilidade significativamente menor de recuperação e que gostariam de receber terapias de terapia intensiva, mas não reanimação cardiopulmonar em caso de parada cardíaca (por exemplo, pacientes com câncer metastático e insuficiência respiratória secundária a pneumonia ou em choque séptico requerendo vasopressores);

2) Unidade de Cuidados Intermediários (UCI)

a) Prioridade 3: Pacientes com disfunção orgânica que requerem monitoramento intensivo e / ou terapias (por exemplo, ventilação não invasiva), ou que, na opinião clínica do médico responsável pela triagem, poderiam ser gerenciados em um nível de cuidado inferior ao da UTI (por exemplo, pacientes pós-operatórios que requerem monitoramento rigoroso para risco de deterioração ou requerem cuidados pós-operatórios intensos, pacientes com insuficiência respiratória tolerando ventilação não invasiva intermitente). Esses pacientes podem precisar ser internados na UTI se o manejo precoce falhar em prevenir a deterioração ou se não houver capacidade de UCI no hospital;

b) Prioridade 4: Pacientes, conforme descrito acima, mas com menor probabilidade de recuperação / sobrevivência (por exemplo, pacientes com doença metastática subjacente) que não desejam ser intubados ou ressuscitados. Como acima, se o hospital não tiver capacidade de UCI, esses pacientes podem ser considerados para UTI em circunstâncias especiais e

3) Cuidados Paliativos

a) Prioridade 5: Pacientes terminais ou moribundos sem possibilidade de recuperação; tais pacientes geralmente não são adequados para admissão na UTI (a menos que sejam potenciais doadores de órgãos). Nos casos em que os indivíduos recusaram inequivocamente as terapias de terapia intensiva ou têm processos irreversíveis, como câncer metastático, sem opções adicionais de quimioterapia ou radioterapia, cuidados paliativos devem ser inicialmente oferecidos.(27)

O Conselho Federal de Medicina (CFM), em 2016, publicou os critérios nacionais para admissão de pacientes em UTI, estabelecendo também 5 prioridades, distribuídas em internações sugeridas em UTI, UCI (prioridades 2 e 4) e unidade de cuidados paliativos (prioridade 5):

1) Prioridade 1: Pacientes que necessitam de intervenções de suporte à vida, com alta probabilidade de recuperação e sem nenhuma limitação de suporte terapêutico.
2) Prioridade 2: Pacientes que necessitam de monitorização intensiva, pelo alto risco de precisarem de intervenção imediata, e sem nenhuma limitação de suporte terapêutico.
3) Prioridade 3: Pacientes que necessitam de intervenções de suporte à vida, com baixa probabilidade de recuperação ou com limitação de intervenção terapêutica.
4) Prioridade 4: Pacientes que necessitam de monitorização intensiva, pelo alto risco de precisarem de intervenção imediata, mas com limitação de intervenção terapêutica.
5) Prioridade 5: Pacientes com doença em fase de terminalidade, ou moribundos, sem possibilidade de recuperação. Em geral, esses pacientes não são apropria dos para admissão na UTI (exceto se forem potenciais doadores de órgãos). No entanto, seu ingresso pode ser justificado em caráter excepcional, considerando as peculiaridades do caso e condicionado ao critério do médico intensivista.(28)

O aspecto ético que envolve a admissão ou não de um paciente no leito especializado envolve todos os participantes envolvidos no cuidado – o próprio paciente, o médico assistente responsável pela internação do paciente, o médico intensivista, o médico substituto no caso da não admissão na UTI, o médico gerente de fluxo, o gestor, o governo, a família do paciente e também os outros pacientes que precisam de leito de UTI. Os valores envolvidos nessa decisão abrangem todos os princípios bioéticos no cuidado do paciente admitido e também do paciente não admitido: não maleficência (não causar mal aos pacientes); beneficência (fazer o bem); respeito à autonomia (desejos de ambos os pacientes) e justiça (distribuição igual ou desigual para beneficiar o menos favorecido). O desafio de equilibrar os princípios na seleção de qual paciente será ou não recebido na UTI ainda é um grande dilema na atualidade, apesar de todos os avanços no conhecimento sobre prognóstico de doenças e uso de recursos de suporte de vida. Assim como a primeira admissão, a

readmissão em UTI é outro aspecto que merece discussão ética sobre os recursos disponíveis e o prognóstico do paciente. (29-31)

Considerando que a demanda por leitos de UTI e profissionais com formação especializada é maior que a disponibilidade dos mesmos, é necessário selecionar quem será admitido. Os dilemas éticos e técnicos envolvidos na seleção do paciente que acessará a UTI abrangem questões como quem deve realizar essa triagem, o que pode limitar o acesso do paciente ao leito e quem é o paciente que se beneficia do cuidado do especialista. Há necessidade de estudos que tornem mais objetiva a triagem desses pacientes, permitindo que a seleção seja adequada e benéfica a todas as partes envolvidas nessa decisão, especialmente em situações de catástrofes e de contingência de recursos. (32-35)

1.1 Justificativa

A preocupação com o correto uso dos recursos humanos e materiais nos hospitais e UTIs é crescente, principalmente em relação às decisões sobre priorização e triagem de pacientes a serem admitidos em ambientes de terapia intensiva, entretanto, as informações sobre os impactos de protocolos para esse fim são escassas.

A avaliação da implementação de um protocolo de priorização e triagem para admissão de pacientes críticos em UTI e as respectivas repercussões na mortalidade, tempo de permanência e gravidade destes pacientes antes e depois de tal protocolo, pode colaborar para o desenvolvimento de novas técnicas que possibilitem a otimização do uso de recursos humanos e financeiros no cuidado ao paciente crítico.

2 OBJETIVOS

2.1 OBJETIVO GERAL

Analisar o efeito da implementação de novo modelo de triagem por prioridades para admissão em unidade de terapia intensiva no desfecho de pacientes graves.

2.2 OBJETIVOS ESPECÍFICOS

1. Caracterizar os pacientes adultos admitidos em unidades de terapia intensiva de acordo com aspectos clínicos e demográficos.
2. Comparar as características clínicas e critérios de gravidade nos períodos do estudo.
3. Comparar o tempo de permanência em terapia intensiva e no hospital nos períodos do estudo.
4. Comparar a taxa de mortalidade hospitalar nos períodos do estudo.
5.

3 MÉTODOS

3.1 Delineamento

Estudo longitudinal retrospectivo.

3.2 População de estudo

Pacientes adultos internados na Unidade de Terapia Intensiva do Hospital Universitário de Londrina.

3.3 Amostragem e local de estudo

Amostragem de conveniência dos pacientes adultos admitidos na Unidade de Terapia Intensiva (UTI) do Hospital Universitário de Londrina (HU), no período de janeiro de 2013 a dezembro de 2017. O HU é um órgão suplementar da Universidade Estadual de Londrina (UEL), atualmente com cerca de 291 leitos e constitui o maior hospital geral público que atende o município de Londrina - Paraná e região. O número de leitos da UTI adulto deste hospital variou de 17 a 20 leitos no período do estudo e nela são internados pacientes clínicos e cirúrgicos.

3.4 Critérios de seleção

- Inclusão: todos os pacientes adultos admitidos na unidade de terapia intensiva no período de estudo.
- Exclusão: pacientes menores de 18 anos, pacientes com tempo de permanência na UTI menor que 24 horas, readmissões na UTI durante a mesma internação hospitalar.

3.5 Aspectos éticos

O presente estudo foi submetido e aprovado pelo Comitê de Ética em Pesquisa Envolvendo Seres Humanos da Universidade Estadual de Londrina (CEP-UEL) conforme parecer substanciado do CEP-UEL no. 3.377.114; CAAE 13959319.4.0000.5231, data da relatoria 07/06/2019. Devido ao delineamento e objetivo do estudo foi solicitada a dispensa do Termo de Consentimento Livre e

Esclarecido. O autor se comprometeu a desenvolver a pesquisa de acordo com a Resolução do Conselho Nacional de Saúde/MS nº 466 de 12 de dezembro de 2012.

3.6 Acompanhamento

Dados completos foram coletados de todos os pacientes inseridos no estudo até o desfecho hospitalar. O desfecho primário foi considerado estado vital na saída do hospital.

3.7 Coleta de dados

Os dados gerais coletados para todas as admissões na UTI foram idade, gênero, data de internação no hospital e na UTI, tipo de admissão, diagnóstico de admissão na UTI, setor de origem, data da alta da UTI e do hospital, desfecho à saída da UTI e do hospital.

Os dados coletados durante a internação na UTI foram: presença de doença crônica, necessidade de ventilação mecânica, uso de drogas vasoativas e os escores *Acute Physiology and Chronic Health Evaluation* (APACHE II), *Sequential Organ Failure Assessment* (SOFA) e *Therapeutic Intervention Scoring System* (TISS 28).

As fontes utilizadas para a coleta de dados foram os prontuários dos pacientes. Todos os dados para cálculo dos escores foram coletados como dados brutos, utilizando-se os extremos de anormalidade durante as primeiras 24 horas de internação na UTI. O cálculo dos escores foi efetuado segundo as definições dos respectivos sistemas. Os pacientes foram acompanhados diariamente até o desfecho final, considerado estado vital na saída do hospital.

3.8 Períodos do estudo

Os pacientes internados na UTI no período do estudo foram divididos em período pré e pós alteração do modelo de triagem para admissão na UTI.

Até o ano 2015 o protocolo institucional para triagem e admissão em UTI era cronológico conforme data e horário de solicitação da vaga (primeiro a chegar, primeiro a receber tratamento) com base nos guidelines da *American Thoracic Society*. No contexto de alta demanda de cuidados intensivos, este hospital implantou naquele ano um modelo de priorização para admissão em UTI com base na diretriz da *Society of Critical Care Medicine* (26). Este modelo se baseia na classificação dos pacientes com demanda de cuidados intensivos em quatro grupos assim denominados:

- Prioridade 1: pacientes críticos que necessitam de intervenção e monitorização que não pode ser obtida fora do ambiente de terapia intensiva;
- Prioridade 2: pacientes que necessitam de monitorização intensiva e que eventualmente poderão necessitar intervenções imediatas;
- Prioridade 3: pacientes críticos e instáveis, mas que possuem uma baixa probabilidade de recuperação por ocasião do seu quadro atual ou devido às comorbidades subjacentes;
- Prioridade 4: são pacientes que geralmente não são apropriados para admissão em UTI e podem ser subdivididos nas categorias A que seriam os pacientes que pouco se beneficiariam dos cuidados intensivos e na categoria B composta pelos pacientes com doenças terminais e irreversíveis na iminência de morte.

Em 2016 esse modelo de priorização foi atualizado (27) de modo a acrescentar um novo grupo (prioridade 5) que seria constituído por pacientes sem possibilidades de recuperação e a quem deveriam ser oferecidos os cuidados paliativos. Nesta atualização além de mudanças na definição de cada grupo de prioridade, o documento também sugere que os pacientes classificados como prioridade 3 e 4 poderiam ser admitidos em unidades de cuidados intermediários, quando existentes:

- Prioridade 1: pacientes críticos que necessitam de intervenção e/ou monitorização intensiva que não pode ser obtida fora do ambiente de terapia intensiva;
- Prioridade 2: pacientes críticos que necessitam de intervenção e/ou monitorização intensiva com probabilidade baixa de recuperação que desejam receber cuidados intensivos exceto ressuscitação cardiopulmonar na hipótese de parada cardiorrespiratória;
- Prioridade 3: pacientes com disfunções orgânicas que necessitam de monitorização intensiva e terapias pouco ou não invasivas e que poderiam ser manejados em ambientes de cuidados intermediários;
- Prioridade 4: pacientes com disfunções orgânicas que necessitam de monitorização intensiva e terapias pouco ou não invasivas, mas que também apresentam baixa probabilidade de recuperação/sobrevida e que não desejam ser entubados ou ressuscitados, podendo ser alocados na UTI em circunstâncias especiais;
- Prioridade 5: Pacientes terminais ou sem possibilidade de recuperação (exceto se for potencial doador de órgãos) que geralmente não são apropriados para o

ambiente de terapia intensiva e a quem deveriam ser iniciados os cuidados paliativos.

Em janeiro de 2017, esta atualização foi adaptada e praticada na triagem dos pacientes que necessitam de cuidados intensivos no HU-UEL. Foram considerados período pré mudança do modelo de triagem os anos de 2013 e 2014. Os anos de 2015 a 2017 foram considerados período pós mudança do modelo de triagem.

3.9 Análise Estatística

Variáveis contínuas foram expressas como média e desvio padrão (DP) ou mediana e intervalo interquartílico (ITQ) de acordo com a distribuição dos dados. As variáveis categóricas foram expressas como proporção. Estatística descritiva foi utilizada para a apresentação de todas as variáveis relevantes. Os dados estão apresentados em gráficos e tabelas. O teste não paramétrico de Mann-Whitney foi usado para a comparação das variáveis contínuas. As variáveis categóricas foram comparadas usando o teste de Qui-quadrado de Pearson ou exato de Fisher e o teste de qui-quadrado de tendência linear. Foi realizada análise bivariada para analisar a associação da triagem com as variáveis do estudo. A análise de regressão de Cox foi aplicada para avaliar fatores que contribuem de forma independente para explicar o desfecho hospitalar, o efeito de cada fator foi expresso em razão de risco proporcional (HR) e intervalo de 95% de confiança (IC 95%). O risco acumulado da mortalidade hospitalar foi descrito pela análise da curva de sobrevivência de Kaplan - Meier. O nível de significância utilizado foi de 5% e as análises foram realizadas utilizando-se o programa *SPSS Statistics for Windows* versão 19.

4 ARTIGO CIENTÍFICO A SER SUBMETIDO À REVISTA *INTENSIVE CARE MEDICINE* (instruções aos autores: ANEXO 4)

TÍTULO: Melhora da performance de uma unidade de terapia intensiva após mudança de modelo de triagem para admissão

4.1 Resumo

Objetivo: Analisar o efeito da implementação de um modelo de priorização e triagem para admissão em unidade de terapia intensiva no desfecho de pacientes graves.

Métodos: Estudo longitudinal retrospectivo realizado por amostragem de conveniência dos pacientes adultos admitidos na Unidade de Terapia Intensiva (UTI) do Hospital Universitário de Londrina (HU), no período de janeiro de 2013 a dezembro de 2017. O desfecho primário foi considerado estado vital na saída do hospital. Foram coletados dados clínicos e os escores *Acute Physiology and Chronic Health Evaluation II* (APACHE II), *Sequential Organ Failure Assessment* (SOFA) e *Therapeutic Intervention Scoring System 28* (TISS 28) na admissão da UTI. Os pacientes foram divididos em período pre e pós alteração do modelo de triagem. O período 1 (triagem cronológica) foram os anos de 2013 a 2014. O período 2 (triagem por priorização) foram os anos de 2015 a 2017. O nível de significância utilizado foi de 5% e as análises foram realizadas utilizando-se o programa SPSS Statistics for Windows, Versão 19.0.

Resultados: Foram analisados 3.283 pacientes, sendo que 1.227 foram admitidos no período 1 e 2.056 no período 2. Os pacientes admitidos no período 2 do estudo eram mais velhos (59,8 anos ±18,3), com menor proporção de doenças crônicas (13,6%), tinham valor médio do escore APACHE II (21,0 ITQ 14-29) e do escore TISS 28 (28,0 ITQ 21-36) maiores comparados aos pacientes do período 1. O diagnóstico de sepse foi mais frequente (50,5%) no segundo período do estudo. Foi observado aumento do número de admissões ao longo do período de estudo. No período 2 os pacientes apresentaram uma tendencia a permanecerem menor tempo internados na UTI (8,5 dias ± 11,8) e no hospital (22,8 dias ± 27,2) e tiveram menor mortalidade na saída da UTI (32,8%) e do hospital (44,2%).

Conclusões: A mudança do modelo de triagem, de um modelo cronológico para um modelo de priorização resultou em melhora do desempenho de uma unidade de terapia intensiva, com aumento do número de admissões, redução da taxa de mortalidade hospitalar e uma tendência à redução do tempo de permanência

Descritores: Cuidados Críticos; Triagem; Admissão do Paciente; Unidades de Terapia Intensiva; Ocupação de Leitos.

4.2 Introdução

É consenso que existe limitação dos recursos de saúde. No que diz respeito ao acesso a leitos especializados em terapia intensiva, frequentemente não há disponibilidade para todas as pessoas que necessitam. Para otimizar os recursos disponíveis é parte das atribuições de um intensivista tomar decisões sobre prioridades de acesso a unidades de terapia intensiva (UTI) (1).

Quando os recursos disponíveis são suplantados pela demanda de um determinado serviço, forma-se uma fila de atendimento, ou seja, uma demanda reprimida. Para entender os motivos da formação dessa fila pode-se remeter à teoria da fila. A teoria das filas é uma área das ciências exatas que estuda a probabilidade da formação de filas. O processo de fila é composto por três elementos: regime de chegada, regime de serviço e disciplina da fila. Na formação da fila devem ser considerados se a população é ou não infinita, o intervalo de tempo entre as chegadas, a disponibilidade do serviço, capacidade do sistema, duração do tempo do serviço para abrir nova vaga, além da disciplina da fila. A disciplina da fila se refere às normas que definem a ordenação dada aos pacientes que serão atendidos. Para isso, existem diversas possibilidades, como o atendimento pela ordem de chegada, atendimento aleatório ou a prioridade para certas categorias de clientes (2).

O modelo intuitivo mais lógico e mais aplicado no dia a dia é o cronológico, ou seja, os primeiros a chegarem são os primeiros a serem atendidos. No entanto, no sistema de saúde e em situações de grande demanda reprimida por leitos de UTI, esse modelo pode ter consequências graves especialmente para pacientes com maiores chances de recuperação. A espera por um leito de UTI pode implicar em redução dessas chances de sobrevida pois existem tratamentos que podem estar disponíveis exclusivamente dentro do ambiente da UTI (3).

Para decidir sobre a admissão em uma UTI existem diversos modelos a serem considerados (4-7). Nos modelos por diagnósticos é utilizada uma lista de condições que indicam tratamento em UTI. Nos modelos por parâmetros objetivos são estabelecidos limites de variáveis fisiológicas e laboratoriais que levam à decisão sobre admissão em UTI. O modelo por parâmetros objetivos pode ser utilizado em combinação com o modelo diagnóstico para melhorar o processo de decisão. Há também o modelo de priorização de admissão na UTI, em que a disciplina da fila de espera obedece a um sistema de triagem estruturado.

Um sistema de triagem deve ser tão preciso quanto possível. A triagem levemente permissiva é preferível, mas em um sistema muito sobrecarregado pode não ser viável, especialmente em situações de grande aumento por demanda de leitos. Se a triagem for excessivamente permissível, pode tornar o sistema

sobrecarregado. Se a triagem for excessivamente restritiva, pode se associar a aumento da mortalidade. Uma força tarefa da sociedade norte americana de medicina intensiva propôs um sistema de triagem com cinco níveis de prioridade, onde o nível 1 é o de maior prioridade para admissão na UTI e o nível 5 o de menor prioridade (5).

Existe limitação significativa de evidências científicas sobre o tema de triagem para admissão na UTI. É assunto complexo que envolve aspectos médicos, éticos e legais e que afeta diretamente a prática médica rotineira. O uso adequado de recursos de saúde limitados é uma grande responsabilidade, assim como a decisão sobre a admissão de um paciente em leito de UTI.

O objetivo deste estudo é analisar o efeito da implementação de um modelo de priorização e triagem para admissão em unidade de terapia intensiva no desfecho de pacientes graves.

4.3 Métodos

Estudo longitudinal retrospectivo realizado por amostragem de conveniência dos pacientes adultos admitidos na Unidade de Terapia Intensiva (UTI) do Hospital Universitário de Londrina (HU), no período de janeiro de 2013 a dezembro de 2017. O HU é um órgão suplementar da Universidade Estadual de Londrina (UEL), atualmente com cerca de 291 leitos e constitui o maior hospital geral público que atende o município de Londrina - Paraná e região. O número de leitos da UTI adulto deste hospital variou de 17 a 20 leitos no período do estudo e nela são internados pacientes clínicos e cirúrgicos. Foram excluídos da análise os pacientes menores de 18 anos, pacientes com tempo de permanência na UTI menor que 24 horas, readmissões na UTI durante a mesma internação hospitalar.

Dados completos foram coletados de todos os pacientes inseridos no estudo até o desfecho hospitalar. O desfecho primário foi considerado estado vital na saída do hospital.

Os dados gerais coletados para todas as admissões na UTI foram idade, sexo, data de internação no hospital e na UTI, diagnóstico principal de admissão na UTI, setor de origem, data da alta da UTI e do hospital, desfecho à saída da UTI e do hospital.

Também foram coletadas informações sobre presença de doença crônica, necessidade de ventilação mecânica, necessidade de diálise, uso de drogas vasoativas e os escores *Acute Physiology and Chronic Health Evaluation* II (APACHE II) (8), *Sequential Organ Failure Assessment* (SOFA) (9) do primeiro dia de internação na UTI e *Therapeutic Intervention Scoring System 28* (TISS 28) (10). Outras variáveis

importantes coletadas foram o tempo de permanência hospitalar e tempo de permanência na UTI.

As fontes utilizadas para a coleta de dados foram os prontuários dos pacientes. Todos os dados para os cálculos dos escores foram coletados como dados brutos, utilizando-se os extremos de anormalidade durante as primeiras 24 horas de internação na UTI. Os cálculos dos escores foram efetuados segundo as definições dos respectivos sistemas.

Os pacientes internados na UTI no período do estudo foram divididos em período pré e pós alteração do modelo de triagem para admissão na UTI. Foram considerados período pré mudança do modelo de triagem os anos de 2013 a 2014, denominado período 1. Os anos de 2015 a 2017 foram considerados período pós mudança do modelo de triagem, denominado período 2.

Até o ano 2015 o protocolo institucional para triagem e admissão em UTI era fundamentado na publicação da *American Thoracic Society* (7) e era basicamente cronológico (primeiro a chegar, primeiro a receber tratamento). No contexto de alta demanda de cuidados intensivos, este hospital alterou a forma de triagem para um modelo de priorização para admissão em UTI baseado na diretriz da *Society of Critical Care Medicine* (11). Este modelo se baseia na classificação dos pacientes com demanda de cuidados intensivos em quatro grupos assim denominados:

- Prioridade 1: pacientes críticos que necessitam de intervenção e monitorização que não pode ser obtida fora do ambiente de terapia intensiva;
- Prioridade 2: pacientes que necessitam de monitorização intensiva e que eventualmente poderão necessitar intervenções imediatas;
- Prioridade 3: pacientes críticos e instáveis, mas que possuem uma baixa probabilidade de recuperação por ocasião do seu quadro atual ou devido às comorbidades subjacentes;
- Prioridade 4: são pacientes que geralmente não são apropriados para admissão em UTI e podem ser subdivididos nas categorias A que seriam os pacientes que pouco se beneficiariam dos cuidados intensivos e na categoria B composta pelos pacientes com doenças terminais e irreversíveis na iminência de morte.

Em 2016 esse modelo de priorização foi atualizado de modo a acrescentar um novo grupo (prioridade 5) que seria constituído por pacientes com nenhuma possibilidade de recuperação e a quem deveria ser oferecidos os cuidados paliativos (5). Nesta atualização foram confirmadas as definições de cada grupo de prioridade, também ficou sugerido que os pacientes classificados como prioridade 3 e 4 poderiam

ser admitidos em unidades de cuidados intermediários, quando existentes. Em janeiro de 2017 esta atualização foi adaptada e praticada na priorização e triagem dos pacientes que necessitam de cuidados intensivos no HU-UEL.

Análise Estatística

Variáveis contínuas foram expressas como média e desvio padrão (DP) ou mediana e intervalo interquartílico (ITQ) de acordo com a distribuição dos dados. As variáveis categóricas foram expressas como proporção. Estatística descritiva foi utilizada para a apresentação de todas as variáveis relevantes. Os dados estão apresentados em gráficos e tabelas. O teste não paramétrico de Mann-Whitney foi usado para a comparação das variáveis contínuas. As variáveis categóricas foram comparadas usando o teste de Qui-quadrado de Pearson ou exato de Fisher e o teste de qui-quadrado de tendência linear. Foi realizada análise bivariada para analisar a associação da triagem com as variáveis do estudo. A análise de regressão de Cox foi aplicada para avaliar fatores que contribuem de forma independente para explicar o desfecho hospitalar, o efeito de cada fator foi expresso em razão de risco proporcional (HR) e intervalo de 95% de confiança (IC 95%). O risco acumulado da mortalidade hospitalar foi descrito pela análise da curva de sobrevivência de Kaplan - Meier.

O nível de significância utilizado foi de 5% e as análises foram realizadas utilizando-se o programa *SPSS Statistics for Windows*, Versão 19.0 (Armonk, NY: IBM Corp.).

4.4 Resultados

Durante o período de estudo, foram admitidos 3.644 pacientes nos leitos de terapia intensiva da instituição da pesquisa. Foram excluídos 69 pacientes com idade menor de 18 anos, 164 pacientes readmitidos na UTI na mesma internação hospitalar e 128 por tempo de permanência na UTI menor que 24 horas. Foram analisados 3.283 pacientes, sendo que 1.227 foram admitidos no período 1 e 2.056 no período 2.

A tabela 1 apresenta a comparação das características clínicas na admissão da UTI e dos desfechos de acordo com os períodos do estudo. Os pacientes admitidos no período 2 do estudo eram mais velhos (59,8 anos ±18,3), com menor proporção de doenças crônicas (13,6%), tinham valor médio do escore APACHE II (21,0 ITQ 14-29) e do escore TISS 28 (28,0 ITQ 21-36) maiores comparados aos pacientes do período 1. O diagnóstico de sepse foi maior no segundo período do estudo. No período 2 os pacientes apresentaram tendência a permanecerem menor tempo internados na UTI e no hospital e tiveram menor mortalidade na saída da UTI e do hospital.

A tabela 2 apresenta as intervenções terapêuticas utilizadas pelos pacientes no primeiro dia de permanência na UTI durante os períodos do estudo. A necessidade de ventilação mecânica invasiva e de diálise foi semelhante nos períodos do estudo. O uso de droga vasoativa única na admissão da UTI foi mais frequente no segundo período do estudo, enquanto o uso de drogas vasoativas múltiplas foi mais frequente no primeiro período do estudo. Houve aumento da realização de traqueostomias no período 2 do estudo.

Na tabela 3 é observado aumento do número de admissões ao longo do período de estudo e um aumento da proporção de admissões clínicas e de pós-operatório de cirurgias eletivas.

A tabela 4 apresenta a regressão de Cox com as variáveis independentes para o desfecho morte na saída do hospital. Os fatores de risco para morte foram idade e os escores APACHE II, SOFA e TISS 28. O período 2 do estudo, modelo de triagem por priorização, foi fator protetor para morte hospitalar, assim como o sexo masculino. A curva de sobrevivência de Kaplan-Meier para o desfecho morte na saída do hospital mostra redução da mortalidade dos pacientes no período 2 do estudo (Figura 1).

4.5 Discussão

O presente estudo analisa o desempenho de uma unidade de terapia intensiva comparando dois períodos de estudo separados pela mudança do modelo de triagem para admissão de pacientes. A mudança de um modelo cronológico para um modelo de priorização resultou em mudança das caraterísticas clínicas dos pacientes, aumento do escore de gravidade e do escore de intervenções terapêuticas, redução da taxa de mortalidade hospitalar dos pacientes e ao mesmo tempo uma tendência de redução do tempo de permanência

A decisão sobre a triagem de pacientes para admissão em unidades de terapia intensiva continua sendo um tema desafiador. Em geral, a aplicação de triagem para atendimento de pacientes tem o objetivo de salvar o maior número de pessoas em momentos de restrição da oferta do atendimento. As decisões para a realização da triagem podem ser feitas com base no benefício terapêutico, escolhendo os melhores candidatos aos leitos disponíveis, ou pode ser feita pelo critério cronológico, com a premissa de que os primeiros a chegarem serão os primeiros a serem atendidos (12-16).

Em situações ideais de disponibilidade de leitos especializados em terapia intensiva, aplicar o critério cronológico para admissão de pacientes parece ser uma opção viável. Com o aumento da demanda por leitos sem a respectiva oferta proporcional, as decisões de triagem devem dar prioridade para os pacientes que irão

se beneficiar desse cuidado especializado (5,17). Para auxiliar no processo de decisão sobre triagem de pacientes para atendimento em situações de restrição de recursos, vários protocolos e ferramentas de triagem foram desenvolvidos (18-23); no entanto, algumas experiências de vida real falharam em documentar priorização adequada com as ferramentas desenvolvidas (20, 22).

As decisões sobre triagem de pacientes podem gerar ansiedade nos profissionais responsáveis. Dúvidas sobre os riscos pessoais e familiares, limitações do sistema e do paciente, falta de experiência e sobrecarga no trabalho são sentimentos que permeiam essas decisões. Dessa forma é recomendável que o profissional responsável pelas decisões de triagem não seja da mesma equipe que será responsável pelas decisões de alta dos pacientes (24). Essas equipes devem ter capacitação específica para essas funções e devem ter o apoio institucional com manutenção adequada dos serviços além de apoio jurídico durante esse processo.

Ao longo dos anos de observação houve aumento importante da demanda de vagas por leitos de terapia intensiva na instituição onde foi realizada a presente pesquisa e esse fato motivou a mudança de modelo de triagem. Com essa mudança de triagem, foi possível observar que não houve impacto clínico significativo da média de idade dos pacientes admitidos na UTI, com aumento médio de dois anos de idade no segundo período. Dessa forma, o modelo de priorização não resultou em restrição de acesso do idoso ao leito de terapia intensiva. A admissão do idoso na UTI é motivo de discussão nos modelos de triagem, pois de um lado existe o envelhecimento da população que aumenta a demanda de leitos pelos idosos, e por outro lado existe a preocupação na triagem de admitir os pacientes idosos que irão se beneficiar do tratamento. De um modo geral, os muito idosos tendem a receber a mesma intensidade de tratamento e ter prognóstico semelhante aos idosos (26).

Após a mudança do modelo de triagem no presente estudo também foi observada maior gravidade de doença na admissão na UTI, com grau de disfunções orgânicas semelhantes, maior intensidade de intervenção terapêutica e ao mesmo tempo menor tempo de permanência na UTI e redução da mortalidade. Esses achados levam a supor melhora do desempenho da unidade de terapia intensiva, que passou a admitir pacientes mais graves, porém resultando em melhores desfechos. Por esses achados é possível supor que o novo modelo de priorização resultou em melhora da triagem por pacientes com maiores chances de recuperação. Dentro do cenário de grande demanda por leitos, esse modelo de priorização provavelmente resultou em menor tempo de espera para admissão na UTI e uma recuperação mais acelerada dos pacientes admitidos. O modelo de priorização resultou em fator de proteção com redução de 13% na chance de morte na saída do hospital no presente estudo.

A redução de um dia no tempo de permanência na UTI significa um aumento da disponibilidade de leitos (27) e isso se refletiu em aumento importante do número de admissões ao longo dos anos do estudo. Mesmo levando-se em consideração que houve um aumento de três leitos de UTI na instituição da pesquisa no ano de 2014, só foi possível observar aumento do número de admissões a partir do ano de 2016, após a mudança do modelo de triagem.

Apesar deste estudo não ser um estudo clínico randomizado, este desenho não seria aplicável na amplitude no contexto a que se refere, sendo então uma boa maneira de avaliar as diferentes abordagens de problemas de logística e estratégia no que se refere à demanda por leitos de alta complexidade. Uma grande limitação deste estudo é ter sido realizado em um centro único, porém o fato de demonstrar que é possível melhorar o desempenho de unidades complexas como as de terapia intensiva com readequações das metodologias de triagem e organização de fluxos internos justifica o investimento em novos estudos sobre o tema.

4.6 Conclusão

A mudança da triagem de pacientes graves, de um modelo cronológico para um modelo de priorização, resultou em melhora do desempenho de uma unidade de terapia intensiva. Foi observado aumento do número de admissões, redução do tempo de permanência na UTI e no hospital, além de redução da taxa de mortalidade hospitalar.

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FIGURA 1 – Curva de sobrevida de Kaplan-Meier para o desfecho hospitalar de acordo com o período de triagem por critério cronológico e por critério de priorização, durante os primeiros 60 dias do estudo

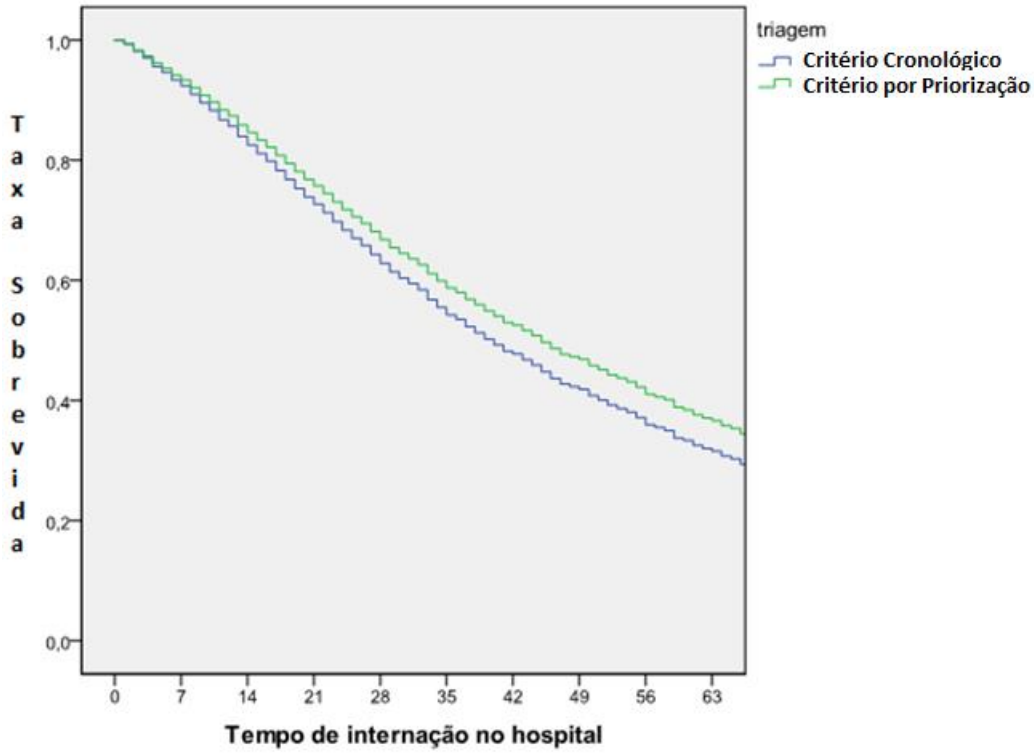

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TABELA 1: Características clínicas e desfechos de acordo com período do estudo

Variável	Período 1 (n=1.227)	Período 2 (n=2.056)	Total (n=3.283)	Valor de p
Idade				< 0,001*
Média ± DP	57,3 ± 19,0	59,8 ± 18,3	58,9 ± 18,6	
Mediana (ITQ)	59,0 (44-73)	63,0 (48-74)	61,0 (47-74)	
Sexo masculino	733 (59,7%)	1.177 (57,2%)	1.910 (58,2%)	0,161**
Procedência				0,001***
Centro cirúrgico	809 (65,9%)	1.312 (63,8%)	2.121 (64,6%)	
Emergência	289 (23,6%)	588 (28,6%)	877 (26,7%)	
Enfermaria	128 (10,4%)	152 (7,4%)	280 (8,5%)	
Outro hospital	1 (0,1%)	4 (0,2%)	5 (0,2%)	
Doença crônica	235 (19,2%)	280 (13,6%)	2.768 (15,7%)	0,001**
Tipo de admissão				
Clínico	385 (31,4%)	721 (35,1%)	1.106 (33,7%)	0,030**
PO urgência	399 (32,5%)	543 (26,4%)	942 (28,7%)	<0,001**
PO eletivo	426 (34,7%)	784 (38,1%)	1.210 (36,9%)	0,500**
IRA admissão	329 (26,8%)	750 (36,5%)	1.079 (32,9%)	<0,001**
VM admissão	656 (53,5%)	1.166 (56,7%)	1.822 (55,5%)	0,070**
Sepse na internação	567 (46,2%)	1.039 (50,5%)	1.606 (48,9%)	0,016**
DVA	525 (42,8%)	850 (41,3%)	1.375 (41,9%)	0,417**
APACHE II				<0,001*
Média ± DP	19,5 ± 9,9	22,1 ± 10,3	21,2 ± 10,2	
Mediana (ITQ)	18,0 (12-26)	21,0 (14-29)	20,0 (13-28)	
SOFA				0,325*
Média ± DP	7,0 ± 4,7	7,2 ± 4,6	7,1 ± 4,7	
Mediana (ITQ)	6,0 (3-11)	7,0 (3-11)	7,0 (3-11)	
TISS 28				<0,001*
Média ± DP	26,9 ± 7,4	29,5 ±10,4	28,5 ± 9,5	
Mediana (ITQ)	27,0 (21-32)	28,0 (21-36)	28,0 (21-34)	
Tempo de UTI				0,060*
Média ± DP	9,6 ± 16,0	8,5 ± 11,8	8,9 ± 13,5	
Mediana (ITQ)	4,00 (1-12)	4,0 (1-11)	4,0 (1-11)	
Tempo de hospital				0,117*
Média ± DP	24,2 ± 28,0	22,8 ± 27,2	23,3 ± 27,5	
Mediana (ITQ)	17,0 (8-31)	16,0 (8-28)	16,0 (8-29)	
Óbito UTI	453 (36,9%)	674 (32,8%)	1.127	0,016**

Óbito hospital	587 (47,8%)	908 (44,2%)	1.495 (34,3%) (45,5%)	0,041**

Legenda: DP - Desvio padrão; ITQ - Intervalo interquartílico; PO - Pós-operatório; IRA - injúria renal aguda; VM - Ventilação mecânica; DVA - Droga vasoativa; APACHE - *Acute Physiology and Chronic Health Evaluation*; SOFA - *Sequential Organ Failure Assessment*; TISS - *Therapeutic Intervention Scoring System*; UTI - Unidade de terapia intensiva

* Teste de Mann-Whitney; ** Teste de qui-quadrado; ***Teste exato de Fisher

TABELA 2: Intervenções terapêuticas de acordo com período do estudo

Variável	Período 1	Período 2	Total	Valor de p
VM na internação	755 (61,5%)	1.251 (60,8%)	2.006 (61,1%)	0,697**
Dias de VM				0,189*
Média ± DP	12,3 ± 15,5	11,1 ± 11,8	11,5 ± 13,4	
Mediana (ITQ)	6,0 (3-17)	7,0 (3-14)	7,0 (3-15)	
Diálise	252 (20,5%)	462 (22,5%)	714 (21,7%)	0,194**
Dias de diálise				0,267*
Média ± DP	10,3± 21,4	8,8 ± 13,0	9,4 ± 16,5	
Mediana (ITQ)	6,0 (1-13)	4,0 (1-11)	4,0 (1-12)	
PIC	51 (4,2%)	86 (4,2%)	137 (4,2%)	0,971**
CVC	960 (78,2)	1.581 (76,9%)	2.541 (77,4%)	0,374**
Enteral	648 (52,8%)	1.154 (56,1%)	1.802 (54,9%)	0,065**
Dias enteral				0,346*
Média ± DP	12,8 ± 19,1	11,6 ± 13,3	12,0 ± 15,6	
Mediana (ITQ)	8,0 (3-16)	8,0 (3-16)	8,0 (3-16)	
NP	80 (6,5%)	63 (3,1%)	143 (4,4%)	<0,001**
Dias NP				0,328*
Média ± DP	11,7 ± 10,8	10,3 ± 10,8	11,1 ±10,8	
Mediana (ITQ)	9,0 (3-16,5)	7,0 (3-14)	8,0 (3-15)	
DVA única na admissão	293 (23,9%)	903 (43,9%)	1.196 (36,4%)	<0,001**
DVA múltipla na admissão	464 (37,8%)	643 (31,3%)	1.107 (33,7%)	<0,001**
Arteriotomia	518 (42,2%)	796 (38,7%)	1.314 (40,0%)	0,048**
Cateter Swan Ganz	15 (1,2%)	8 (0,4%)	23 (0,7%)	0,006**
Traqueotomia	205 (16,7%)	407 (19,8%)	612 (18,6%)	0,028**

Legenda: VM - Ventilação mecânica; DP - Desvio padrão; ITQ - Intervalo interquartílico; PIC - Pressão intracraniana; CVC - Cateter venoso central; NP - nutrição parenteral; DVA - Droga vasoativa

* Teste de Mann-Whitney; ** Teste de qui-quadrado

TABELA 3 - Número e tipo de admissão por ano de estudo

	2013	2014	2015	2016	2017	Valor de p*
N. admissões	628	566	548	717	824	
	(19,1%)	(17,2%)	(16,7%)	(21,8%)	(25,1%)	
Clínico	189	180	204	249	284	0,054
	(30,1%)	(31,8%)	(37,2%)	(34,7%)	(34,5%)	
PO urgência	198	191	158	181	214	< 0,001
	(31,5%)	(33,7%)	(28,8%)	(25,2%)	(26,0%)	
PO eletivo	228	191	181	287	323	0,033
	(36,3%)	(33,7%)	(33,0%)	(40,0%)	(39,2%)	

Legenda: N - número; PO - Pós-operatório; * Qui-quadrado de tendência linear

TABELA 4 – Regressão de COX para desfecho hospitalar

Variável	Hazard ratio	IC 95%	Valor de p
Idade	1,015	1,011 - 1,018	<0,001
Sexo masculino	0,881	0,794 - 0,979	0,018
Doença crônica	1,084	0,952 - 1,234	0,225
Período 2 do estudo	0,870	0,780 - 0,971	0,013
APACHE II	1,034	1,026 - 1,042	<0,001
SOFA	1,085	1,066 - 1,105	<0,001
TISS 28	1,008	1,002 - 1,015	0,011

Legenda: APACHE - *Acute Physiology and Chronic Health Evaluation*; SOFA - *Sequential Organ Failure Assessment*; TISS - *Therapeutic Intervention Scoring System*; IC 95% - Intervalo de confiança 95%.

5 CONSIDERAÇÕS FINAIS

Apesar da decisão sobre a seleção de qual paciente será admitido na unidade de terapia intensiva ser uma rotina para o médico intensivista, esses profissionais frequentemente estão incertos do real significado da aplicação de critérios de triagem. Além de escolher e priorizar os pacientes a serem atendidos, triagem também significa utilizar os recursos escassos para fazer o maior bem ao maior número de pessoas.

Nesse contexto, devemos ter em mente o significado real dos termos subtriagem e supertriagem. Nos casos de subtriagem, um paciente grave pode não ser reconhecido, resultando em demora no seu atendimento e provavelmente reduzindo suas chances de recuperação. Nos casos de supertriagem, um paciente não grave pode ser priorizado para o atendimento em detrimento de outros que poderiam estar em maior necessidade. Em ambas as situações pode haver demora no atendimento de pessoas na fila de atendimento, uso inadequado de recursos e pior desempenho no atendimento.

Ao tomar decisões sobre triagem, é preciso lembrar que quando o acesso a uma unidade de terapia intensiva é priorizado, não significa que o paciente não irá receber tratamento e que certamente irá morrer. Essa não é uma decisão binária, mas sim uma decisão sobre probabilidade de sobrevida ao longo de toda a permanência do seu tratamento. Além disso, é importante considerar que a sobrevida não é o único desfecho importante nessa situação, mas igualmente importante é considerar a qualidade de vida dos sobreviventes.

Recentemente o mundo viveu situação de restrição de oferta de recursos da saúde por aumento incontrolável da sua necessidade durante uma pandemia. Esses efeitos são sentidos até a data de hoje. É objetivo pessoal deste autor que essa tese de doutorado venha a contribuir para otimizar os processos de triagem dos pacientes graves na instituição onde essa pesquisa foi desenvolvida e que isso sirva de exemplo e inspiração para outras instituições.

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ANEXOS

ANEXO 1 – *Acute Physiology and Chronic Health Evaluation II* (APACHE II)

THE APACHE II SEVERITY OF DISEASE CLASSIFICATION SYSTEM

PHYSIOLOGIC VARIABLE	HIGH ABNORMAL RANGE					LOW ABNORMAL RANGE			
	+4	+3	+2	+1	0	+1	+2	+3	+4
TEMPERATURE — rectal (°C)	≥ 41°	39° 40.9°		38.5° 38.9°	36° 38.4°	34° 35.9°	32° 33.9°	30° 31.9°	≤ 29.9°
MEAN ARTERIAL PRESSURE — mm Hg	≥ 160	130-159	110-129		70-109		50-69		≤ 49
HEART RATE (ventricular response)	≥ 180	140-179	110-139		70-109		55-69	40-54	≤ 39
RESPIRATORY RATE — (non-ventilated or ventilated)	≥ 50	35-49		25-34	12-24	10-11	6-9		≤ 5
OXYGENATION: A-aDO_2 or PaO_2 (mm Hg) a. FiO_2 ≥ 0.5 record A-aDO_2	≥ 500	350-499	200-349		≤ 200				
b. FiO_2 < 0.5 record only PaO_2					PO_2 > 70	PO_2 61-70		PO_2 55-60	PO_2 < 55
ARTERIAL pH	≥ 7.7	7.6-7.69		7.5-7.59	7.33-7.49		7.25-7.32	7.15-7.24	< 7.15
SERUM SODIUM (mMol/L)	≥ 180	160-179	155-159	150-154	130-149		120-129	111-119	≤ 110
SERUM POTASSIUM (mMol/L)	≥ 7	6-6.9		5.5-5.9	3.5-5.4	3-3.4	2.5-2.9		< 2.5
SERUM CREATININE (mg/100 ml) (Double point score for acute renal failure)	≥ 3.5	2-3.4	1.5-1.9		0.6-1.4		< 0.6		
HEMATOCRIT (%)	≥ 60		50-59.9	46-49.9	30-45.9		20-29.9		< 20
WHITE BLOOD COUNT (total/mm3) (in 1,000s)	≥ 40		20-39.9	15-19.9	3-14.9		1-2.9		< 1
GLASGOW COMA SCORE (GCS): Score = 15 minus actual GCS									
[A] Total ACUTE PHYSIOLOGY SCORE (APS): Sum of the 12 individual variable points									
Serum HCO_3 (venous-mMol/L) [Not preferred, use if no ABGs]	≥ 52	41-51.9		32-40.9	22-31.9		18-21.9	15-17.9	< 15

[B] AGE POINTS:
Assign points to age as follows:

AGE(yrs)	Points
< 44	0
45-54	2
55-64	3
65-74	5
≥ 75	6

[C] CHRONIC HEALTH POINTS
If the patient has a history of severe organ system insufficiency or is immuno-compromised assign points as follows:
a. for nonoperative or emergency postoperative patients — 5 points
or
b. for elective postoperative patients — 2 points

DEFINITIONS
Organ insufficiency or immuno-compromised state must have been evident prior to this hospital admission and conform to the following criteria:

LIVER: Biopsy proven cirrhosis and documented portal hypertension; episodes of past upper GI bleeding attributed to portal hypertension; or prior episodes of hepatic failure/encephalopathy/coma

CARDIOVASCULAR: New York Heart Association Class IV.

RESPIRATORY: Chronic restrictive, obstructive, or vascular disease resulting in severe exercise restriction, i.e., unable to climb stairs or perform household duties; or documented chronic hypoxia, hypercapnia, secondary polycythemia, severe pulmonary hypertension (>40mmHg), or respirator dependency.

RENAL: Receiving chronic dialysis.

IMMUNO-COMPROMISED: The patient has received therapy that suppresses resistance to infection, e.g., immuno-suppression, chemotherapy, radiation, long term or recent high dose steroids, or has a disease that is sufficiently advanced to suppress resistance to infection, e.g., leukemia, lymphoma, AIDS

APACHE II SCORE
Sum of [A] + [B] + [C]
[A] APS points ____
[B] Age points ____
[C] Chronic Health points ____
Total APACHE II ____

Fonte: Knaus WA, Draper EA, Wagner DP, Zimmerman JE. Apache II: A severity of disease classification system.Crit Care Med. 1985; 13(10): 818-29. Available from: file:///C:/Users/Usuario/Downloads/APACHE_II_a_severity_of_disease_classification_sys.pdf

1 **ANEXO 2 – *Sequential Organ Failure Assessment* (SOFA)**

	SOFA Score				
	0	1	2	3	4
Respiration					
Pao_2/Fio_2 (torr)	>400	≤400	≤300	≤200 With respiratory support	≤100 With respiratory support
Coagulation					
Platelets ($\times 10^3/mm^3$)	>150	≤150	≤100	≤50	≤20
Liver					
Bilirubin (mg/dL)	<1.2	1.2–1.9	2.0–5.9	6.0–11.9	>12.0
(μmol/L)	<20	20–32	33–101	102–204	>204
Cardiovascular					
Hypotension	No hypotension	MAP <70 mm Hg	Dopamine ≤5 or dobutamine (any dose)[a]	Dopamine >5 or epi ≤0.1 or norepi ≤0.1[a]	Dopamine >15 or epi >0.1 or norepi >0.1[a]
Central Nervous System					
Glasgow Coma Score	15	13–14	10–12	6–9	<6
Renal					
Creatinine (mg/dL)	<1.2	1.2–1.9	2.0–3.4	3.5–4.9	>5.0
(μmol/L)	<110	110–170	171–299	300–440	>440
or urine output				or <500 mL/day	or <200 mL/day

epi, epinephrine; norepi, norepinephrine.
[a]Adrenergic agents administered for at least 1 hr (doses given are in μg/kg/min).
To convert torr to kPa, multiply the value by 0.1333.

Fonte: Vincent J-L, de Mendonça A, Cantraine F, Moreno R, Takala J, Suter PM, et al. Use of the SOFA score to assess the incidence of organ dysfunction/failure in intensive care units: Results of a multicenter, prospective study. Crit Care Med. 1998;26(11):1793–800.

ANEXO 3 – *Therapeutic Intervention Scoring System-28* (TISS-28)

Table 1. Therapeutic Intervention Scoring System-28

	Points
Basic Activities	
Standard monitoring Hourly vital signs, regular registration and calculation of fluid balance	5
Laboratory. Biochemical and microbiological investigations	1
Single medication. Intravenously, intramuscularly, subcutaneously, and/or orally (e.g., gastric tube)	2
Multiple intravenous medication More than one drug, single shots, or continuously	3
Routine dressing changes. Care and prevention of decubitus and daily dressing change	1
Frequent dressing changes. Frequent dressing change (at least one time per each nursing shift) and/or extensive wound care	1
Care of drains All (except gastric tube)	3
Ventilatory Support	
Mechanical ventilation. Any form of mechanical ventilation/assisted ventilation with or without positive end-expiratory pressure, with or without muscle relaxants, spontaneous breathing with positive end-expiratory pressure	5
Supplementary ventilatory support Breathing spontaneously through endotracheal tube without positive end-expiratory pressure; supplementary oxygen by any method, except if mechanical ventilation parameters apply	2
Care of artificial airways. Endotracheal tube or tracheostoma	1
Treatment for improving lung function. Thorax physiotherapy, incentive spirometry, inhalation therapy, intratracheal suctioning	1
Cardiovascular Support	
Single vasoactive medication. Any vasoactive drug	3
Multiple vasoactive medication. More than one vasoactive drug, disregard type and doses	4
Intravenous replacement of large fluid losses. Fluid administration >3 L/m²/day, disregard type of fluid administered	4
Peripheral arterial catheter	5
Left atrium monitoring Pulmonary artery flotation catheter with or without cardiac output measurement	8
Central venous line	2
Cardiopulmonary resuscitation after arrest; in the past 24 hrs (single precordial percussion not included)	3
Renal Support	
Hemofiltration techniques. Dialytic techniques	3
Quantitative urine output measurement (e.g., by urinary catheter à demeure)	2
Active diuresis (e.g , furosemide >0 5 mg/kg/day for overload)	3
Neurologic Support	
Measurement of intracranial pressure	4
Metabolic Support	
Treatment of complicated metabolic acidosis/alkalosis	4
Intravenous hyperalimentation	3
Enteral feeding. Through gastric tube or other gastrointestinal route (e.g., jejunostomy)	2
Specific Interventions	
Single specific intervention in the intensive care unit. Naso- or orotracheal intubation, introduction of pacemaker, cardioversion, endoscopies, emergency surgery in the past 24 hrs, gastric lavage. Routine interventions without direct consequences to the clinical condition of the patient, such as radiographs, echography, electrocardiogram, dressings, or introduction of venous or arterial catheters, are not included	3
Multiple specific interventions in the intensive care unit. More than one, as described above	5
Specific interventions outside the intensive care unit Surgery or diagnostic procedures	5

Criteria of exclusion are applied in four conditions: "Multiple intravenous medication" excludes "single medication", "mechanical ventilation" excludes "supplementary ventilatory support", multiple vasoactive medication" excludes "single vasoactive medication", "multiple specific interventions in the intensive care unit" excludes "single specific interventions in the intensive care unit "

1 Fonte: Miranda DR, de Rijk A, Schaufeli W. Simplified Therapeutic Intervention
2 Scoring System: The TISS-28 items - results from a multicenter study. Cri Care Med.
3 1996; 24 (1):64-73.

ANEXO 4 – Instruções aos autores da *INTENSIVE CARE MEDICINE*

Disponível em: https://www.springer.com/journal/134/submission-guidelines (01/06/2020)

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All manuscripts undergo review. An initial check is conducted soon after submission to ensure that all manuscripts comply with the guidelines outlined in the Instructions for Authors. A pre-evaluation is then performed by the Editor-in-Chief and one or more Editors to determine which papers are sent for external peer review. Papers not sent out for review will be immediately rejected.
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• Conclusions are presented in a clear and concise manner and are supported by the data.
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Reference citations in the text should be identified by numbers in square brackets. Some examples:

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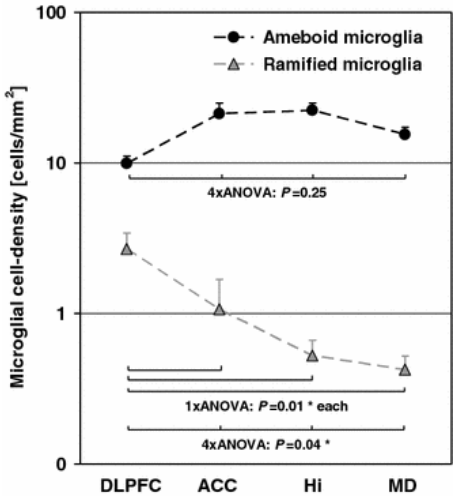

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Authors are responsible for correctness of the statements provided in the manuscript. See also Authorship Principles. The Editor-in-Chief reserves the right to reject submissions that do not meet the guidelines described in this section.

Informed consent

All individuals have individual rights that are not to be infringed. Individual participants in studies have, for example, the right to decide what happens to the (identifiable) personal data gathered, to what they have said during a study or an interview, as well as to any photograph that was taken. This is especially true concerning images of vulnerable

people (e.g. minors, patients, refugees, etc) or the use of images in sensitive contexts. In many instances authors will need to secure written consent before including images. Identifying details (names, dates of birth, identity numbers, biometrical characteristics (such as facial features, fingerprint, writing style, voice pattern, DNA or other distinguishing characteristic) and other information) of the participants that were studied should not be published in written descriptions, photographs, and genetic profiles unless the information is essential for scholarly purposes and the participant (or parent or guardian if the participant is incapable) gave written informed consent for publication. Complete anonymity is difficult to achieve in some cases. Detailed descriptions of individual participants, whether of their whole bodies or of body sections, may lead to disclosure of their identity. Under certain circumstances consent is not required as long as information is anonymized and the submission does not include images that may identify the person.

Informed consent for publication should be obtained if there is any doubt. For example, masking the eye region in photographs of participants is inadequate protection of anonymity. If identifying characteristics are altered to protect anonymity, such as in genetic profiles, authors should provide assurance that alterations do not distort scientific meaning.

Exceptions where it is not necessary to obtain consent:

• Images such as x rays, laparoscopic images, ultrasound images, brain scans, pathology slides unless there is a concern about identifying information in which case, authors should ensure that consent is obtained.

• Reuse of images: If images are being reused from prior publications, the Publisher will assume that the prior publication obtained the relevant information regarding consent. Authors should provide the appropriate attribution for republished images.

Consent and already available data and/or biologic material

Regardless of whether material is collected from living or dead patients, they (family or guardian if the deceased has not made a pre-mortem decision) must have given prior written consent. The aspect of confidentiality as well as any wishes from the deceased should be respected.

Data protection, confidentiality and privacy

When biological material is donated for or data is generated as part of a research project authors should ensure, as part of the informed consent procedure, that the participants are made what kind of (personal) data will be processed, how it will be used and for what purpose. In case of data acquired via a biobank/biorepository, it is possible they apply a broad consent which allows research participants to consent to a broad range of uses of their data and samples which is regarded by research ethics committees as specific enough to be considered “informed”. However, authors should always check the specific biobank/biorepository policies or any other type of data provider policies (in case of non-bio research) to be sure that this is the case.

Consent to Participate

For all research involving human subjects, freely-given, informed consent to participate in the study must be obtained from participants (or their parent or legal guardian in the case of children under 16) and a statement to this effect should appear in the manuscript. In the case of articles describing human transplantation studies, authors must include a statement declaring that no organs/tissues were obtained from prisoners and must also name the institution(s)/clinic(s)/department(s) via which organs/tissues were obtained. For manuscripts reporting studies involving vulnerable groups where there is the potential for coercion or where consent may not have been fully informed, extra care will be taken by the editor and may be referred to the Springer Nature Research Integrity Group.

Consent to Publish

Individuals may consent to participate in a study, but object to having their data published in a journal article. Authors should make sure to also seek consent from individuals to publish their data prior to submitting their paper to a journal. This is in particular applicable to case studies. A consent to publish form can be found

Summary of requirements

The above should be summarized in a statement and placed in a **"Declarations"** section before the reference list under a heading of **'Consent to participate'** and/or **'Consent to publish'**.

Please see the various examples of wording below and revise/customize the sample statements according to your own needs.

Provide **"Consent to participate"** as a heading

Sample statements for consent to participate:

Informed consent was obtained from all individual participants included in the study.

Informed consent was obtained from legal guardians.

Written informed consent was obtained from the parents.

Verbal informed consent was obtained prior tothe interview.

Sample statements for **"Consent to publish"**:

The authors affirm that human research participants provided informed consent for publication of the images in Figure(s) 1a, 1b and 1c.

The participant has consented to the submission of the case report to the journal.

Patients signed informed consent regarding publishing their data and photographs.

Sample statements if identifying information about participants is available in the article:

Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

Authors are responsible for correctness of the statements provided in the manuscript. See also Authorship Principles. The Editor-in-Chief reserves the right to reject submissions that do not meet the guidelines described in this section.

Images will be removed from publication if authors have not obtained informed consent or the paper may be removed and replaced with a notice explaining the reason for removal.

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The purpose of the proof is to check for typesetting or conversion errors and the completeness and accuracy of the text, tables and figures. Substantial changes in content, e.g., new results, corrected values, title and authorship, are not allowed without the approval of the Editor.

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- Visiting the English language tutorial which covers the common mistakes when writing in English.
- Using a professional language editing service where editors will improve the English to ensure that your meaning is clear and identify problems that require your review. Two such services are provided by our affiliates Nature Research Editing Service and American Journal Experts. Springer authors are entitled to a 10% discount on their first submission to either of these services, simply follow the links below.

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If your manuscript is accepted it will be checked by our copyeditors for spelling and formal style before publication.

ANEXO 4 – Instruções aos autores da *INTENSIVE CARE MEDICINE*

Disponível em: https://www.springer.com/journal/134/submission-guidelines (01/06/2020)

Instructions for Authors

General

All papers providing pre-clinical data (experimental, animal, in-vitro, bench studies or studies without patients) should be submitted to ICM Experimental ICM Experimental/. It is necessary for you to upload the appropriate EQUATOR checklist for your study. Please find the appropriate checklist at EQUATOR Network.

All manuscripts undergo review. An initial check is conducted soon after submission to ensure that all manuscripts comply with the guidelines outlined in the Instructions for Authors. A pre-evaluation is then performed by the Editor-in-Chief and one or more Editors to determine which papers are sent for external peer review. Papers not sent out for review will be immediately rejected.

Research articles must meet the following criteria:

• The manuscript presents the results of primary scientific research.
• The results have not been published in full elsewhere.
• Analyses are performed to a high technical standard and are described in full in the manuscript.
• Conclusions are presented in a clear and concise manner and are supported by the data.
• Manuscripts must be written English using standard scientific terms.
• The research meets all applicable ethical standards.
• The article adheres to appropriate reporting guidelines and community standards for full data disclosure.
• All conflicts of interest should be clearly stated in the manuscript.
• According to the Uniform Requirements for Manuscripts Submitted to Biomedical Journals, designation as an author must satisfy three conditions. The author must have:
- Contributed substantially to the conception and design of the study, the acquisition of data, or the analysis and interpretation of the data.
- Drafted or provided critical revision of the article.
- Provided final approval of the version submitted for publication.
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- A 140-character Tweet that may appear online via the Intensive Care Medicine website or social media platforms. This Tweet will not form part of the print version of the manuscript.
• The role of authors and contributors has recently been clarified by the ICMJE

Types of Papers

ICM is not accepting papers providing pre-clinical data (experimental, animal, in-vitro, bench studies or studies without patients). These manuscripts should be submitted to ICM Experimental

Original Papers

Research articles must meet the following criteria:

• The manuscript presents the results of primary scientific research
• The results have not been published in full elsewhere
• Analyses are performed to a high technical standard and are described in full in the manuscript
• Conclusions are presented in a clear and concise manner and are supported by the data

• Manuscripts must be written in English using standard scientific terms
• The research meets all applicable ethical standards
• The article adheres to appropriate reporting guidelines and community standards for full data disclosure. In general papers of studies that have been pre-registered or have a pre-published or approved protocol and analysis plan are prioritized
• All conflicts of interest should be clearly stated in the manuscript
• It is mandatory to upload the appropriate EQUATOR checklist for your study. Please find the appropriate checklist at EQUATOR Network
• According to the Uniform Requirements for Manuscripts Submitted to Biomedical Journals, designation as an author must satisfy three conditions. Each author must have:
- Contributed substantially to the conception and design of the study, the acquisition of data, or the analysis and interpretation of the data
- Drafted or provided critical revision of the article
- Provided final approval of the version submitted for publication
• A statement detailing the role of each author in the study should be reported in an appropriate Authorship statement section of the manuscript in compliance with the ICMJE recommendations.
• At the Editor's discretion, authors may be asked to reduce the number of authors in the byline, whenever appropriate. The authors may add a study group name as an author in the byline and list the study group members in an appropriate footnote in the first page of the manuscript in order to have their names entered in PubMed as Collaborators.
• In addition to the abovementioned statements an Authorship and Conflict of Interest form should be completed, signed by each author and uploaded with the manuscript. The form can be downloaded here.
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• Original papers must not exceed 3,000 words and should include no more than 5 illustrations and tables.
• Up to 50 references are permitted. If a higher number of references is needed, explain the reasons during the submission processes.
• When reporting the results of a randomized controlled trial, author(s) should use the CONSORT statement as a guide in preparing the manuscript.
• If the authors consider that their manuscript needs to be longer than 3,000 words or contain more figures or tables, the reasons for this should be justified in the cover letter to the Editor-in-Chief.
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• IRB/ethical committee approval and patient informed consent statements should be reported in the manuscript in the Materials and Methods section or in a separate section at the end of the manuscript
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.
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• From a manuscript preparation point of view, please comply with the instructions for Original Articles

Review Articles, Systematic Reviews, Meta-Analyses

• Review articles should only be submitted after prior consultation with the editors and are subject to the peer review process. The journal is primarily interested in receiving systematic reviews and meta-analyses that use high-quality methodology (pre-registered, published protocol, systematic search, selection and reporting paper) and address relevant clinical questions not already or completely addressed in the literature.
• Review articles must not exceed 4,000 words and 75 references. Supplementary information can be published in electronic supplements without limitation.
• Proposals for review articles should be submitted as a two-page outline so that content can be discussed at an early stage. Review articles must include original tables, figures, graphs, and other didactic materials. They must provide unique information not available elsewhere.
• Authorship should comply with the ICMJE recommendation for authorship and the role of each author should be specified in the first page of the manuscript below the byline.
• At the Editor's decision, authors may be asked to reduce the number of authors in the byline whenever appropriate. The authors may add a study group name as an author in the byline and list the study group members in an appropriate footnote in the first page of the manuscript in order to have their names entered in PubMed as Collaborators.
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- A "Take-home message" (two sentences) which summarizes how the manuscript adds to current knowledge. This will appear in the final published version of the paper.
- A 140-character Tweet that may appear online via the Intensive Care Medicine website or social media platforms. This Tweet will not form part of the print version of the manuscript

Two types of reviews are considered: Systematic Reviews and Meta-Analyses (or a combination of both). It is strongly recommended that systematic reviews and meta-analyses comply with the PRISMA Statement, which is available

Narrative/Scoping Reviews

Narrative/Scoping Reviews should only be submitted after prior consultation with the Editors and are subject to the peer-review process. They represent the state-of-the-art in a specific field of research and are prepared by senior authors with a broad knowledge of the field.
• Narrative reviews should not exceed 4,000 words and 80 references and should contain figures and tables
• Authorship should not exceed 3 authors, preferably from different centres/countries, although some exceptions can be made by the Editors on a case by case basis depending on the topic
• A statement detailing each Author's role in the study and conflict of interest is mandatory for all papers
• In addition to the abovementioned statements an Authorship and Conflict of Interest form should be completed, signed by each author and uploaded with the manuscript. The form can be downloaded here.
• IRB/ethical committee approval and informed consent statements are not required

• A structured abstract is not required

Editorials

• Editorials are always commissioned by the Editors and comment on one or more articles in the same issue of the Journal. Editorials must not exceed 1,000 words and up to 15 references, and include a mandatory table or figure.
• Editorials have a maximum of 3 authors
• No abstract
• Conflict of interest disclosure is mandatory for all papers
• Conflict of interest disclosure is mandatory for all papers and should be accompanied by a form to be signed by each author. The form can be downloaded here.

What's New in Intensive Care?

• What's New articles can only be submitted after invitation by an Editor
• Expert clinicians and scientists are invited to outline the most striking advances in their field of expertise. The manuscript should focus on the most recent knowledge and address ICM's global readership.
• What's New articles are in the format of editorials and typically entitled "What's New in ...". They must not exceed 1,000 words and up to 15 references, and include a mandatory table or figure. A maximum of three authors is permitted.
• Expert clinicians and scientists are invited to outline the most striking advances in their field of expertise. The manuscript should focus on the most recent knowledge and address ICM's global readership.
• No abstract

Understanding the Disease

"Understanding the disease" articles can only be submitted after invitation by an Editor. Authors should outline a clinical challenge in intensive care medicine and can include a specific disease state, a syndrome, and a clinical abnormality or an intervention. The manuscript should communicate best practice in this field in a focused and structured way that is accessible to a broad group of clinical colleagues, while outlining the most recent advances.
• They are prepared in the format of editorials and must not exceed 1,000 words and up to 15 references.
• A single image is mandatory
• A maximum of three authors is permitted
• No abstract is required

Less is more in Intensive Care

„Less is more in Intensive Care" articles can only be submitted upon invitation by an Editor.
They should not exceed 1,000 words and 20 references.
• A maximum of three authors is permitted, preferably from different centres/countries
• No abstract is required

Images

• Submission under the Image section must be of high scientific quality and value as well as providing didactic and self-explanatory lessons. They must be unique and adhere to ethical standards with patient/relative approval when appropriate, protection of patient identity and privacy, and local ethics approval as appropriate.
• The accompanying text must not exceed 200 words. A maximum of four authors is permitted.
• No abstract or references
• The section is not supposed for the publication of case-reports. The focus is on the images

Correspondence

Correspondence articles provide an opportunity to debate published articles on ICM. The Correspondence is aimed at commenting on an ICM article.

• The Correspondence article must not exceed 500 words, 5 references (including the ICM article which is referred) and 1 figure or table
• The total number of authors should not exceed 5
• At the Editor's discretion the authors of the commented original article may be invited to write a reply, which also should not exceed 500 words, 5 references (including the original ICM article and the related correspondence) and 1 figure or table

Letters to the Editor

• Letters to the editor provide an opportunity to present results of high scientific value where a short format is most appropriate. Typically, letters are dedicated to small pilot/feasibility studies and/or preliminary data. They must not exceed 500 words, 5 references and 1 figure or table.
• The journal does not consider case reports or brief reports for publication.
• Authorship of letters to the editor should be limited to 5 authors or less. In case of letters which stem from an original study with a higher number of authors, a choice must be made by the authors on the names that should appear in the byline and those that may appear in a footnote or in a study group
• Study group collaborating authors should be included in the front page but separate from the byline
• To the Editor's discretion the authors may be asked to specify the role of each author in the article preparation

From the Inside

• From the inside includes poetry, trivia, personal stories, thoughts and memories, sounding boards, obituaries or other qualitative materials that authors wish to share with colleagues.

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Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

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Please follow the hyperlink "Submit online" on the right and upload all of your manuscript files following the instructions given on the screen.
Please ensure you provide all relevant editable source files. Failing to submit these source files might cause unnecessary delays in the review and production process.

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Please use this **template title page** for providing the following information.
The title page should include:

- The name(s) of the author(s)
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- The affiliation(s) of the author(s), i.e. institution, (department), city, (state), country
- A clear indication and an active e-mail address of the corresponding author
- If available, the 16-digit ORCID of the author(s)

If address information is provided with the affiliation(s) it will also be published.
For authors that are (temporarily) unaffiliated we will only capture their city and country of residence, not their e-mail address unless specifically requested.

Abstract

P/lease provide a structured abstract of 150 to 250 words which should be divided into the following sections:

- Purpose (stating the main purposes and research question)
- Methods
- Results
- Conclusion

For life science journals only (when applicable)

Trial registration number and date of registration

Trial registration number, date of registration followed by “retrospectively registered”

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

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All manuscripts must contain the following sections under the heading 'Declarations'.

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To be used for non-life science journals

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Conflicts of interest/Competing interests (include appropriate disclosures)

Availability of data and material (data transparency)

Code availability (software application or custom code)

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory)

To be used for life science journals + articles with biological applications

Funding (information that explains whether and by whom the research was supported)

Conflicts of interest/Competing interests (include appropriate disclosures)

Ethics approval (include appropriate approvals or waivers)

Consent to participate (include appropriate statements)

Consent for publication (include appropriate statements)

Availability of data and material (data transparency)

Code availability (software application or custom code)

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory)

Please see the relevant sections in the submission guidelines for further information as well as various examples of wording. Please revise/customize the sample statements according to your own needs.

Please note:

- An abstract is not required for Editorials, Short articles such as ‘Focus on, Less is More in Intensive Care, Understanding the Disease, etc.’
- For details, or to submit an outline of your manuscript, please contact the Intensive Care Medicine Managing Editor at intensivecaremedicine@unimib.it

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Text Formatting

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.
- Use the equation editor or MathType for equations.
- Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX.

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Zotero

If you use Zotero, the ICM styling template can be found here.

Scientific style

Generic names of drugs and pesticides are preferred; if trade names are used, the generic name should be given at first mention.

References

Citation

Reference citations in the text should be identified by numbers in square brackets. Some examples:

1. Negotiation research spans many disciplines [3].
2. This result was later contradicted by Becker and Seligman [5].
3. This effect has been widely studied [1-3, 7].

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

The entries in the list should be numbered consecutively.

- Journal article
  Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. Eur J Appl Physiol 105:731-738. https://doi.org/10.1007/s00421-008-0955-8
  Ideally, the names of all authors should be provided, but the usage of “et al” in long author lists will also be accepted:
  Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. N Engl J Med 965:325–329
- Article by DOI
  Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. J Mol Med. https://doi.org/10.1007/s001090000086
- Book
  South J, Blass B (2001) The future of modern genomics. Blackwell, London
- Book chapter
  Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257
- Online document
  Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb. http://physicsweb.org/articles/news/11/6/16/1. Accessed 26 June 2007

- Dissertation
  Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations, see
If you are unsure, please use the full journal title.
For authors using EndNote, Springer provides an output style that supports the formatting of in-text citations and reference list.
Please note:
References are not necessary for the following sections: Correspondences, Imaging, and From the inside.

Tables

- All tables are to be numbered using Arabic numerals.
- Tables should always be cited in text in consecutive numerical order.
- For each table, please supply a table caption (title) explaining the components of the table.
- Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
- Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

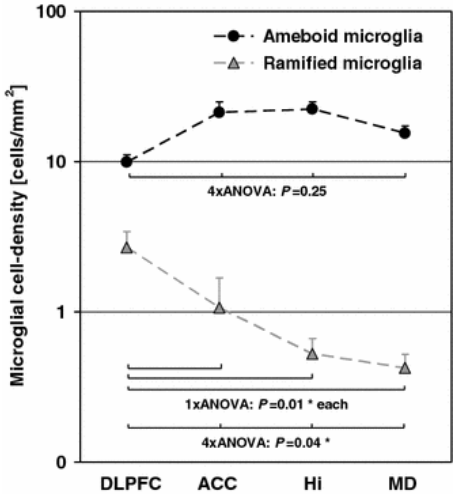
Tables for ICM publication should be prepared taking into account the current style of the journal. Tables that do not exceed the A4 width of a page (portrait format) are preferred. Decimals should be limited to two digits, unless data require to specify up to the third or fourth decimal digit (e.g. 0.0004). Unnecessary decimals should be avoided (e.g. 4.00 should be 4).

Artwork and Illustrations Guidelines

Electronic Figure Submission

- Supply all figures electronically.
- Indicate what graphics program was used to create the artwork.
- For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.
- Vector graphics containing fonts must have the fonts embedded in the files.
- Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art



- Definition: Black and white graphic with no shading.
- Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
- All lines should be at least 0.1 mm (0.3 pt) wide.
- Scanned line drawings and line drawings in bitmap format should have a

minimum resolution of 1200 dpi.
- Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art
- Definition: Photographs, drawings, or paintings with fine shading, etc.
- If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.
- Halftones should have a minimum resolution of 300 dpi.

Combination Art
- Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.
- Combination artwork should have a minimum resolution of 600 dpi.

Color Art
- Color art is free of charge for online publication.
- If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.
- If the figures will be printed in black and white, do not refer to color in the captions.
- Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering
- To add lettering, it is best to use Helvetica or Arial (sans serif fonts).
- Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).
- Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.
- Avoid effects such as shading, outline letters, etc.
- Do not include titles or captions within your illustrations.

Figure Numbering
- All figures are to be numbered using Arabic numerals.
- Figures should always be cited in text in consecutive numerical order.
- Figure parts should be denoted by lowercase letters (a, b, c, etc.).
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