



IMAGE: A MAP OF THE STARS OF THE ORION CONSTELLATION

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# Efficacy of Vacuum Dressing Versus Traditional Dressing in Healing Soft Tissue Injuries in Patients with Post-Traumatic Fractures: A Systematic Review

*Giovanna dos Santos Cesario, Leticia Pastana De Mello, Isabela Tiemi Aguiar Matsuda, Luísa Vieira Causin Alves, Sofia Mei Hirata, Danilo de Amorim Simões, Yasmin de Paula Assumpção, Bruna Mendes Abib, Giovanna Anjos, Giovanna Marcusso Fontenla, Beatriz Cianci, Thomas Moreno Camargo & Ana Beatriz Gardim Granja*

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## ABSTRACT

**Introduction:** Soft tissue injuries in post- traumatic fractures are a clinical challenge, associated with high complication rates. Negative Pressure Wound Therapy (NPWT) has emerged as a promising alternative to traditional dressings.

**Objective:** To evaluate, through a systematic review, the efficacy of Negative Pressure Wound Therapy (NPWT) compared to traditional dressings in the treatment of soft tissue injuries in patients with fractures.

**Keywords:** fracture, soft tissue injuries, negative- pressure wound therapy, dressings, wound healing.

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# Efficacy of Vacuum Dressing Versus Traditional Dressing in Healing Soft Tissue Injuries in Patients with Post-Traumatic Fractures: A Systematic Review

Eficácia Do Curativo A Vácuo Versus Curativo Tradicional Na Cicatrização De Lesões De Partes Moles Em Pacientes Com Fraturas Pós Trauma: Uma Revisão Sistemática

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## RESUMO

**Introdução:** As lesões de partes moles em fraturas pós-trauma são um desafio clínico, associadas a altas taxas de complicações. A Terapia por Pressão Negativa (TPN) surgiu como uma alternativa promissora aos curativos tradicionais.

**Objetivo:** Avaliar, por meio de uma revisão sistemática, a eficácia da Terapia por Pressão Negativa (TPN) em comparação ao curativo tradicional no tratamento de lesões de partes moles em pacientes com fraturas.

**Metodologia:** Realizou-se uma revisão sistemática da literatura nas bases de dados PubMed, SciELO e LILACS, com artigos publicados entre 2010 e 2025. Seis estudos foram incluídos na síntese qualitativa final.

**Resultados:** As evidências indicam que a TPN é superior ao curativo tradicional na redução do tempo de cicatrização e na diminuição das taxas de infecção, especialmente em fraturas de membros inferiores. Contudo, os benefícios quanto à redução do tempo de hospitalização e da necessidade de reintervenções cirúrgicas são inconsistentes na literatura. A custo-efetividade da TPN mostrou-se controversa e dependente do contexto do sistema de saúde, e os dados sobre

*desfechos funcionais a longo prazo são escassos. Conclusão: A TPN é uma ferramenta terapêutica eficaz e preferencial para o manejo de feridas complexas associadas a fraturas, principalmente para acelerar a cicatrização e reduzir o risco de infecção. A decisão de seu uso, no entanto, deve ser ponderada, considerando as controvérsias sobre sua custo-efetividade, a heterogeneidade das evidências e o perfil clínico do paciente.*

**Palavras-Chave:** fratura, lesões de partes moles, terapia por pressão negativa na ferida, curativos, cicatrização.

## ABSTRACT

**Introduction:** Soft tissue injuries in post-traumatic fractures are a clinical challenge, associated with high complication rates. Negative Pressure Wound Therapy (NPWT) has emerged as a promising alternative to traditional dressings.

**Objective:** To evaluate, through a systematic review, the efficacy of Negative Pressure Wound Therapy (NPWT) compared to traditional dressings in the treatment of soft tissue injuries in patients with fractures.

**Methods:** A systematic literature review was conducted in the PubMed, SciELO, and LILACS

databases, including articles published between 2010 and 2025. Six studies were included in the final qualitative synthesis.

*Results: The evidence indicates that NPWT is superior to traditional dressings in reducing healing time and decreasing infection rates, particularly in lower limb fractures. However, the benefits regarding the reduction of hospitalization time and the need for surgical reinterventions are inconsistent in the literature. The cost-effectiveness of NPWT proved to be controversial and dependent on the healthcare system context, and data on long-term functional outcomes are scarce.*

*Conclusion: NPWT is an effective and preferential therapeutic tool for managing complex wounds associated with fractures, primarily for accelerating healing and reducing infection risk. The decision for its use, however, must be carefully considered, taking into account the controversies regarding its cost-effectiveness, the heterogeneity of the evidence, and the patient's clinical profile.*

**Keywords:** fracture, soft tissue injuries, negative-pressure wound therapy, dressings, wound healing.

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## I. INTRODUÇÃO

As fraturas pós-trauma representam um importante desafio para a ortopedia e a traumatologia, pois, além da lesão óssea, frequentemente envolvem um comprometimento complexo dos tecidos moles adjacentes. Lesões de pele, subcutâneo e musculatura, especialmente em fraturas expostas classificadas como de alta energia (ex: Gustilo-Anderson tipo III), aumentam drasticamente o risco de complicações graves como infecção, necrose tecidual, desenvolvimento de osteomielite crônica e atraso na consolidação óssea (Gustilo & Anderson, 1976; Lira et al., 2020; Zalavras et al., 2004). O manejo adequado dessa cobertura de partes moles é um pilar determinante para o prognóstico do

paciente, influenciando o tempo de recuperação, a necessidade de reintervenções cirúrgicas, os custos hospitalares e o resultado funcional final (Ferreira; Soares, 2018; Parrett & Matros, 2010).

Historicamente, o curativo tradicional, tipicamente com gaze úmida para seca, tem sido o método padrão no tratamento de feridas traumáticas. Embora desempenhe um papel na proteção mecânica e na absorção de exsudatos, suas limitações são bem documentadas. Tais curativos podem aderir ao leito da ferida, causando dor e trauma tecidual durante as trocas, além de falharem em manter um ambiente úmido controlado, essencial para a migração celular e a cicatrização (Gupta et al., 2019; Jones, 2006). A incapacidade de gerenciar grandes volumes de exsudato e de controlar o edema local impulsionou o desenvolvimento de novas estratégias terapêuticas, entre as quais se destaca a terapia por pressão negativa (TPN), também conhecida como curativo a vácuo (*Vacuum-Assisted Closure - V.A.C.®*) (Meara et al., 2000; O'Brien, 2012).

A TPN, introduzida na prática clínica por Argenta e Morykwas (1997), consiste na aplicação de pressão subatmosférica controlada e contínua ou intermitente sobre o leito da ferida, através de uma espuma de poliuretano ou álcool polivinílico conectada a um sistema de sucção selado. O mecanismo de ação é multifatorial, envolvendo efeitos de macrodeformação (contração da ferida, aproximação das bordas) e microdeformação (estiramento celular que estimula a angiogênese e a mitose) (Saxena et al., 2004; Glass et al., 2014). Essa técnica promove a remoção ativa de secreções e material infeccioso, a redução do edema intersticial, o controle da carga bacteriana e a estimulação da formação de tecido de granulação, criando um microambiente favorável à cicatrização e preparando a ferida para o fechamento definitivo (Webb, 2005; Orgill & Bayer, 2013).

A aplicação da TPN no contexto ortopédico tem sido associada a resultados promissores. Diversos estudos sugerem uma redução nas taxas de infecção de sítio cirúrgico, uma diminuição na necessidade de procedimentos de retalho

complexos e uma otimização do tempo até o fechamento da ferida (Stannard et al., 2009; Dedmond et al., 2007). Ensaios clínicos e meta-análises têm demonstrado a eficácia da TPN em feridas traumáticas complexas, úlceras de pressão, feridas diabéticas e deiscências pós-operatórias (Blume et al., 2008; Liu et al., 2018; Webster et al., 2019). No entanto, a superioridade da TPN sobre os curativos convencionais em todos os cenários ainda é objeto de debate. Grandes ensaios clínicos randomizados, como o estudo WOLFF (Costa et al., 2016), não encontraram diferenças estatisticamente significativas na taxa de infecção profunda em fraturas abertas de membros inferiores. Em contrapartida, o estudo FLOW (FLOW

Investigators, 2015), um dos maiores na área, sugeriu benefícios, embora as conclusões sobre curativos permaneçam complexas.

Essa heterogeneidade de resultados, somada às discussões sobre o custo-efetividade da terapia (Flack et al., 2015; Spencer, 2013), evidencia a necessidade de revisões sistemáticas que consolidem o conhecimento, avaliem criticamente as evidências e estabeleçam parâmetros claros para a indicação da

TPN no tratamento de lesões de partes moles associadas a fraturas. A sistematização das evidências pode auxiliar na elaboração de protocolos assistenciais, otimizar a tomada de decisão clínica e, em última instância, melhorar os desfechos para os pacientes.

## II. REFERENCIAL TEÓRICO

O tratamento de feridas traumáticas associadas a fraturas evoluiu consideravelmente ao longo das décadas. O modelo histórico, centrado em curativos tradicionais, visava primariamente proteger a lesão, absorver exsudatos e prevenir a contaminação grosseira (Ferreira; Soares, 2018). Contudo, a compreensão moderna da fisiologia da cicatrização destacou as limitações desse método, especialmente sua incapacidade de manter um ambiente úmido ideal e de gerenciar ativamente o microambiente da ferida (O'Brien, 2012; Atiyeh et al., 2002). Essas deficiências motivaram a busca

por tecnologias avançadas, culminando na terapia por pressão negativa (TPN) como uma das inovações mais impactantes no cuidado de feridas complexas (Voinchet & Goudot, 2005).

A TPN, cujo conceito foi pioneiramente descrito e popularizado por Argenta e Morykwas (1997), baseia-se na aplicação de pressão subatmosférica (geralmente entre -75 e -125 mmHg) sobre um curativo oclusivo. Este processo gera um gradiente de pressão que promove múltiplos efeitos terapêuticos. Fisiologicamente, a TPN remove o excesso de fluido intersticial, reduzindo o edema e a compressão sobre os capilares, o que melhora a perfusão sanguínea local (Morykwas et al., 1997). A remoção contínua de exsudato também diminui a carga bacteriana e a concentração de citocinas inflamatórias no leito da ferida (Mouës et al., 2004). Além disso, a deformação mecânica induzida pela espuma (microdeformação) estimula a proliferação de fibroblastos e células endoteliais, acelerando a formação de tecido de granulação e a angiogênese (Glass et al., 2014; McNulty et al., 2007).

Na prática ortopédica, a TPN é frequentemente utilizada como uma "ponte para o fechamento", estabilizando a ferida até que o paciente tenha condições clínicas para um procedimento de cobertura definitivo, como enxerto de pele ou retalho microcirúrgico (DeFranzo et al., 2001; Bovill et al., 2009). Ensaios controlados e estudos de coorte demonstraram benefícios significativos. Por exemplo, o trabalho de Stannard et al. (2012) mostrou uma redução notável na taxa de infecção em fraturas de tíbia de alta energia tratadas com TPN em comparação com curativos convencionais. Da mesma forma, revisões sistemáticas e meta-análises corroboram a eficácia da TPN na redução do tempo de cicatrização e na melhora da qualidade do tecido de granulação em feridas agudas e crônicas (Peinemann & Sauerland, 2011; Huang et al., 2014).

Apesar do crescente corpo de evidências favoráveis, a aplicação da TPN não é isenta de controvérsias e desafios. A análise de custo-efetividade é complexa; embora o custo diário da TPN seja superior ao dos curativos

tradicionais, alguns estudos sugerem que ela pode reduzir os custos globais ao diminuir o tempo de internação, a frequência de trocas de curativo e a necessidade de reoperações (Braakenburg et al., 2006; Flack et al., 2015). No entanto, os resultados de grandes ensaios, como o WOLFF (Costa et al., 2016), questionaram seu benefício universal na prevenção de infecções em fraturas expostas, sugerindo que a seleção de pacientes e o protocolo de aplicação são cruciais. Além disso, a TPN possui contraindicações, como a presença de malignidade na ferida, osteomielite não tratada, fístulas não exploradas e tecido necrótico com escara, e requer cautela em pacientes com risco de sangramento (Orgill & Bayer, 2013; Vig et al., 2011).

Assim, a literatura atual, embora majoritariamente favorável, reflete um cenário de nuances. A TPN é uma ferramenta poderosa, mas sua indicação deve ser criteriosa, baseada no tipo de ferida, nas comorbidades do paciente e nos recursos disponíveis. Essas lacunas e debates reforçam a importância de uma revisão sistemática que sintetize criticamente as evidências, comparando desfechos clínicos, funcionais e econômicos para subsidiar a elaboração de protocolos clínicos mais assertivos e baseados em evidências.

### III. OBJETIVOS

#### 3.1 Objetivo Geral

Avaliar, por meio de uma revisão sistemática da literatura, a eficácia do curativo a vácuo em comparação ao curativo tradicional na cicatrização de lesões de partes moles em pacientes com fraturas pós-trauma.

### IV. OBJETIVOS ESPECÍFICOS

1. Comparar o tempo médio de cicatrização entre curativo a vácuo e curativo tradicional.
2. Avaliar a incidência de infecção e complicações associadas a cada técnica de curativo.
3. Analisar o impacto dos métodos de curativo no tempo de hospitalização e na necessidade de reintervenções cirúrgicas.

4. Investigar a influência dos diferentes métodos de curativo na evolução funcional e no prognóstico dos pacientes.
5. Identificar evidências sobre custo-efetividade e aplicabilidade clínica do curativo a vácuo em diferentes contextos de saúde.

## V. METODOLOGIA

### 5.1 Tipo de Estudo

Trata-se de uma revisão sistemática da literatura, desenvolvida de acordo com as recomendações do *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA 2020) e conduzida conforme os princípios éticos para publicação científica propostos pelo *Committee on Publication Ethics* (COPE). O estudo teve como objetivo comparar a eficácia do curativo a vácuo (*Negative Pressure Wound Therapy – NPWT*) com o curativo tradicional na cicatrização de lesões de partes moles em pacientes com fraturas decorrentes de trauma.

### 5.2 Pergunta de Pesquisa (PICO)

A pergunta foi estruturada segundo o modelo *PICO*, sendo:

- *P (População)*: pacientes com fraturas pós-trauma e lesões de partes moles;
- *I (Intervenção)*: curativo a vácuo (NPWT ou Vacuum Assisted Closure);
- *C (Comparador)*: curativo tradicional ou tratamento convencional;
- *O (Desfechos)*: tempo de cicatrização, taxa de infecção, tempo de internação, complicações e custo-efetividade.

### 5.3 A Questão Norteadora Foi

“O curativo a vácuo é mais eficaz que o curativo tradicional na cicatrização de lesões de partes moles em pacientes com fraturas pós-trauma?”

### 5.4 Fontes De Informação E Bases De Dados

A busca dos artigos foi realizada nas seguintes bases de dados eletrônicas: PubMed, SciELO (Scientific Electronic Library Online) e Lilacs A pesquisa incluiu publicações no período entre

Foram utilizados descritores em inglês e português (*Medical Subject Headings - MeSH* e *Descritores em Ciências da Saúde - DeCS*), combinados com os operadores booleanos "AND" e "OR".

### 5.5 Filtros Aplicados

Período: janeiro de 2010 a setembro de 2025;  
Tipos de estudo: ensaios clínicos randomizados, estudos de coorte e revisões sistemáticas prévias;  
Idiomas: inglês, português e espanhol; População: humanos adultos.

### 5.6 Seleção dos Estudos e Critérios de Elegibilidade

O processo de seleção dos estudos foi realizado em duas etapas por dois revisores independentes, com as divergências resolvidas por consenso:

1. *Triagem por Título e Resumo:* Todos os artigos identificados foram avaliados com base na relevância de seus títulos e resumos. Aqueles que claramente não se alinhavam aos objetivos da pesquisa foram excluídos.
2. *Avaliação do Texto Completo:* Os artigos que passaram na triagem inicial foram lidos na íntegra para uma avaliação final de elegibilidade, aplicando-se rigorosamente os critérios de inclusão e exclusão descritos abaixo.

### 5.7 Critérios de Inclusão

#### Inclusão

- Estudos que compararam diretamente o curativo a vácuo ao curativo tradicional;
- Pacientes com fraturas e lesões de partes moles resultantes de trauma;
- Trabalhos que apresentaram desfechos clínicos mensuráveis (tempo de cicatrização, infecção, hospitalização, custo).

#### Exclusão

- Estudos em animais, relatos de caso, revisões narrativas e conferências;
- Lesões não associadas a fraturas;
- Textos sem acesso completo ou publicados em idioma diferente dos selecionados.

### 5.8 Extração e Síntese dos Dados

Para cada estudo incluído, os dados foram extraídos em uma planilha padronizada, contendo as seguintes informações:

- *Características do Estudo:* Autores, ano de publicação, país e desenho do estudo.
- *Características da População:* Número de atletas, idade, sexo e modalidade esportiva.
- *Protocolo de Reabilitação:* Descrição das fases, principais intervenções terapêuticas (fortalecimento, controle neuromuscular, pliometria), critérios para progressão e tempo de duração.
- *Desfechos Avaliados:* Critérios para liberação ao esporte, testes funcionais utilizados (ex: *Hop Tests*), escalas de avaliação psicológica (ex: ACL-RSI, Escala Tampa de Cinesiofobia), tempo para retorno ao esporte e taxas de recidiva da lesão.

### 5.9 Seleção Dos Estudos

A triagem seguiu o *fluxograma PRISMA 2020*. Os registros foram importados para um gerenciador bibliográfico (Zotero), e as duplicatas removidas. Dois revisores independentes examinaram títulos e resumos; os estudos potencialmente elegíveis foram avaliados na íntegra. Divergências foram resolvidas por consenso ou por um terceiro revisor.

### 5.10 Extração E Síntese Dos Dados

As informações extraídas incluíram: autor, ano de publicação, país, desenho do estudo, amostra, tipo de intervenção, comparador, desfechos e principais resultados.

Os dados foram sintetizados de forma *qualitativa descritiva*, enfatizando comparações entre os métodos de curativo.

Quando disponíveis, foram coletadas medidas quantitativas (tempo médio de cicatrização, taxa de infecção, tempo de hospitalização).

### 5.11 Avaliação Da Qualidade Metodológica

A qualidade dos estudos incluídos foi avaliada por dois revisores independentes utilizando o

*instrumento ROB 2* (para ensaios clínicos randomizados) e o *ROBINS-I* (para estudos não randomizados). Cada domínio de viés foi classificado como baixo, incerto ou alto risco, seguindo as recomendações da Cochrane Collaboration.

### 5.12 Síntese Dos Resultados

Devido à heterogeneidade dos métodos e desfechos, a meta-análise só será conduzida se houver dados comparáveis. Os resultados serão apresentados em tabelas e narrativas, destacando diferenças entre o curativo a vácuo e o curativo tradicional quanto à eficácia, segurança e custo.

### 5.13 Aspectos Éticos e Transparência

Por tratar-se de uma revisão sistemática, não houve coleta de dados diretos com seres humanos, dispensando submissão a Comitê de Ética.

Todas as etapas seguiram as boas práticas de *transparência, integridade e reprodutibilidade científica*, conforme as diretrizes da COPE e as políticas de publicação ética de periódicos internacionais indexados. Os dados extraídos serão sintetizados de forma qualitativa. As informações sobre os componentes dos protocolos, critérios de progressão e testes de avaliação serão agrupadas e analisadas para identificar os padrões, as convergências e as divergências na literatura atual. Os resultados serão apresentados de forma descritiva e, quando apropriado, em quadros e tabelas para facilitar a comparação e a compreensão.

### 5.14 Considerações Éticas

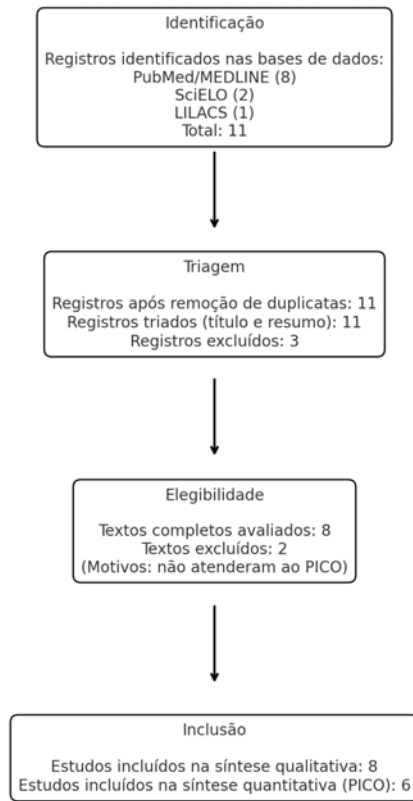
Por se tratar de uma revisão baseada em dados secundários, não houve envolvimento direto de participantes humanos. Todas as etapas seguiram as diretrizes de ética, integridade científica e transparência editorial recomendadas pelo COPE e pela Declaração de Helsinque (2013, atualização 2018).

## VI. RESULTADOS

A busca sistemática realizada nas bases de dados PubMed/MEDLINE, SciELO e LILACS, no

período de 2010 a 2025, resultou em 11 artigos inicialmente identificados. Após aplicação dos critérios de elegibilidade, 8 estudos foram incluídos na síntese qualitativa, dos quais 6 atenderam integralmente ao modelo PICO (população humana com fraturas pós-trauma e lesões de partes moles, comparando NPWT versus curativo tradicional). (FIGURA 1). Os artigos incluídos compreenderam ensaios clínicos randomizados, revisões sistemáticas, meta-análises e estudos observacionais comparativos.

**Fluxograma PRISMA 2020 - Seleção dos Estudos**



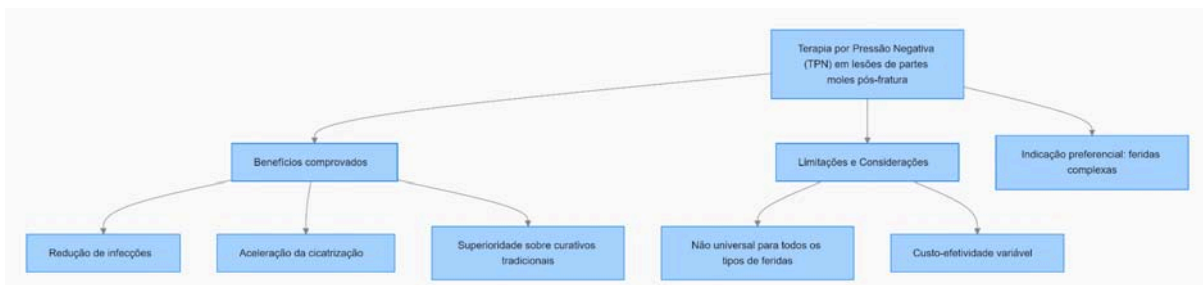
Fonte: Elaborado pelo autor (2025)

Figura 1

*Eficácia Do Curativo A Vácuo Em Comparação Ao Curativo Tradicional Na Cicatrização De Lesões De Partes Moles Em Pacientes Com Fraturas Pós-Trauma.*

A literatura revisada sugere que a Terapia por Pressão Negativa (TPN), ou curativo a vácuo, demonstra ser uma intervenção promissora e, em diversos cenários, superior ao curativo tradicional para a cicatrização de lesões de partes moles em

pacientes com fraturas pós-trauma. Evidências apontam para benefícios na redução de infecções e na aceleração do processo cicatricial, especialmente em feridas complexas (Alves *Et Al.*, 2024; Kim; Lee, 2019). Contudo, a superioridade da TPN pode não ser universal para todos os desfechos ou tipos de feridas, e a consideração da custo-efetividade é um fator relevante em determinados contextos (Iheozor-Ejiofor *Et Al.*, 2018) conforme ilustrado na Figura 2.



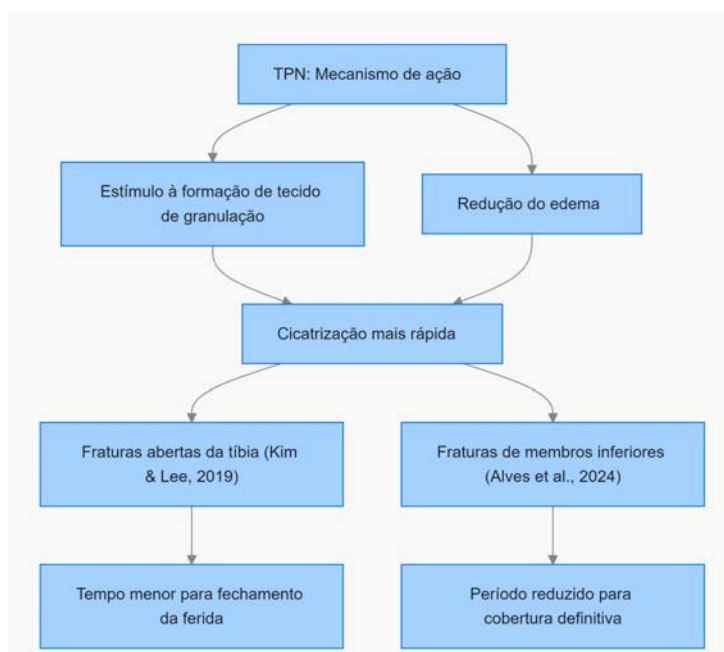
Fonte: Elaborado pelo autor (2025)

Figura 2: Benefícios e Limitações da TPN em Feridas Pós-Fratura

### 6.1 Tempo Médio De Cicatrização Entre Curativo A Vácuo E Curativo Tradicional

Estudos indicam que a TPN pode contribuir para a redução do tempo de cicatrização em lesões de partes moles associadas a fraturas. A meta-análise de Kim e Lee (2019) demonstrou que a TPN resultou em um tempo significativamente menor para o fechamento da ferida em fraturas abertas da tíbia, em comparação com o curativo tradicional. Corroborando, Alves et al. (2024)

observaram uma redução no tempo de cicatrização e no período necessário para a cobertura definitiva da ferida com o uso da TPN em fraturas de membros inferiores. Além disso, o mecanismo de ação da TPN, que inclui o estímulo à formação de tecido de granulação e a redução do edema, é consistentemente associado a uma cicatrização mais rápida (Lima; Coltro; Faro-Junior, 2017) conforme ilustrado na Figura 3.



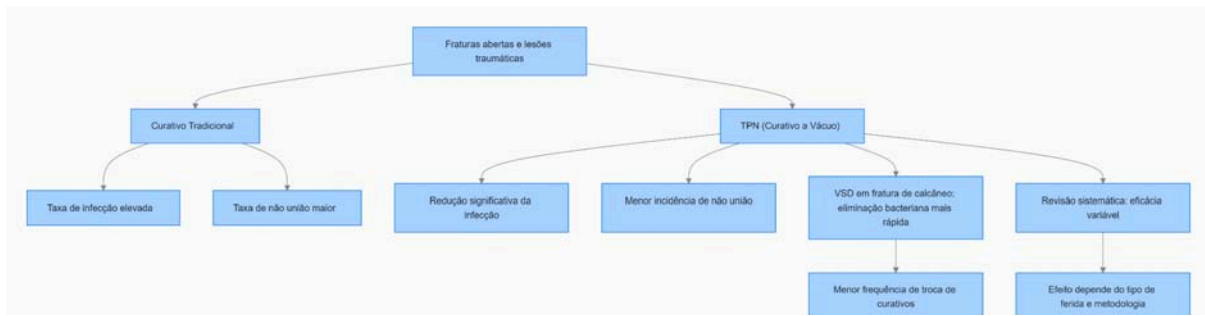
Fonte: Elaborado pelo autor (2025)

Figure 3: Mecanismo de Acao da TPN e Impacto Clinico

### 6.2 Incidência De Infecção e Complicações Associadas a Cada Técnica De Curativo

A incidência de infecções e outras complicações é um desfecho crítico na comparação entre as técnicas de curativo. Kim e Lee (2019) relataram uma redução significativa na taxa de infecção e na incidência de não união em pacientes tratados com TPN para fraturas abertas da tíbia. De forma similar, Alves *et al.* (2024) evidenciaram que a TPN diminui a taxa de infecção e o risco de não união em fraturas de membros inferiores. Em casos de infecção grave tardia após cirurgia de fratura de calcâneo, a drenagem por selamento a vácuo de dupla camada (VSD) demonstrou um tempo menor para eliminação bacteriana e menor

frequência de troca de curativos em comparação com o manejo convencional (Wang *et al.*, 2017). No entanto, uma revisão sistemática anterior sobre feridas traumáticas abertas não encontrou uma diferença clara no risco de infecção entre TPN e cuidados padrão, sugerindo que a eficácia pode variar dependendo da especificidade da ferida e da metodologia do estudo (Iheozor-Ejiofor *et al.*, 2018) conforme ilustrado na Figura 4.



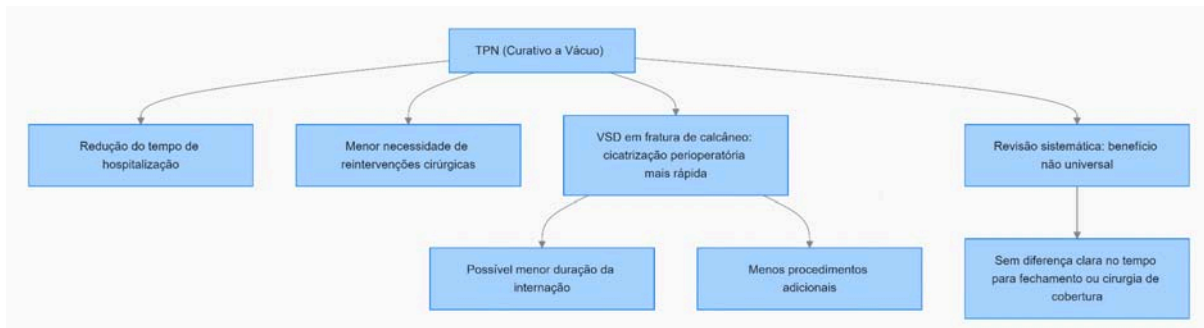
Fonte: Elaborado pelo autor (2025)

Figura 4: Fraturas Traumáticas: Curativo Tradicional vs. TPN

### 6.3 Impacto Dos Métodos De Curativo No Tempo De Hospitalização e Na Necessidade De Reintervenções Cirúrgicas

O impacto da TPN no tempo de hospitalização e na necessidade de reintervenções cirúrgicas é um aspecto relevante para a gestão clínica. Alves et al. (2024) sugerem que a TPN pode contribuir para a redução do tempo de internação hospitalar e da necessidade de reintervenções cirúrgicas, embora os resumos não detalham a magnitude exata dessa redução. O estudo sobre infecção grave tardia em fraturas de calcâneo também indicou um tempo

de cicatrização perioperatório mais curto com a VSD, o que pode estar indiretamente associado a uma menor duração da hospitalização e a menos procedimentos adicionais (Wang et al., 2017). Em contraste, uma revisão sistemática sobre feridas traumáticas abertas não identificou uma diferença clara no tempo para o fechamento ou cirurgia de cobertura entre a TPN e os cuidados padrão, indicando que o benefício nesse desfecho pode não ser universal para todas as condições (Iheozor-Ejiofor et al., 2018) conforme ilustrado na Figura 5.



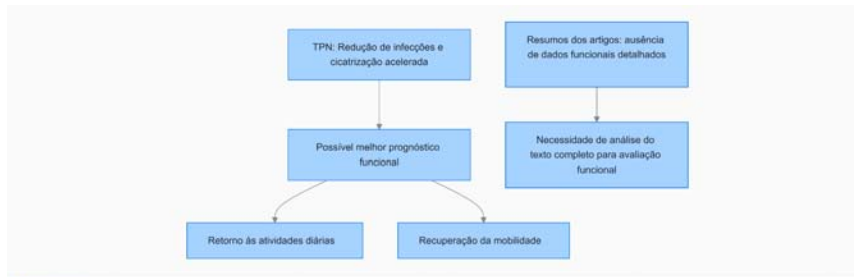
Fonte: Elaborado pelo autor (2025)

Figura 5: Impacto da TPN no Prognóstico Funcional

### 6.4 Influência Dos Diferentes Métodos De Curativo Na Evolução Funcional E No Prognóstico Dos Pacientes

Os resumos dos artigos identificados não fornecem informações detalhadas sobre a evolução funcional e o prognóstico a longo prazo dos pacientes. Embora a redução de infecções e um tempo de cicatrização mais rápido, proporcionados pela TPN, possam inferir um melhor prognóstico e uma recuperação funcional

mais favorável, desfechos funcionais específicos, como o retorno às atividades diárias ou a mobilidade, não foram explicitamente abordados nos resumos analisados. Para uma avaliação completa deste objetivo, seria necessária a análise do texto completo dos estudos conforme ilustrado na Figura 6.

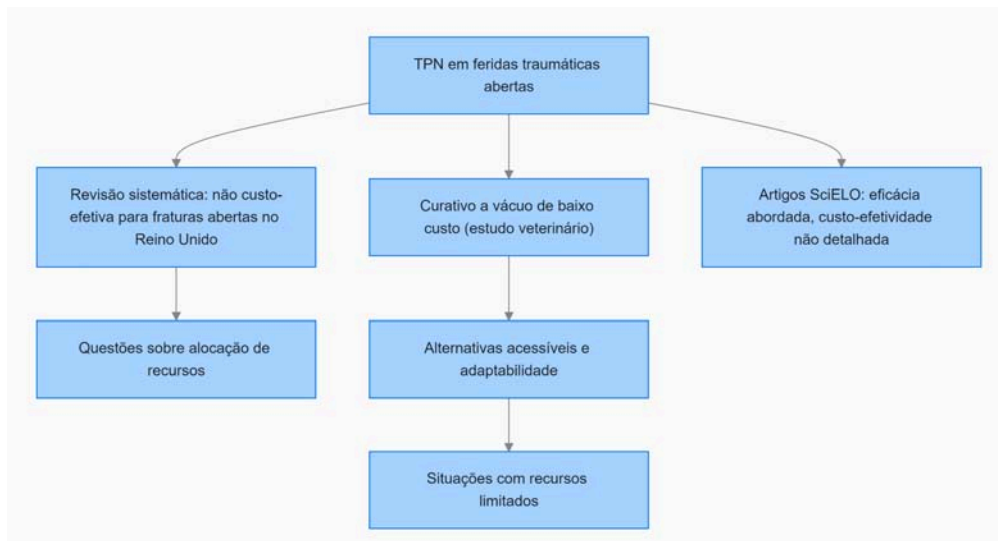


Fonte: Elaborado pelo autor (2025)

### 6.5 Custo-Efetividade E Aplicabilidade Clínica Do Curativo A Vácuo Em Diferentes Contextos De Saúde

A custo-efetividade da TPN é um ponto de discussão importante. Uma revisão sistemática sobre feridas traumáticas abertas concluiu que a TPN provavelmente não é um tratamento custo-efetivo para fraturas abertas no Reino Unido, levantando questões sobre a alocação de recursos em sistemas de saúde específicos (Ihezor-Ejiofor *Et Al.*, 2018). Por outro lado, a

utilização de um curativo a vácuo de baixo custo, como observado em um estudo de caso veterinário, sugere a busca por alternativas mais acessíveis e a adaptabilidade da técnica a diferentes contextos, incluindo aqueles com recursos limitados (Domingues *et al.*, 2021). Os artigos da SciELO, embora abordem a eficácia e as indicações da TPN em feridas complexas, não detalham explicitamente a custo-efetividade em seus resumos (Lima; Coltro; Faro-Junior, 2017) conforme ilustrado na Figura 7.



Fonte: Elaborado pelo autor (2025)

Figura 7: TPN em Feridas Traumáticas: Evidências e Custos

## VII. DISCUSSÃO

Os achados da literatura, indicam que a TPN oferece vantagens significativas em diversos desfechos, mas também revelam áreas onde a evidência é menos robusta ou apresenta controvérsias. Em relação ao tempo médio de cicatrização, a TPN demonstrou consistentemente uma redução no tempo necessário para o fechamento da ferida e para a cobertura

definitiva, conforme evidenciado por meta-análises e revisões sistemáticas (Alves *Et Al.*, 2024; Kim; Lee, 2019). Este benefício é atribuído aos mecanismos de ação da TPN, que incluem a promoção da formação de tecido de granulação, a redução do edema e a remoção de exsudatos, criando um ambiente otimizado para a cicatrização (Lima; Coltro; Faro-Junior, 2017).

A incidência de infecção e complicações é um dos pontos mais fortes a favor da TPN. Estudos robustos indicam uma redução significativa nas taxas de infecção e na incidência de não união em fraturas abertas tratadas com TPN (Alves *Et Al.*, 2024; Kim; Lee, 2019). A capacidade da TPN de remover fluidos e bactérias do leito da ferida, juntamente com a estimulação do fluxo sanguíneo local, contribui para um ambiente menos propício à proliferação microbiana (Wang *et al.*, 2017). Contudo, é crucial notar que nem todos os estudos encontraram uma diferença clara no risco de infecção, sugerindo que a eficácia pode ser influenciada por fatores como o tipo específico de ferida traumática e a metodologia do estudo (Iheozor-Ejiofor *Et Al.*, 2018).

O impacto no tempo de hospitalização e na necessidade de reintervenções cirúrgicas é um desfecho de grande relevância clínica e econômica. Embora alguns estudos sugiram que a TPN pode reduzir o tempo de internação e a necessidade de cirurgias adicionais (Alves *Et Al.*, 2024; Wang *Et Al.*, 2017), outros não encontraram diferenças significativas no tempo para o fechamento da ferida ou cirurgia de cobertura (Iheozor-Ejiofor *Et Al.*, 2018). Essa variabilidade pode ser atribuída à heterogeneidade das populações de pacientes, tipos de fraturas e protocolos de tratamento, o que ressalta a necessidade de estudos mais padronizados para uma conclusão definitiva.

No que tange à influência na evolução funcional e no prognóstico dos pacientes, a literatura revisada, baseada principalmente em resumos, não forneceu dados detalhados. Embora a redução de infecções e a aceleração da cicatrização sejam fatores que indiretamente contribuem para um melhor prognóstico e recuperação funcional, a ausência de desfechos funcionais explícitos nos resumos impede uma análise aprofundada neste aspecto. Futuras revisões deveriam priorizar a busca por estudos que avaliem desfechos funcionais a longo prazo. Finalmente, a custo-efetividade e aplicabilidade clínica da TPN são aspectos complexos. Enquanto a TPN é reconhecida por seus benefícios clínicos, sua implementação pode ser dispendiosa. Uma revisão destacou que a TPN pode não ser

custo-efetiva para fraturas abertas em certos sistemas de saúde (Iheozor-Ejiofor *et al.*, 2018). No entanto, a existência de abordagens de baixo custo, como demonstrado em um estudo de caso (Domingues *et al.*, 2021), sugere que a aplicabilidade da TPN pode ser expandida, especialmente em contextos com recursos limitados, desde que alternativas acessíveis sejam desenvolvidas e validadas.

As limitações desta revisão incluem a heterogeneidade metodológica e clínica dos estudos que dificultou a generalização dos achados.

### VIII. CONCLUSÃO / INTERPRETAÇÃO

A síntese das evidências indica que a terapia por pressão negativa (TPN/NPWT) é, em geral, mais eficaz que o curativo tradicional no manejo de lesões de partes moles associadas a fraturas pós-trauma, especialmente no que tange à redução de infecções e à aceleração da cicatrização. Revisões sistemáticas e meta-análises recentes sustentam menor risco de infecção e de não união em cenários como fraturas abertas de membros inferiores, ao passo que estudos observacionais e séries clínicas reforçam melhora na preparação do leito da ferida para cobertura definitiva.

Entretanto, os benefícios não são uniformes em todos os desfechos: parte da literatura não demonstra diferença consistente em tempo para fechamento/cobertura ou em necessidade de reintervenções quando comparada ao manejo convencional. Além disso, a custo-efetividade permanece contexto-dependente; dispositivos comerciais podem elevar custos diretos, enquanto soluções de menor custo sugerem viabilidade em ambientes com recursos limitados, carecendo, porém, de validação robusta.

Do ponto de vista metodológico, a heterogeneidade clínica e de protocolos (tipos de fratura, classificação de Gustilo, parâmetros da TPN, definições de desfecho) e a escassez de medidas funcionais de longo prazo limitam a generalização. A força da evidência é maior para infecção e tempo de cicatrização em fraturas

abertas de tibia e membros inferiores; é mais incerta para desfechos funcionais e econômicos.

Em síntese, a TPN deve ser considerada como estratégia preferencial em fraturas com comprometimento complexo de partes moles, particularmente quando o objetivo clínico inclui controle de infecção e rápida granulação para cobertura definitiva. A decisão terapêutica deve integrar perfil do paciente, gravidade da lesão, disponibilidade de recursos e expertise da equipe, com atenção às políticas de custo e acesso.

### 8.1 Implicações Para A Prática

- Priorizar TPN em fraturas abertas com grande dano de partes moles, visando reduzir infecção e preparar a ferida para fechamento.
- Padronizar protocolos de pressão, modo (contínuo/intermitente) e frequência de trocas, e registrar definições de desfecho para monitorar desempenho local.
- Avaliar custo total do cuidado (dispositivo, internação, reoperações), considerando alternativas viáveis e treinamento da equipe.

### 8.2 Perspectivas De Pesquisa

- Ensaios multicêntricos padronizados que comparem TPN vs. curativo tradicional por subgrupos clínicos (Gustilo, osso acometido, presença de retalho).
- Inclusão de desfechos funcionais e qualidade de vida, além de análises econômicas com metodologia transparente.
- Estudos que testem soluções de baixo custo com validação de eficácia e segurança, ampliando a aplicabilidade em contextos com recursos limitados.

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# Consumption of Iron and Vitamin C in Pregnant Women from a Coastal Community in Northern Peru

*Jhon Ypanaque Ancajima, Lady Elizabeth Apolo Marchan, Gabriela Córdova Silva & Paúl Vilchez Castro*

## SUMMARY

**Background:** Iron deficiency anemia is the most frequent cause in the world and derives from the negative balance of iron, due to an inadequate contribution or absorption in the diet, as well as physiological periods such as pregnancy.

**Methods:** Correlational descriptive research, 42 pregnant women who attended their obstetric consultation and nutritional consultation between the ages of 18 and 40 years were interviewed. The 24-hour food consumption recall and the food frequency assessment were used. A descriptive and inferential analysis was carried out with the SPSS program.

**Results:** Iron consumption was deficient by 76.19% in the study group. 64.29% of the pregnant women did not have anemia; Only 19.05% had mild anemia, 7.14% moderate and 9.52% severe anemia. In relation to the consumption of vitamin C, it was deficient by 40.48%.

**Keywords:** gestational anemia, food consumption, iron, vitamin c.

**Classification:** NLM Code: WQ 240

**Language:** English



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# Consumption of Iron and Vitamin C in Pregnant Women from a Coastal Community in Northern Peru

Consumo De Hierro Y Vitamina C En Gestantes De Una Comunidad Costera Del Norte Del Perú

Jhon Ypanaque Ancajima<sup>a</sup>, Lady Elizabeth Apolo Marchan<sup>o</sup>, Gabriela Córdova Silva<sup>p</sup> & Paúl Vilchez Castro<sup>co</sup>

## RESUMEN

**Fundamentos:** La anemia por deficiencia de hierro es la causa más frecuente de anemia gestacional en el mundo. Deriva del balance negativo de hierro, debido a un inadecuado aporte o absorción en la alimentación, además de periodos fisiológicos como el embarazo.

**Métodos:** Investigación descriptiva correlacional, se entrevistaron a 42 gestantes que acudieron a su consulta obstétrica y su interconsulta nutricional en edades de 18 a 40 años. Se utilizó el recordatorio de consumo de alimentos de 24 horas y la evaluación de frecuencia de alimentos. Los análisis descriptivo e inferencial fueron realizados con el programa SPSS.

**Resultados:** El consumo de hierro fue deficiente en un 76,19% en el grupo de estudio. El 64,29% de las gestantes no presentaban anemia; solo el 19,05% presentaba anemia leve, el 7,14% moderada y el 9,52% anemia severa. En relación al consumo de vitamina C, fue deficiente en un 40,48%.

**Conclusiones:** El 35,71% de las gestantes estudiadas presentaron anemia. El porcentaje de adecuación del consumo de hierro de vitamina C fueron deficientes en un 76,19% y 40,48%, respectivamente. La principal fuente de consumo de hierro hemo fue el hígado ( $Rho = 0,54$ ); de hierro no hemo, el brócoli ( $Rho = 0,60$ ) y de la vitamina C, la naranja ( $Rho = 0,42$ ).

**Palabras Clave:** anemia gestacional, consumo alimentario, hierro, vitamina c.

## SUMMARY

**Background:** Iron deficiency anemia is the most frequent cause in the world and derives from the negative balance of iron, due to an inadequate contribution or absorption in the diet, as well as physiological periods such as pregnancy.

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**Results:** Iron consumption was deficient by 76.19% in the study group. 64.29% of the pregnant women did not have anemia; Only 19.05% had mild anemia, 7.14% moderate and 9.52% severe anemia. In relation to the consumption of vitamin C, it was deficient by 40.48%.

**Conclusions:** 35.71% of the pregnant women studied presented anemia. The percentage of adequacy of vitamin C iron consumption were deficient by 76.19% and 40.48%, respectively. The main source of heme iron consumption was the liver ( $Rho = 0.54$ ); of non-heme iron, broccoli ( $Rho = 0.600$ ) and of vitamin C, orange ( $Rho = 0.42$ )

**Keywords:** gestational anemia, food consumption, iron, vitamin c.

## I. INTRODUCCIÓN

La anemia gestacional es un serio problema de salud pública que enfrentan los países en desarrollo. A pesar de los esfuerzos por los sistemas sanitarios de abordar esta problemática, aún la prevalencia e incidencia es muy alta. Si bien, la organización mundial de la salud (OMS), ha descrito patrones de descenso de anemia gestacional entre los años 2000 y 2010, partir del año 2015 existe un estancamiento a una prevalencia del 39,3% en todo el mundo (1).

En Perú, si bien existe una reducción paulatina de la prevalencia de anemia gestacional desde el año 2012 (26,8%) al 2018 (19,1%), esta cifra sigue siendo relativamente alta. Para el 2021 Perú registró una prevalencia de anemia del 27,0%, observándose que, en algunas regiones, como la de Tumbes, dicha prevalencia presentaba una tasa del 35,1% (2). Sin embargo, en el distrito costero de Zorritos, de la región de Tumbes, se reportó una prevalencia aproximada del 22,2% de anemia gestacional para el 2019 (3). Si bien, existen estrategias de intervención para mejorar el estado de salud de esta población, aún se reflejan brechas de cobertura de atención como la entrega de suplementación de hierro, el dosaje de hemoglobina y la atención integral de salud a través del control prenatal (4).

Se estima que el 50% de todos los casos de anemia es de origen ferropénico, lo que ocurre cuando el cuerpo no tiene suficiente cantidad de hierro. Otras posibles causas de anemia son las deficiencias nutricionales como las de folatos y/o vitaminas B12, A y C (5). El hierro obtenido de los diferentes alimentos se encuentra en forma hemínica y en forma no hemínica o iónica. El hierro hemínico o hemo es el que forma parte de la hemoglobina, mioglobina, citocromos y otras hemoproteínas y se encuentra en los alimentos de tipo animal, mientras que el hierro no hemínico es de origen vegetal, siendo beneficioso el consumo de vitamina C para mejorar la absorción de este tipo de hierro (6,7). Así, la vitamina C participa en la absorción del hierro ya que esta puede formar

quelatos de bajo peso molecular que facilitan la absorción o nivel gastrointestinal, y además permite una mayor movilización de hierro desde los depósitos (8, 9).

Diferentes investigaciones indican que sería bueno para la gestante que el consumo de vitamina C o ácido ascórbico aumentase durante el proceso de embarazo, por lo que sugieren aumentar de manera adicional diez miligramos (10 mg) llegando a un total de cincuenta y cinco miligramos (55 mg). Durante el parto la placenta cede al neonato la vitamina C, de forma que al nacer los depósitos del recién nacido duplican a los de la puérpera, por esta razón las madres gestantes y lactantes requieren dosis adicionales de vitamina C (10).

Se ha descrito como la ingesta de vitamina C incrementa la absorción del hierro no hemo al reducir el efecto inhibitorio de algunas sustancias presentes en distintos alimentos. Algunos ejemplos son los cereales y las leguminosas, incluyendo la soja que deprimen la absorción del hierro no hemo, mientras que los fitatos, presentes en la harina de maíz y trigo, la caseína y el calcio, presentes en la leche de vaca, la clara y la yema de huevo, el té y/o el café inhiben la absorción del hierro no hemo (11). Además, la presencia de esta vitamina en el organismo, a nivel gastrointestinal permite un mayor desplazamiento del hierro desde los depósitos de almacenamiento (12). Por todo ello, diferentes investigaciones indican que el consumo de vitamina C o ácido ascórbico debe aumentar durante el proceso de embarazo (10, 13).

Varios estudios realizados en Perú han encontrado que la dieta tradicional no alcanza a cubrir el incremento de las necesidades de hierro y folatos durante la gestación (14,15). En el contexto regional no se hallaron publicaciones en la Región Tumbes, que pudieran demostrar la relación del consumo de hierro y vitamina C y el nivel de anemia en un grupo de mujeres gestantes; siendo necesario abordar esa problemática, a fin de generar información que permita diseñar medidas efectivas para la prevención de la anemia.

## II. MATERIAL Y MÉTODOS

Investigación de enfoque cuantitativo, no experimental, descriptiva correlacional, prospectiva de corte transversal. Se entrevistaron 42 gestantes de segundo y tercer trimestre del embarazo, con o sin anemia; que acudieron a su consulta obstétrica y su interconsulta nutricional en la comunidad costera del Distrito de Zorritos, Región Tumbes en el año 2022.

Se aplicaron cuestionarios anónimos para evaluar el consumo alimentario de hierro y vitamina C en la consulta del servicio de nutrición, previo consentimiento informado. La técnica para la recolección de datos de la adecuación de hierro y vitamina C, fue la entrevista de frecuencia de consumo alimentario en el recordatorio de 24 horas, que tuvo por finalidad describir todos los alimentos y bebidas que la gestante había consumido durante tres días no consecutivos que equivalen al consumo semanal, extrapolando ese consumo a un patrón mensual. Para la determinación del consumo, se usó el cuestionario de frecuencia de consumo de hierro y vitamina C en las escalas: nunca; número de veces al mes (consumo poco frecuente); número de veces a la semana (consumo frecuente) y número de veces al día (consumo muy frecuente).

El cuestionario de frecuencia de consumo de hierro y vitamina C, se sometió al análisis de correlación interno con la prueba alfa de Cronbach y se obtuvo como resultado 0,74, siendo calificado como aceptable para su aplicación. Respecto al juicio de expertos se obtuvo un índice de validez de contenido de 0,90.

Para el cálculo de la adecuación de hierro y vitamina C en la dieta se empleó la siguiente fórmula: ( $\% \text{ de adecuación} = \text{ingesta} / \text{requerimiento} \times 100$ ). Para la obtención del porcentaje de adecuación de hierro y vitamina C se utilizaron los requerimientos y recomendaciones del Ministerio de Salud del Perú (MINSA) (16) y la Organización de las Naciones Unidas para la Alimentación y la Agricultura (FAO) (17), donde precisa; si el resultado es mayor o igual al 100%, significa que la ingesta cubre o supera el requerimiento. Si es menor que el 100%, indica un déficit en la ingesta del

nutriente. Se consideraron el segundo y tercer trimestre del embarazo, dado la instalación del cuadro clínico de anemia en estas fases del embarazo.

Para determinar el origen del hierro, así como de los moduladores de la absorción de este micronutriente aportados por la dieta, se listaron los alimentados según su contenido de: 1) hierro hemo: sangrecita, hígado, carne de vacuno, bofe/pulmón, carne de cerdo, bazo y carne de ovino y pescado; 2) hierro no hemo: lentejas, tomate, frejol, arvejas, brócoli, pallar, habas, quinua cañihua y alfalfa; 3) potenciadores de absorción de hierro: naranja, mandarina, limón, granadilla, piña, lima y toronja (18).

Para la determinación de los niveles de hemoglobina se utilizó la técnica de cianometahemoglobina directa con Colorimetric Detection Kit. El instrumento para determinar el nivel de hemoglobina fue el equipo analizador de hematología automático BHA-3000.

Los datos fueron sometidos a la estadística descriptiva para el análisis univariado de frecuencias absolutas y relativas de cada variable. Se desarrollaron tablas de contingencia para determinar la asociación entre las variables. Se realizó el análisis bivariado con la prueba de correlación Rho Spearman, con una significancia estadística menor a 0,05. Para la realización de estos análisis se usó el paquete estadístico SPSS® v.23.

Durante el estudio, se respetaron cada uno de los principios éticos: la libre participación, y la no maleficencia, el anonimato y la confidencialidad. Se brindó cumplimiento a la Resolución Ministerial N°233-2020-MINSA (19), siguiendo las consideraciones éticas para la investigación en salud con seres humanos.

## III. RESULTADOS

En este estudio participaron un total de 42 gestantes, de las cuales el 64,29% no presentaron anemia; solo el 10,05% presentaba anemia leve, el 9,54% anemia severa, y el 7,14% anemia moderada. El porcentaje de adecuación del consumo de hierro fue deficiente en un 76,19% y

del consumo de vitamina C deficiente en un 40,48% (Tabla 1).

*Tabla 1:* Datos Descriptivos, De An

Edad gestacional	n	%
II trimestre	30	71,43
III trimestre	12	28,57
Nivel de anemia	n	%
Anemia leve	8	19,05
Anemia moderada	3	7,14
Anemia severa	4	9,52
Sin anemia	27	64,29
% adecuación de hierro	n	%
Deficiente	32	76,19
Normal	5	11,90
Exceso	5	11,90
% adecuación vitamina C	n	%
Deficiente	17	40,48
Normal	8	19,05
Exceso	17	40,48

*Deficiente: < 90%; Normal: 90% - 110%; Exceso: >110%.*

El promedio de frecuencia de consumo de hierro fue de 1 vez a la semana para la sangrecita, hígado, carne de vacuno, frejol, arvejas y brócoli. Además, se registró un consumo frecuente de lentejas de 2 a 4 veces por semana y un consumo de pescado de 5 a 6 veces por semana. La frecuencia de consumo de vitamina C fue de 5 a 6 veces por semana para la naranja, mandarina y limón (Tabla 2).

*Tabla 2:* Frecuencia De Consumo Alimentario De Hierro Y Vitamina C

Consumo de hierro	Media	Frecuencia	DE
Hierro Hemo			
Sangrecita, hígado, carne de vacuno	3	Frecuente, 1 vez a la semana	1,31
Bofe/pulmón, carne de cerdo	2	Poco frecuente, 1 a 3 veces al mes	1,22
Bazo y carne de ovino	1	Nunca consume	0,53
Pescado	5	Frecuente, 5 a 6 veces a la semana	1,1
Hierro No Hemo			
Lenteja, tomate	4	Frecuente, 2 a 4 veces a la semana	0,82
Frejol, arvejas, brócoli	3	Frecuente, 1 vez a la semana	1,00
Pallar, habas, quinua	2	Poco frecuente, 1 a 3 veces al mes	0,84
Cañihua, alfalfa	1	Nunca	0,63
Consumo de vitamina C			
Naranja, mandarina limón	5	Frecuente, 5 a 6 veces a la semana	1,22
Granadilla, piña	3	Frecuente, 1 vez a la semana	1,53
Lima, Toronja	1	Nunca	0,91

*n=42 DE: desviación estándar*

1= Nunca; 2= poco frecuente 1 a 3 veces al mes; 3 = frecuente 1 vez a la semana; 4 = frecuente 2 a 4 veces a la semana; 5 = frecuente 5 a 6 veces a la semana

Al establecer la correlación del consumo alimentario de hierro hemo y el nivel de hemoglobina, se evidenció una correlación positiva media para el consumo de sangrecita (Rho= 0,36), bofe/pulmón (Rho= 0,37) y carne de vacuno (Rho= 0,32). El consumo de hígado presentó una correlación positiva considerable (Rho= 0,54). Asimismo, entre el consumo de hierro hemo y el nivel de hemoglobina, se observó una correlación positiva considerable (Rho= 0,60) para el consumo de brócoli. Por otro lado, el

consumo de frejol mostró una correlación positiva media (Rho= 0,34) (Tabla 3).

En cuanto al consumo de potenciadores de hierro y su relación con el nivel de hemoglobina, se evidenció una correlación positiva media para el consumo de granadilla (Rho= 0,37), piña (Rho= 0,34) y naranja (Rho= 0,42). Por otro lado, en relación con los inhibidores de hierro y el nivel de hemoglobina (Tabla 4).

**Tabla 3:** Correlación Del Consumo De Hierro, Adecuación Y Nivel De Hemoglobina

Hierro Hemo	Prueba	% adecuación hierro	%adecuación vitamina C	hemoglobina	Hierro No Hemo	Prueba	% adecuación hierro	% adecuación vitamina C	Nivel de hemoglobina
Sangrecita	Rho	0,70**	0,25	0,36*	Lenteja	Rho	0,25	0,04	0,25
	p valor	0,00	0,09	0,01		p valor	0,09	0,76	0,11
Bofe/pulmón	Rho	,332*	0,24	0,37*	Frejol	Rho	0,26	0,01	0,34*
	p valor	0,03	0,12	0,01		p valor	0,08	0,93	0,02
Hígado	Rho	0,35*	0,58**	0,54**	Pallar	Rho	0,26	0,02	0,22
	p valor	0,02	0,00	0,00		p valor	0,09	0,85	0,15
Bazo	Rho	0,01	0,00	0,05	Arvejas	Rho	0,13	0,13	0,21
	p valor	0,94	0,98	0,73		p valor	0,39	0,39	0,17
Carne de vacuno	Rho	0,03	0,07	0,32*	Habas	Rho	0,31*	-0,03	0,20
	p valor	0,83	0,62	0,03		p valor	0,04	0,82	0,19
Carne de cerdo	Rho	0,20	0,09	0,16	Quinua	Rho	0,27	0,01	0,26
	p valor	0,20	0,55	0,28		p valor	0,08	0,92	0,09
Pescado	Rho	0,15	0,29	0,21	Cañihua	Rho	0,15	-0,03	-0,03
	p valor	0,31	0,05	0,18		p valor	0,32	0,81	0,83
Rho= correlación de Spearman p valor < 0,05 significativo la correlación					Brócoli	Rho	0,52**	0,29	0,60**
						p valor	0,00	0,05	0,00
					Tomate	Rho	0,46**	0,04	0,24
						p valor	0,00	0,78	0,11
					Alfalfa	Rho	-0,11	0,01	-0,08
						p valor	0,49	0,90	0,59

**Tabla 4:** Correlación Del Consumo De Vitamina C Y Nivel De Hemoglobina

Potenciadores de hierro	Prueba	% adecuación hierro	% adecuación vitamina C	Nivel de hemoglobina
Naranja	Rho	0,24	0,21	0,42**
	p valor	0,11	0,18	0,00
	N	42	42	42
Mandarina	p valor	0,32*	0,54**	0,21
	Rho	0,03	0,00	0,17
	N	42	42	42
Lima	Rho	0,16	0,14	0,19
	p valor	0,28	0,35	0,22
	N	42	42	42

Limón	p valor	0,06	0,23	0,21
	Rho	0,68	0,13	0,16
	N	42	42	42
Toronja	Rho	0,00	-0,07	0,28
	p valor	0,98	0,64	0,07
	N	42	42	42
Granadilla	p valor	0,16	0,17	0,37*
	Rho	0,29	0,27	0,01
	N	42	42	42
Piña	Rho	0,29	0,27	0,34*
	p valor	0,05	0,07	0,02
	N	42	42	42

*Rho= correlación de Spearman. p valor < 0,05 significativo la correlación*

#### IV. DISCUSIÓN

El consumo de hierro y vitamina C fue deficiente en el grupo de estudio, lo que es congruente con estudios previos los cuales concluyen que la ingesta de hierro en las gestantes está por debajo de lo recomendado para este grupo poblacional (16). Diversas investigaciones (20,21) han demostrado la asociación de la ingesta dietética de hierro, desarrollando un patrón muy cambiante en la ingesta dietética de energía, proteínas, grasas y vitamina C. Además, describen una disposición de la oferta de vitamina C y hierro baja, escenario similar en poblaciones de países de bajos recursos económicos. En esa línea de afirmación, López et al (11) realizaron un estudio sobre la suplementación con hierro en mujeres embarazadas en México y encontraron que el consumo de este micronutriente varió a lo largo de la gestación. Antes del embarazo, la cantidad diaria de hierro ingerida fue en promedio de 8,7 mg, fluctuando entre 4,9 y 19,8 mg. Sin embargo, en el primer trimestre, la ingesta aumentó significativamente a 24,0 mg diarios, con una variación de 14,3 a 39,4 mg. A medida que avanzaba la gestación, la suplementación se incrementó aún más, alcanzando un promedio de 60,3 mg diarios durante el segundo y tercer trimestre, con valores que oscilaron entre 48,6 mg y 98,2 mg. Estos hallazgos evidencian una mayor necesidad de hierro conforme progresa el embarazo, probablemente debido a los requerimientos fisiológicos de la madre y el feto, así como a la implementación de estrategias de suplementación para prevenir la anemia materna. Kumar et al (22), indican una asociación directa entre la edad gestacional y la anemia.

Específicamente, las encuestadas en su segundo trimestre de gestación tenían mayores probabilidades de ser anémicas que aquellas en su primer y tercer trimestre. Es un hecho bien establecido que, debido al aumento del volumen plasmático durante el embarazo, los niveles de hemoglobina y hematocrito disminuyen en el primer trimestre, alcanzan su punto más bajo al final del segundo trimestre, y se incrementan nuevamente en el tercer trimestre (23). De manera similar, la anemia fue más prevalente entre las encuestadas en su segundo trimestre (52,3%) que entre las de su primero (21%) y tercer trimestre (26,6%). La caída en la concentración de hemoglobina puede afectar negativamente la salud de la madre si no se toman las medidas adecuadas.

Keats et al (24) mencionan que las deficiencias de múltiples micronutrientes suelen coexistir entre las mujeres en edad reproductiva en países de ingresos bajos y medios. Se exacerban durante el embarazo debido a las mayores demandas del feto en desarrollo a partir del segundo y tercer trimestre del embarazo, lo que lleva a efectos potencialmente adversos para la madre y el feto (25).

Los estudios han demostrado que una proporción significativa de mujeres embarazadas sufren múltiples deficiencias concurrentes de micronutrientes, especialmente durante el embarazo cuando aumentan las demandas nutricionales. Estas deficiencias se han asociado con una serie de malos resultados del embarazo, incluidos bajo peso al nacer, prematuridad, mortalidad perinatal y mortalidad materna.

Diversos estudios (25,26), han comparado la suplementación con hierro con o sin ácido fólico, determinando algunos beneficios, como que probablemente existe una ligera reducción en los nacimientos prematuros. La suplementación con micronutrientes posiblemente también redujo los nacimientos de neonatos que fueron considerados pequeños para su edad gestacional (PEG), redujo los nacimientos que se consideraron de bajo peso al nacer (BPN) y tuvo poca o ninguna diferencia en la mortalidad perinatal. De manera similar a los nacimientos prematuros, hubo una ligera reducción en los mortinatos, aunque el intervalo de confianza para la estimación del efecto agrupado apenas cruzó la línea de ningún efecto.

Es importante mencionar que el presente estudio describe que las asociaciones son muy significativas para el hierro hemo, precisando entonces, que el hierro obtenido de los diferentes alimentos se encuentra en forma hemo y en forma no hemo o iónica (27). Estudios similares reportados por Del Castillo (6) mostraron como resultado que el consumo de hierro provenía de fuentes de origen animal y vegetal como el pescado (72,9%), lentejas (64,3%), verduras verdes (58,6%), hígado (30%), 27,1% carne de res (27,1%), sangrecita (20%), bofe (5,7%) y 2,9% molleja y yema de huevo respectivamente. El consumo de vitaminas C lo obtenían de líquidos que toma con la suplementación, bebidas a base de limón (67,1%); naranja (61,4%), maracuyá (5,7%) y otros 2,9%.

Un estudio en Ghana obtuvo datos del cuestionario de recordatorio de 24 horas de 3 días, que se utilizaron para estimar la ingesta absoluta de nutrientes dietéticos de los encuestados y se compararon con las cantidades recomendadas para las mujeres embarazadas. Los hallazgos del estudio mostraron que más del 50% de las mujeres embarazadas corrían el riesgo de tener una ingesta diaria inadecuada de vitaminas A, E, B2, B3, B6, folato, hierro, proteínas, calcio y zinc. Además, no se observó ninguna diferencia significativa entre la ingesta dietética de estos micronutrientes y vitaminas entre las participantes residentes en áreas rurales y las de áreas urbanas (28).

La puntuación media de diversidad alimentaria de las mujeres de este estudio fue inferior a la puntuación mínima de diversidad alimentaria recomendada para las embarazadas. La baja ingesta alimentaria, e inadecuada, de la mayoría de los nutrientes entre las embarazadas es una indicación de que es poco probable que las mujeres satisfagan sus necesidades nutricionales necesarias para apoyar el crecimiento y el desarrollo de su feto. Las embarazadas necesitan comer una amplia variedad de alimentos para mejorar su nutrición y también para prevenir los resultados adversos asociados con la desnutrición en el embarazo (29).

Obtener una dieta rica en nutrientes durante el embarazo es un desafío para las mujeres embarazadas que viven en países de bajos ingresos (29). El Ministerio de Salud del Perú, recomienda consumir además de alimentos como hígado, sangrecita, baso, carne, bofe, pescado, consumir diariamente frutas y verduras de preferencia de color naranja, amarillo y hojas de color verde oscuro, por su alto contenido de minerales y vitaminas que fortalecen el aprovechamiento de los alimentos ricos en hierro (30).

Igualmente, a pesar de que numerosos estudios que confirman la importancia de una dieta equilibrada durante el embarazo, muchas mujeres embarazadas en el mundo, incluidas las de los países desarrollados, todavía corren el riesgo de una ingesta subóptima de elementos esenciales y vitaminas (31). El conocimiento de los factores que influyen en las opciones dietéticas y, en consecuencia, el estado nutricional durante el embarazo es crucial para la evaluación de las necesidades de la población y el desarrollo de mensajes e intervenciones de salud pública eficaces (32).

Las implicaciones del estudio permitirán diseñar propuestas de salud pública para la promoción de alimentos propios del contexto regional, así la seguridad alimentaria será sostenible en las regiones de bajos recursos económicos.

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# Epidemiological Profile of Suspected Suicide Victims in the Metropolitan Region of Belém – Pa (2019-2023): A Documental Analysis at the Forensic Medical Institute

*Prof. Luis Basílio Bouzas Nunes Junior, PhD, José Eduardo Serrão Arakawa & Helber Carlos de Souza da Silva*

## ABSTRACT

Suicide is figured as a public health problem, complex and multicausal in nature, with a significant individual and collective impact. This study aimed to outline the epidemiological profile of suspected suicide victims in the Metropolitan Region of Belém, between 2019 and 2023, based on data from the Renato Chaves Forensic Medical Institute. This is a documentary, quantitative, and retrospective study that analyzed 480 autopsy cases performed during the period. The results indicated a higher prevalence among male individuals (76.66%), with a focus on the 18 to 30 age group (30.83%). Single individuals were the most affected group in terms of marital status (65.83%). A concentration of cases in certain geographical areas and the influence of socioeconomic factors were also observed. The findings reinforce the need for targeted public policies and prevention strategies focusing on the identified vulnerable groups.

**Keywords:** suicide, epidemiological profile, public health, forensic medicine, metropolitan region of belém.

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*Suicide is figured as a public health problem, complex and multicausal in nature, with a significant individual and collective impact. This study aimed to outline the epidemiological profile of suspected suicide victims in the Metropolitan Region of Belém, between 2019 and 2023, based on data from the Renato Chaves Forensic Medical Institute. This is a documentary, quantitative, and retrospective study that analyzed 480 autopsy cases performed during the period. The results indicated a higher prevalence among male individuals (76.66%), with a focus on the 18 to 30 age group (30.83%). Single individuals were the most affected group in terms of marital status (65.83%). A concentration of cases in certain geographical areas and the influence of socioeconomic factors were also observed. The findings reinforce the need for targeted public policies and prevention strategies focusing on the identified vulnerable groups.*

**Keywords:** suicide, epidemiological profile, public health, forensic medicine, metropolitan region of belém.

## I. INTRODUCTION

Suicide is one of the oldest and most complex issues related to individual health, remaining to this day shrouded in stigma and prejudice. It is a multi-causal phenomenon, with both individual and collective impact, affecting people of different backgrounds, sex, cultures, social classes, and ages.

It's important to highlight that the Brazilian Ministry of Health<sup>1</sup> classifies suicide as a public health issue of great relevance, given its high incidence and the aggravating increase observed in recent decades<sup>1</sup>.

The severity of the global suicide situation can be seen in the report "Suicide Worldwide in 2019," in which suicide remains among the leading causes of death worldwide, even surpassing the number of deaths from HIV, malaria, breast cancer, wars, and homicides. In 2019, more than 700,000 people died by suicide, which is equivalent to one in every 100 deaths recorded globally. WHO also highlights that, among young people aged 15 to 29, suicide is the fourth leading cause of death, which underscores the urgent nature of the issue.<sup>2</sup>

In the Brazilian context, the situation also presents worrying rates. Brazil ranks among the Latin American countries with the highest absolute number of suicide cases. Furthermore, a gradual and consistent increase in suicide mortality rates is observed in several regions, with the Metropolitan Region of Belém being one of the areas that deserve special attention. Despite the seriousness of the national data, there is still a scarcity of epidemiological studies that include a detailed regional analysis, which highlights a significant gap in the scientific literature.

The scarcity of local data is an obstacle to the formulation of effective public policies, hindering the planning of preventive strategies appropriate to the socioeconomic and cultural specificities of the population. In this sense, conducting studies

that describe the epidemiological profile of suicide victims in regions such as the Metropolitan Area of Belém is fundamental to support public health actions, especially in a scenario marked by underreporting and difficulty in accessing consolidated information.

This article's primary objectives aims to outline the epidemiological profile of suspected suicide victims in the Metropolitan Region of Belém from 2019 to 2023, based on the analysis of data from the Renato Chaves Forensic Medical Institute. In addition, as secondary objectives, it aims to contribute to regional scientific production, seeking to provide support for the development of more effective public policies aligned with the local reality, considering the magnitude and complexity of the problem.

## II. METHODOLOGY

This study is characterized as an observational, documentary, epidemiological, and retrospective research, with a quantitative and comparative approach to the data collected. The time frame considered the period from 2019 to 2023, with the objective of outlining the epidemiological profile of victims suspected of suicide in the Metropolitan Region of Belém, state of Pará.

The inclusion criteria encompassed all suspected suicide victims who underwent autopsy at the Renato Chaves Institute of Legal Medicine and Dentistry (IML-PA) within the established period and who resided in the municipalities that comprise the Metropolitan Region of Belém. On the other hand, the exclusion criteria included indigenous victims, cases of victims who were not autopsied at the IML-PA, and those who did not reside in the geographical area delimited by the study.

The data collection process was carried out through the quantitative analysis of reports provided by the Scientific Police of Pará, based on records from the PericiaNet system. This system consolidates information related to the number of records originating in the Metropolitan Region of Belém, specifically those referring to autopsy examinations associated with suicide cases autopsied at the Renato Chaves Forensic Medical Institute.

For the organization and analysis of the information, the collected data were entered into electronic spreadsheets using Microsoft Excel software. This systematization allowed for the construction of descriptive tables and graphics, aiming for better visualization and interpretation of the findings.

Furthermore, to estimate the number of cases not confirmed as suicide, a comparative analysis was conducted between the total number of suspected suicide cases subjected to autopsy and the number of cases officially reported in the Mortality Information System (SIM). This methodological strategy allowed the calculation of the difference between the cases examined by the Forensic Medical Institute and the official suicide records, contributing to a more accurate understanding of the magnitude of the problem.

Regarding ethical aspects, all stages of the research followed the guidelines established by Resolution No. 466/2012 of the National Health Council (CNS). The study ensured respect for the privacy, anonymity, and confidentiality of the information collected. It should be emphasized that the identifying data from the victims' medical records were not accessed at any stage, considering only the variables relevant to the proposed objectives.

The researchers adopted rigorous measures to protect the integrity and security of the data. The information was stored in password-protected electronic folders and is scheduled to be destroyed after the publication of the results, in accordance with the ethical commitment made. The potential social risk was also considered, avoiding the public exposure of information that could cause embarrassment or suffering to the victims' families.

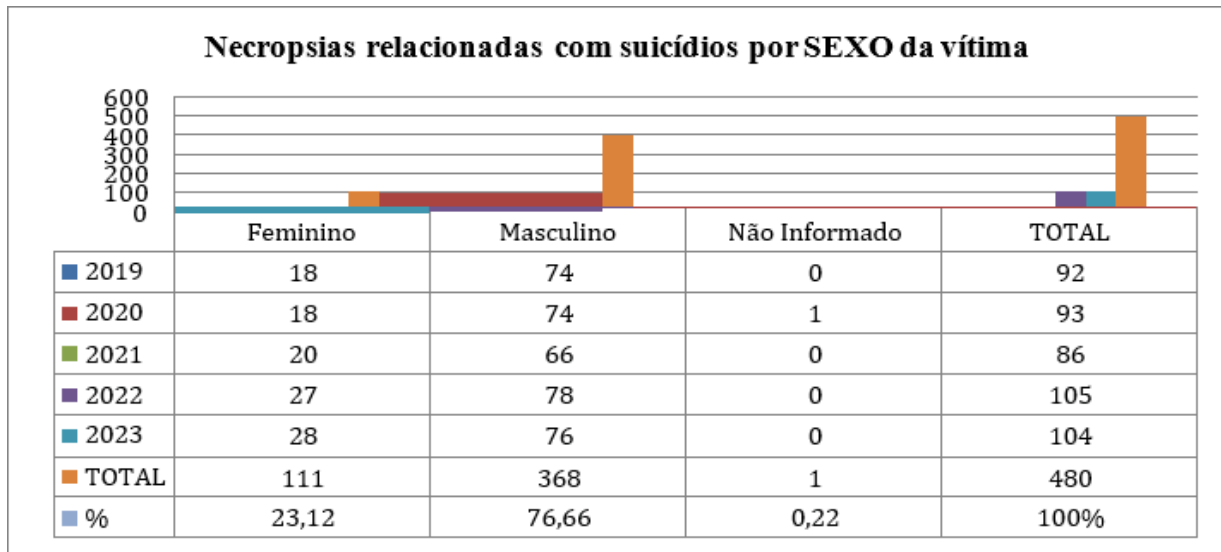
This is also important to emphasize that the expected benefit of this research is to provide consistent and relevant data to support public policies for suicide prevention, contributing to the planning of more effective actions tailored to the specific characteristics of the Metropolitan Region of Belém.

### III. RESULTS

This study analyzed cases of suspected suicide victims that occurred in the Metropolitan Region of Belém, from 2019 to 2023, totalizing 480 autopsies performed at the Renato Chaves Forensic Medical Institute.

Initially, the data revealed the distribution of cases by victim's sex. A prevalence of deaths was observed in males, totaling 368 cases (76.66%),

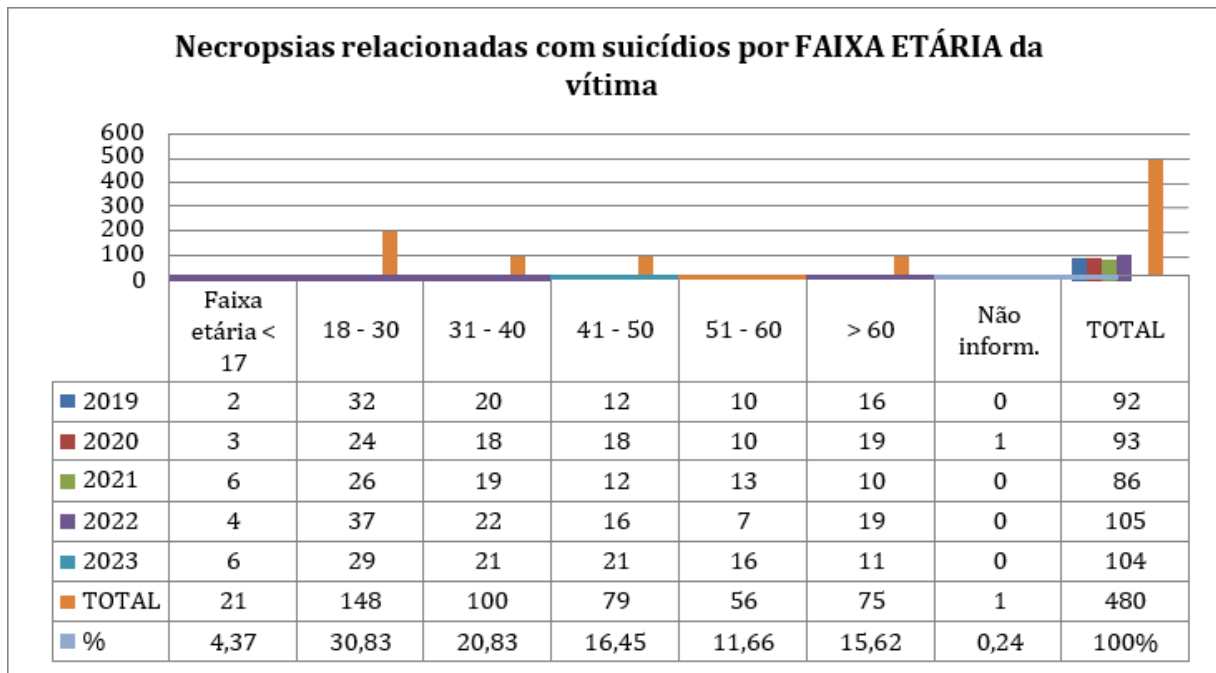
compared to 111 cases in females (23.12%) and 1 case with unspecified sex (0.22%) during the evaluated period. This difference was evident throughout all the years of the historical series. Regarding the years analyzed, a decrease in the number of cases stands out in 2021, a period that coincided with the peak of the COVID-19 pandemic.



Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 1: Autopsies related to suicide, by sex of the victim (Female, Male, Non-Informed)

Regarding the distribution by age group, the highest concentration of cases was observed among young adults aged 18 to 30 years, corresponding to 30.83% of the total cases. Following this, the age brackets of 31 to 40 years (20.83%), 41 to 50 years (16.45%), and over 60 years (15.62%) stood out. Age groups under 17 years showed a lower prevalence (4.37%).

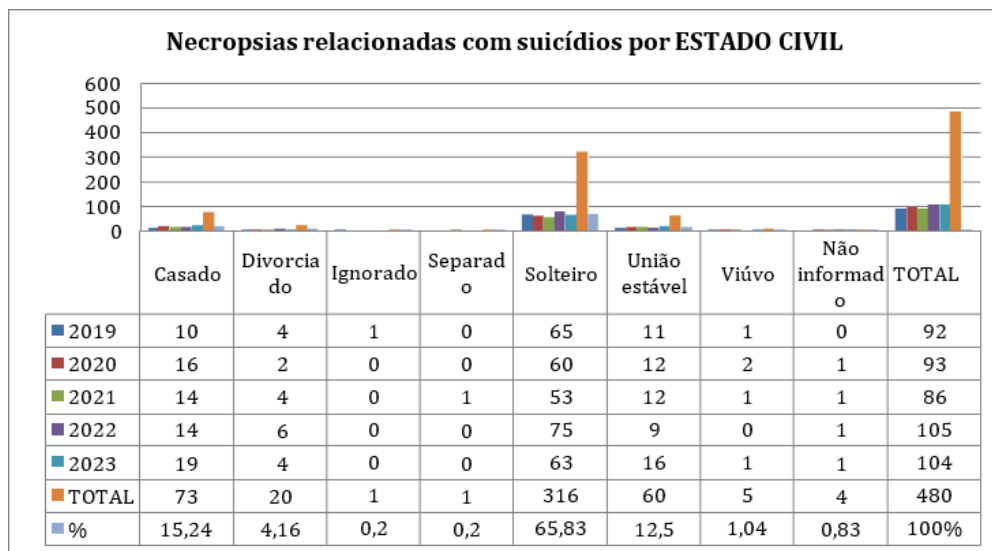


Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 2: Autopsies related to suicides by age brackets of the victim

Regarding marital status, single individuals were the most affected, representing 65.83% of the occurrences. They were followed by married individuals (15.24%) and those in common-law

relationships (12.5%). The other marital statuses presented significantly smaller proportions, such as divorced (4.16%), widowed (1.04%), and separated (0.2%).

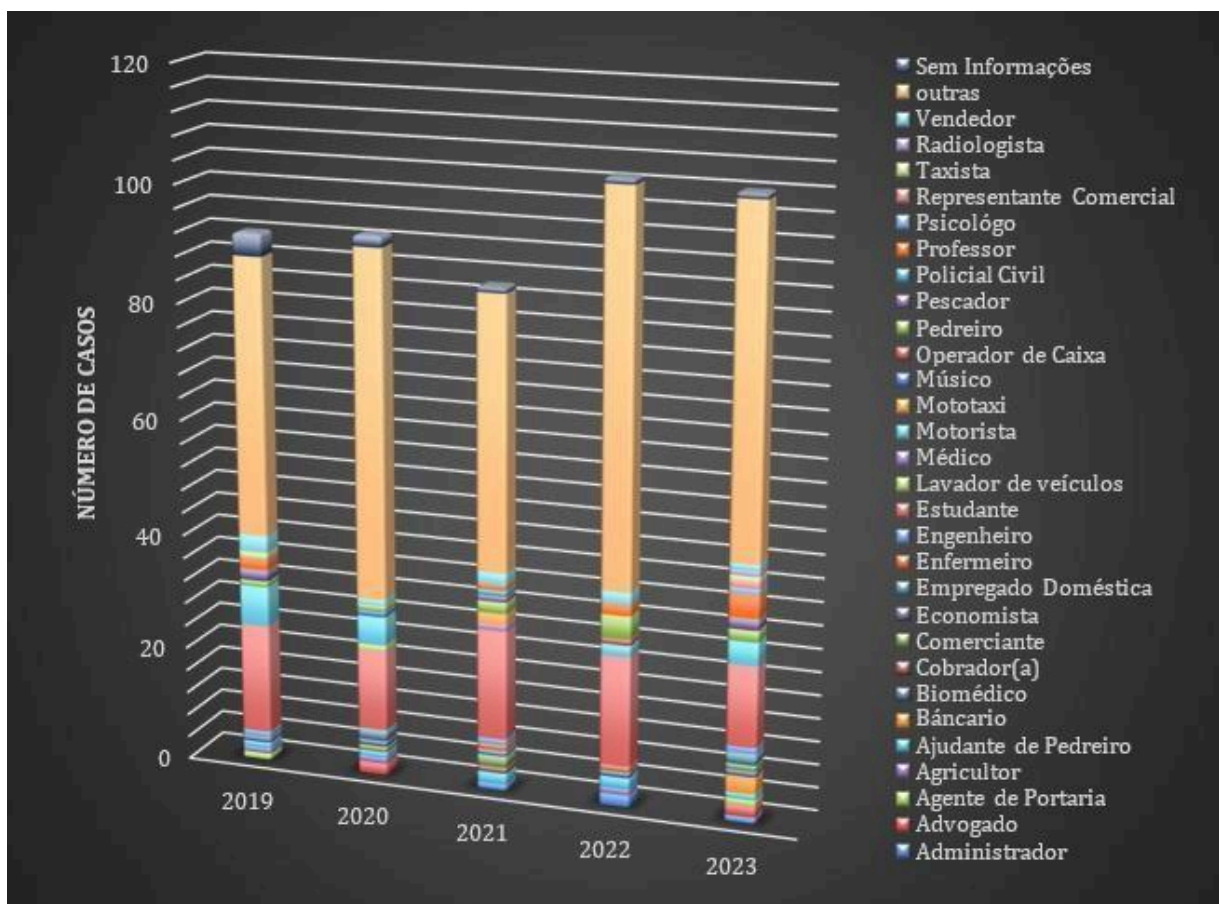


Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 3: Autopsies related to suicides by marital status of the victim (Married, Divorced, Ignored, Separated, Single, Common-Law Marriage, Widowed, Non-Informed)

The analysis by profession revealed that the majority of cases were categorized as "other unspecified professions," encompassing 58.54% of the victims. This was followed by students, with

17.7% of the cases, and drivers, with 3.375%. Other occupations showed much lower incidences, distributed among various professional categories.

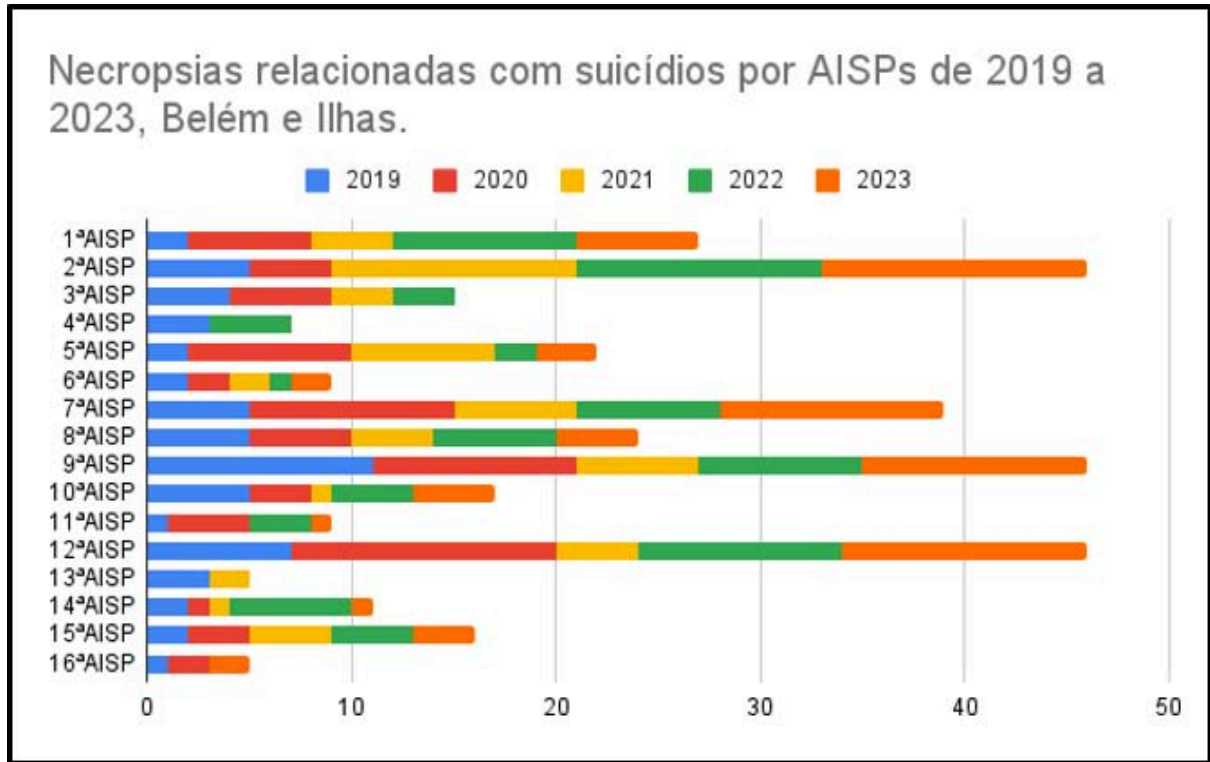


Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 4: Autopsies Related to Suicides, Categorized by the Victim's Profession, with Highlight to Others Causes, Students and Drivers

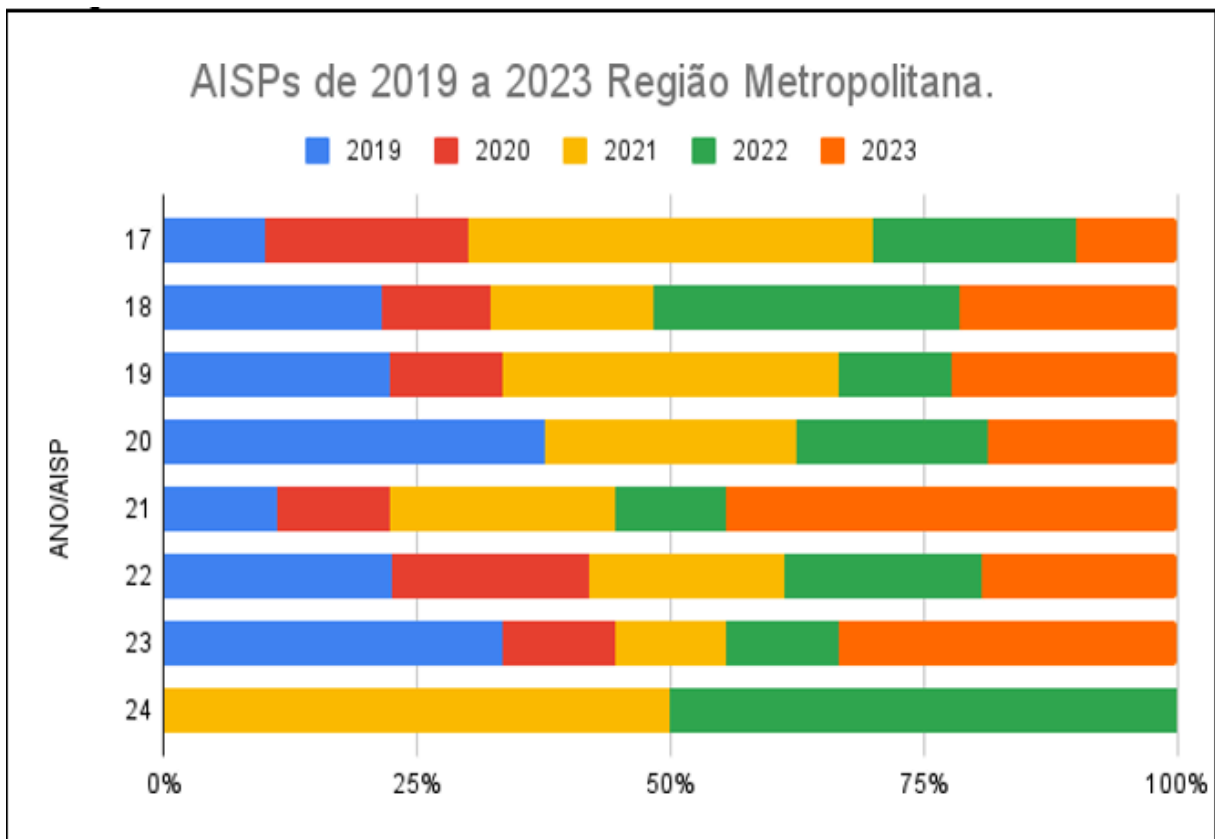
Regarding the location of the incidents, the data were stratified by Integrated Public Security Areas (AISPs), distributed between the capital (Belém – RISP 1) and the Metropolitan Region (RISP 2: Ananindeua, Marituba, Benevides and Santa Bárbara do Pará).

In the capital, the neighborhoods with the highest number of reported cases were those belonging to AISPs 2, 9, and 12. In the Metropolitan Region, AISP 18, which includes neighborhoods such as Cidade Nova, Guajará, Icuí-Guajará, Icuí-Laranjeira, Jibóia Branca and 40 Horas, in the municipality of Ananindeua, stood out with the highest number of cases. (11.67% of the total victims).



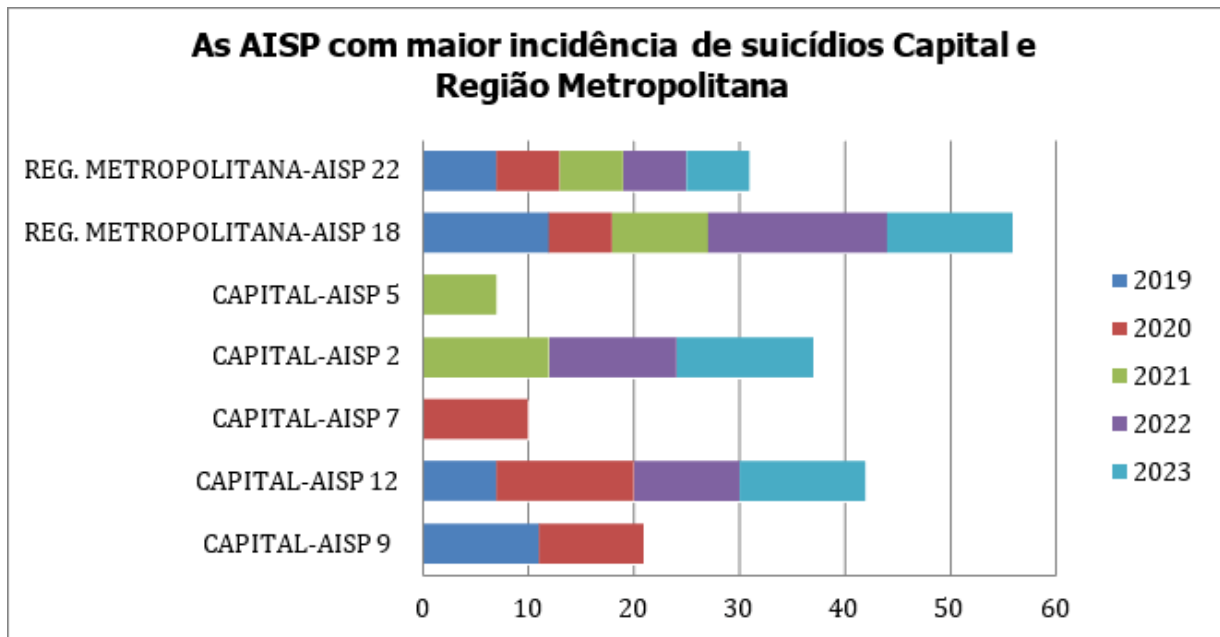
Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 5: Autopsies related to suicides by AISP from 2019 to 2023 – Capital (Belém and islands)



Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 6: Autopsies related to suicides by AISP – Metropolitan Region (2019 – 2023)

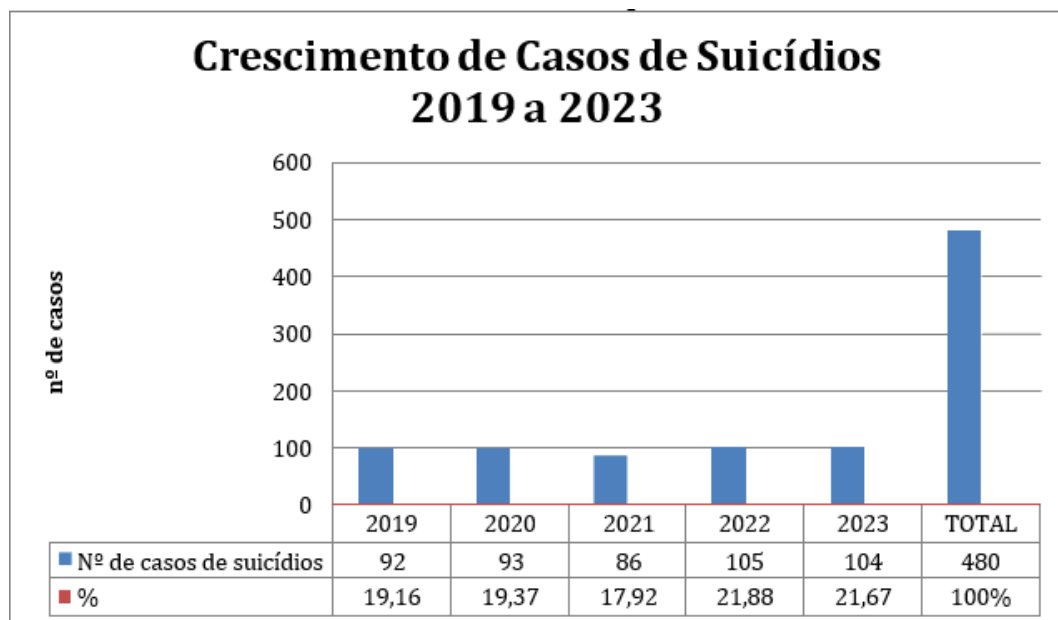


Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 7: Comparison of the main AISPs with the highest number of cases – Capital and Metropolitan Region

The temporal analysis of cases, distributed annually, indicated a progressive increase in the number of occurrences between 2019 and 2023. The percentage of cases, year by year, was 19.16% in 2019, 19.37% in 2020, 17.92% in 2021, 21.88%

in 2022, and 21.67% in 2023. Despite the reduction in 2021, possibly related to the direct and indirect effects of the pandemic, the data showed a resumption of the increase in the following years.



Source: Scientific Police of Pará, Forensic Intelligence Center, 2023

Graphic 8: Increase in suicide cases in the Metropolitan Region of Belém (2019 to 2023)

Finally, when comparing the data obtained with the records from the Mortality Information System (SIM), a considerable difference was observed between the suspected cases that underwent autopsy and those officially confirmed as suicide. This discrepancy can be attributed to underreporting, inadequate classification of causes of death, and a lack of integration between death registration systems.

#### IV. DISCUSSION

This study conducted a detailed analysis of the epidemiological profile of suspected suicide victims in the Metropolitan Region of Belém, from 2019 to 2023, based on autopsy records from the Renato Chaves Forensic Medical Institute. The data reveal that the number of victims autopsied with suspected suicide reached 480 cases, representing a significant annual average for the region. This number reinforces the relevance of the topic and the need for the implementation of effective public policies aimed at suicide prevention, especially in historically vulnerable regions.

Regarding the sex of the victims, the results showed a significant predominance of males, who accounted for 76.66% of the cases analyzed. This data is consistent with national and international literature, as pointed out by Palma<sup>3</sup>, who highlight that men are more prone to committing suicide due to cultural, social, and biological factors. Among the aspects emphasized by the authors are greater male impulsivity, men's resistance to seeking psychiatric help, the effects of testosterone, and high alcohol consumption. The epidemiological bulletin of the Brazilian Ministry of Health<sup>1</sup> also confirms that, in Brazil, males lead the suicide statistics, presenting a rate three times higher than that observed among women.

The predominance of males may also be associated with the use of more lethal methods. Palma<sup>3</sup> highlight that men tend to employ means with a greater potential for lethality, such as firearms and hanging, which reduces the chances of intervention after the attempt. This fact was corroborated by the findings of this research,

which showed hanging as the main method used, followed by firearms and poisoning with chemical substances.

Regarding age group, the data revealed that the highest number of cases were concentrated among individuals aged 18 to 30 years, representing 30.83% of the occurrences. This result reinforces the warning from the World Health Organization (2021), which identifies suicide as the fourth leading cause of death among young people aged 15 to 29 worldwide. The research by Abasse et al.<sup>4</sup> also shows that adolescents and young adults form one of the groups most vulnerable to suicidal behavior, which is aggravated by factors such as family conflicts, financial difficulties, instability in the job market, and undiagnosed mental disorders.

In the analysis by marital status, the study showed a significant prevalence of single victims, representing 65.83% of the cases. Married individuals accounted for 15.24%, and those in common-law relationships for 12.5%. These data align with the findings of Arruda<sup>5</sup>, who, when analyzing suicidal behavior in Brazil, observed that single individuals comprise the group most affected by suicides. According to Batista et al.<sup>6</sup>, social isolation and the absence of emotional support may be determining factors for this epidemiological pattern.

Another relevant aspect concerns the victims' professions. It was observed that the category "other unspecified professions" was the most frequent, with 58.54% of cases, followed by students, who represented 17.7%. This high participation of students in the total number of cases raises concerns about the mental health of young people, especially in urban contexts. Batista et al.<sup>6</sup> highlight the importance of special attention to children and adolescents in school environments, emphasizing the need for public policies that address mental health in educational settings.

Regarding geographical distribution, the research indicated that 70.42% of the cases occurred in the state's capital city, Belém, while the municipalities of the Metropolitan Region, such

as Ananindeua, Marituba, Benevides, and Santa Bárbara do Pará, accounted for 29.58% of the occurrences. Among the most affected police districts (AISPs) in Belém, AISP 2, AISP 9, and AISP 12 stood out. In the Metropolitan Region, AISP 18, located in Ananindeua, concentrated 11.67% of the cases. Rodrigues et al.<sup>7</sup> had already identified these regions as areas of greater vulnerability in a previous study on suicides in Belém.

The highest concentration of cases in the capital can be explained by factors such as higher population density, accelerated urbanization, and precarious socioeconomic conditions. On the other hand, the progressive increase in cases in the Metropolitan Region since 2021 highlights the need for special attention to these territories, considering the lack of mental health services and the increase in social inequalities in these areas.

The temporal analysis of the cases revealed a 13.04% increase in the number of reported cases between 2019 and 2023. Although the year 2021 showed a reduction, possibly due to mobility restrictions and social isolation measures adopted during the COVID-19 pandemic, the years 2022 and 2023 showed a recovery and a significant increase in the number of cases. This trend is consistent with national data published by the Brazilian Public Security Yearbook<sup>8</sup>, which indicated a 7.4% increase in suicide cases in Brazil between 2020 and 2021.

The pandemic brought with it a series of psychosocial impacts that may have contributed to the worsening of the population's mental health, such as increased unemployment, social isolation, collective grief, and financial difficulties. Barbosa<sup>9</sup> emphasizes that the emotional consequences of the pandemic may last for years, requiring the implementation of effective and integrated public policies.

In addition to the sociodemographic analyses, the study highlighted the methods used in suicide cases, with hanging leading the statistics, followed by the use of firearms and chemical poisoning. This data is consistent with what was pointed out by Krug (2002), who identified

hanging as the most common method in developing countries. Palma<sup>3</sup> also reinforces that men tend to choose more lethal methods, which may explain the higher male suicide rate.

A critical point observed was the discrepancy between the data from the Forensic Medical Institute and the official records of the Mortality Information System. This difference can be attributed to problems of underreporting, incorrect classification of causes of death, and limitations in the information systems. Other researcher<sup>(5-6)</sup> had already pointed out these weaknesses in the national databases on suicide mortality.

This underreporting compromises not only the true scope of the problem, but also the development of public policies for prevention and psychosocial care. The lack of accurate data prevents the creation of more effective strategies, hindering the allocation of resources and the targeting of actions towards the groups at greatest risk.

Another factor that deserves emphasis is the influence of social determinants of health on suicidal behavior. The Pan American Health Organization<sup>2</sup> highlights that factors such as unemployment, low educational attainment, income inequality, and insufficient public mental health policies contribute directly to the increase in suicide rates. These aspects are particularly critical in the Metropolitan Region of Belém, marked by historical socioeconomic inequalities<sup>2</sup>.

Considering the results obtained, the need to strengthen the Psychosocial Care Network (RAPS) in the region becomes evident, with the expansion of mental health services, training of professionals, and integration among the various sectors involved in addressing suicide. Programs such as "Vidas Preservadas" (Lives Preserved), developed in the Brazilian state of Ceará and cited by the Pan American Health Organization<sup>2</sup>, can serve as a model for the implementation of intersectoral actions that encompass everything from restricting access to lethal means to community awareness campaigns.

Furthermore, it is fundamental to ensure the improvement of death registration and notification systems in order to guarantee more reliable data for planning preventive actions. The integration between the Forensic Medical Institute, the Mortality Information System (SIM), and public health services is an essential measure in this process.

Regarding the limitations of the present study, it is important to highlight the use of secondary data, which are subject to errors in completion and classification. Furthermore, the research only considered cases referred to the Forensic Medical Institute, which may have excluded victims who were not subjected to a post-mortem examination. These limitations, however, do not invalidate the relevance of the findings, which offer a consistent and unprecedented overview of the epidemiological profile of victims suspected of suicide in the Metropolitan Region of Belém.

In light of all that has been presented, the results of this research reinforce the need for a multidimensional and intersectoral approach to addressing suicide. Understanding the profile of the victims, as well as the associated risk factors, is a fundamental step in developing more effective public policies aimed at reducing suicide rates and promoting mental health in the region.

## V. FINAL CONSIDERATIONS

This study aimed to analyze the epidemiological profile of suspected suicide victims in the Metropolitan Region of Belém, from 2019 to 2023. The data obtained from autopsies performed at the Renato Chaves Forensic Medical Institute revealed a worrying reality, highlighting the magnitude and complexity of suicide as a public health problem in the region. The high incidence of cases, especially among young, single men and students, underscores the urgency of implementing public policies for suicide prevention, considering the sociodemographic and geographical aspects identified.

The predominance of males in the statistics, the most affected age group (18 to 30 years), the prevalence of single marital status, and the most frequently used method (hanging) are consistent

with the profile described in national and international studies. This data reinforces the need for specific actions aimed at these more vulnerable groups. The concentration of cases in AISPs 2, 9, and 12 in Belém, as well as in AISP 18 in Ananindeua, indicates that prevention strategies need to be localized, taking into account the socioeconomic peculiarities of each locality.

Furthermore, the gradual increase in the number of cases throughout the analyzed period, especially after the most critical period of the COVID-19 pandemic, suggests that the psychosocial effects caused by the health crisis continue to impact the mental health of the population. These findings reinforce Barbosa's<sup>9</sup> warning about the long-term consequences of the pandemic on increased suicide rates, especially in regions with lower coverage of mental health services.

The methodological limitations of the study must be acknowledged. The use of secondary data from the PericiaNet system and the analysis of cases only of victims who underwent autopsies represent a partial view of reality. There is also the aggravating factor of underreporting, already widely discussed in the literature, which compromises the accuracy of the data available in official mortality registration systems. This reality reinforces the need for improvements in the quality of information on deaths, especially those related to suicide.

The results of this study highlight the importance of strengthening the Psychosocial Care Network (RAPS) in the Metropolitan Region of Belém. Expanding services, increasing the supply of trained mental health professionals, and implementing preventive actions in the most affected areas are urgent measures. Furthermore, intersectoral policies that integrate health, education, social assistance, and public security should be prioritized in order to mitigate the risk factors associated with suicidal behavior.

Finally, it is recommended that further research be conducted using diverse methodological approaches, including qualitative studies that can

deepen the understanding of the social, cultural, and psychological determinants involved in suicide. Strengthening databases, improving reporting processes, and integrating information among the different responsible agencies are essential measures to ensure that future interventions are more assertive and effective.

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# Unmasking Olfactory Neuroblastoma: A Case of Rare Pediatric Tumour and the Diagnostic and Therapeutic Challenges

*Suraien Mariappen, Gina Ho Mei Ching, Thevagi Maruthamuthu,  
Chenthilnathan Periasamy, Tan Tay Eng & Professor Irfan Mohamad*

*Universiti Sains Malaysia Health Campus*

## INTRODUCTION

Olfactory Neuroblastoma (ON) A rare malignant tumor originating from the olfactory epithelium of the sinonasal tract, first described by Berger and Richard in 1924. Common symptoms patients typically present with unilateral nasal obstruction (70%), epistaxis (50%), and may also experience headaches, pain, excessive tearing, rhinorrhea, anosmia, and visual symptoms. Incidence Occurs at a rate of 0.1 per 100,000 in the pediatric population, making it particularly rare in toddlers. Imaging is crucial for staging the disease; both Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) are used for diagnosis and assessment. Treatment Multimodal approach often recommended, including surgical resection, chemotherapy, and sometimes radiotherapy. The role of neoadjuvant chemotherapy in facilitating complete surgical resection requires further study. Prognosis Depends on the stage of the disease, including locoregional extension and presence of distant metastasis.

*Keywords:* NA

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# Unmasking Olfactory Neuroblastoma: A Case of Rare Pediatric Tumour and the Diagnostic and Therapeutic Challenges

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## I. INTRODUCTION

Olfactory Neuroblastoma (ON) A rare malignant tumor originating from the olfactory epithelium of the sinonasal tract, first described by Berger and Richard in 1924. Common symptoms patients typically present with unilateral nasal obstruction (70%), epistaxis (50%), and may also experience headaches, pain, excessive tearing, rhinorrhea, anosmia, and visual symptoms. Incidence Occurs at a rate of 0.1 per 100,000 in the pediatric population, making it particularly rare in toddlers. Imaging is crucial for staging the disease; both Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) are used for diagnosis and assessment. Treatment Multimodal approach often recommended, including surgical resection, chemotherapy, and sometimes radiotherapy. The role of neoadjuvant chemotherapy in facilitating complete surgical resection requires further study. Prognosis Depends on the stage of the disease, including locoregional extension and presence of distant metastasis.

## II. CASE REPORT

A 1 year 9 months old boy presented with persistent fever, protrusion of the right eye, and visual disturbances lasting for a month, along

with lethargy and poor oral intake. He did not have weight loss, night sweats, or nosebleeds. Clinical examination revealed right eye bulging and a bony prominence on the right frontal skull. There were no masses or swollen lymph nodes in the head and neck, and other systemic examinations were normal.

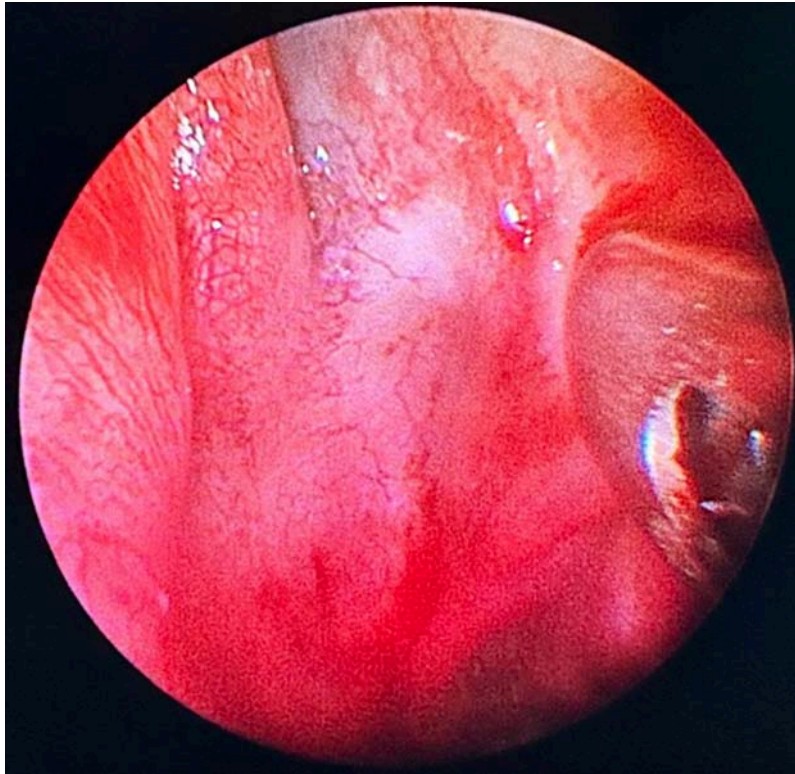
Suspected Foster-Kennedy Syndrome led to a CT scan, which showed a diffuse periosteal reaction with a sunburst pattern affecting the sphenoid, frontal, and parietal bones. There was a thick mass (2.0 cm) in the right frontoparietal region causing brain compression, with extension into the sphenoid and ethmoid sinuses and the orbital space. The optic nerves appeared compressed by the mass.



*Figure 1:* Axial View Shows Enhancing Soft Tissue (Blue Arrow) Component in the Extra-Axial Space of Anterior Middle Cranial Fossa

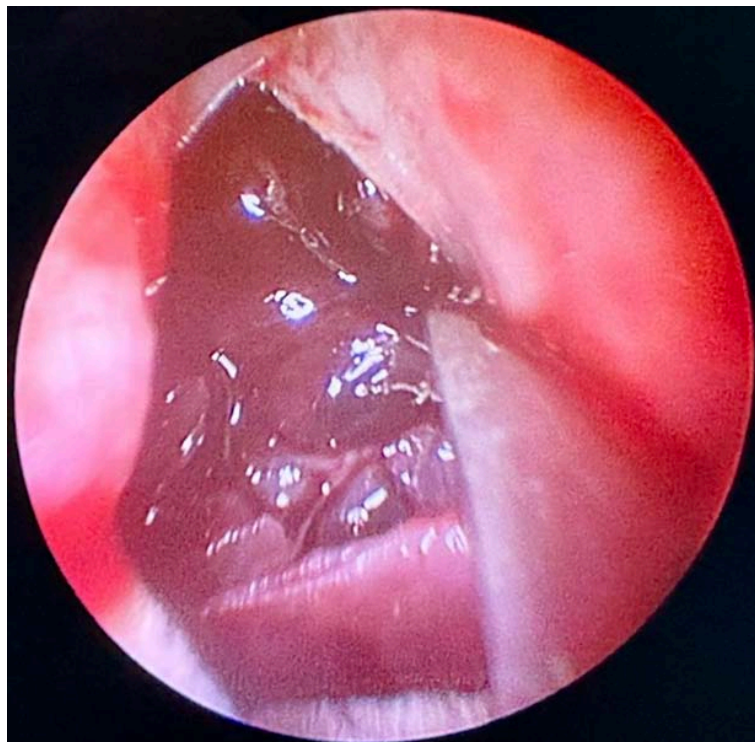


*Figure 2:* Sagittal View Shows Sunburst Appearance (Blue Arrow) at The Sphenoid Bone



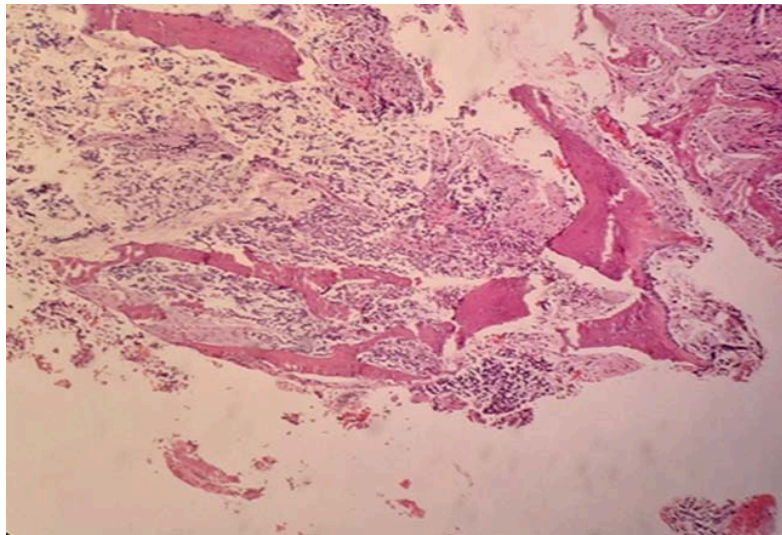
*Figure 3:* Intra-Operative Endoscopic View of Anatomical Landmark for Right Posterior Ethmoidectomy

BE: Bulla Ethmoidalis, Bl: Basal Lamella, Mt: Middle Turbinate

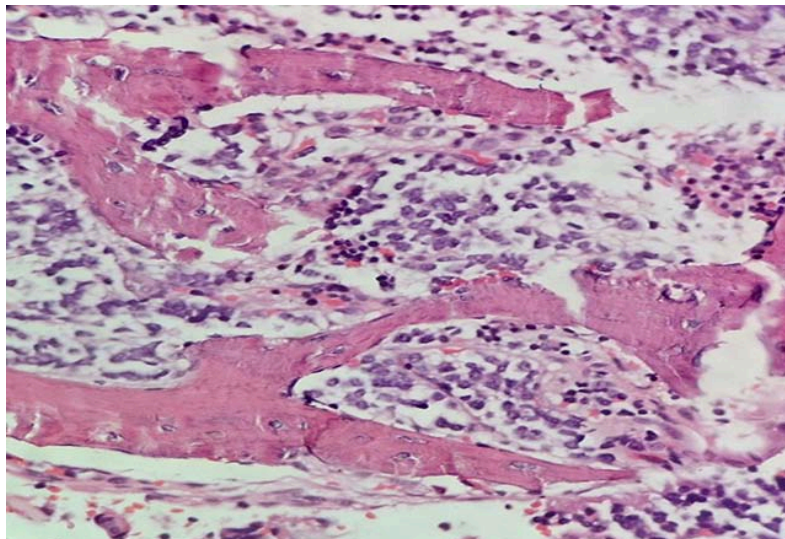


*Figure 4:* Endoscopic View of Tumour (Blue Arrow) in the Right Posterior Ethmoid Sinus Cavity

A biopsy was performed via endoscopic transnasal and transethmoidal surgery. The biopsy revealed a fleshy bluish mass in the right posterior ethmoid sinus.

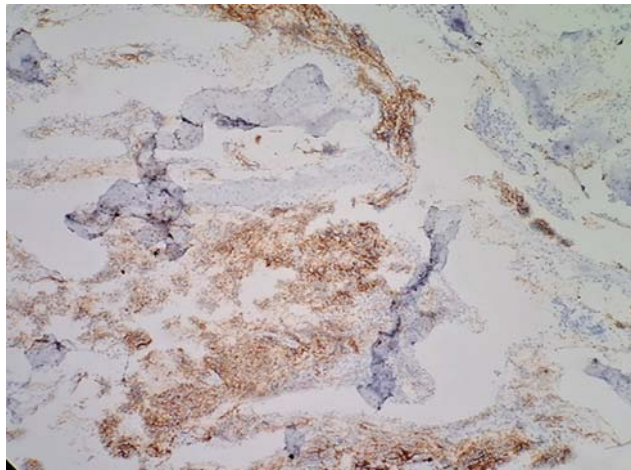


*Figure 5:* Microscope View at 200x Magnification Shows Loose Aggregates and Small Sheets of Tumour Cells

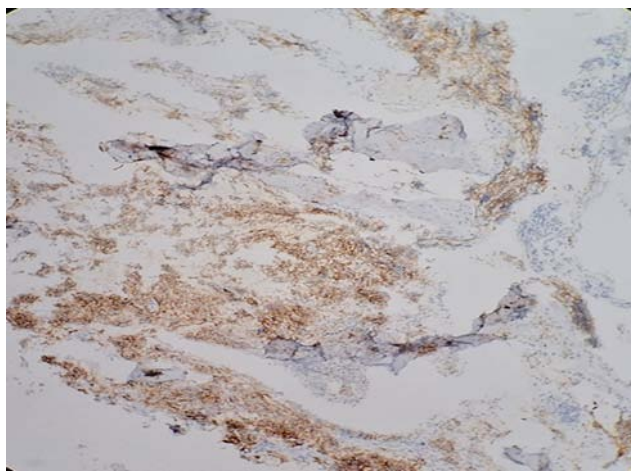


*Figure 6:* Microscopy at 400x Magnification Shows Tumour Cells with Round to Ovoid Nuclei, Granular to Stippled Chromatin Pattern AAnd Scanty Cytoplasm

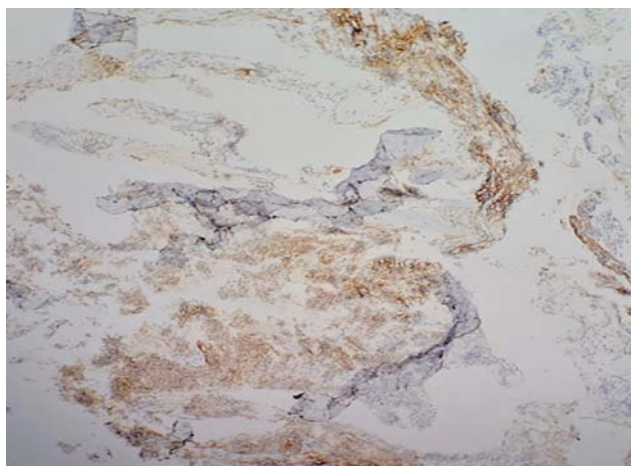
Histopathology showed fibrocollagenous tissue with respiratory epithelium and tumor cells with round to oval nuclei, granular chromatin, and moderate nuclear pleomorphism. Immunohistochemical tests showed the tumor cells were positive for synaptophysin (Figure 7), chromogranin (Figure 8), and CD56 (Figure 9), but negative for various other markers. The Ki-67 proliferation index was high at 50%. The findings confirmed to be ON and the patient was referred to a Pediatric Oncology Team for treatment.



*Figure 7:* 100x Magnification; Positive Stain For Synaptophysin



*Figure 8:* 100x Magnification; Positive Stain for Chromogranin



*Figure 9:* 100x Magnification; Positive Stain For Cd56

### III. DISCUSSION

Naturally ON is a locally aggressive malignant neoplasm originating from the olfactory neuroepithelium, which spans the roof of the nose, superior turbinates, and part of the nasal

septum [6]. Malignancies here can invade the cribriform plate and spread to intracranial structures. Historical Context First described by Berger et al. in 1924, with around 1000 cases reported. ON occurs across various age groups, with a higher frequency in those aged 10-20 and

50-60. Its rarity in children makes it particularly challenging.

Pediatric incidence extremely rare in children, with an incidence of 0.1 per 100,000. Despite this, ON is noted as the most common malignancy of the paranasal sinuses in this age group. Localized lesions often present with symptoms of unilateral nasal obstruction and epistaxis. Advanced cases might exhibit neurologic, oral, facial, cervical, and ophthalmologic symptoms. Systemic examination is crucial to rule out distant metastases.

Role of Imaging CT imaging is crucial for staging, identifying locoregional extension, and differentiating from other conditions. MRI provides better tumor delineation.

Staging Systems Kadish's system (1976) classifies ON into <sup>[1,10]</sup>:

A modified stage D for distant metastases was added by Morita et al. in 1993 <sup>[4]</sup>.

Histopathological Features ON typically shows nests of small, round cells with scant cytoplasm in a vascularized stroma. The presence of neuroblastic pseudorosettes is characteristic. Immunohistochemistry is essential for diagnosis, ON typically expresses neuroendocrine markers like synaptophysin, chromogranin, and NSE <sup>[3]</sup>. The diagnosis is confirmed through specific staining patterns.

Multimodal Treatment Combining surgery (craniofacial or endoscopic) with radiotherapy and chemotherapy has shown improved survival rates and reduced recurrence. However, the aggressive nature of treatment poses risks, particularly in children, including potential complications from surgery and long-term effects of radiotherapy.

Surgical resection in children can be challenging and is complicated by the delicate craniofacial anatomy, and radiotherapy can impact quality of life due to potential growth impairment and other side effects. Chemotherapy has shown promise in reducing tumor size preoperatively but requires more research to determine optimal regimens.

Research renders further studies are needed to refine treatment protocols, especially regarding the effectiveness and safety of Intensity-Modulated Radiation Therapy (IMRT) and chemotherapy regimens tailored for pediatric patients. More data is required to establish standardized treatment guidelines and improve patient outcomes.

#### IV. CONCLUSION

ON is an exceptionally rare malignant tumor affecting all age groups, with no established gold standard for treatment due to the limited number of cases. Further research is needed to evaluate the effectiveness of various treatment options in improving patient outcomes. Future studies should also investigate the potential benefits of IMRT for treating ON in children.

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# The Many Psychoanalysis

*Rainer Krause*

## SUMMARY

In this thesis, various concepts that see themselves as psychoanalytic are described, and the question is asked how it can be that such mutually exclusive conceptions have nevertheless found shelter under the umbrella of "psychoanalytic". With recourse to empirical studies on micro affective behavior, it is shown that something that can be called repetition compulsion is the core of the disease process, and that the success of psychoanalysts goes hand in hand with the fact that psychoanalysts can oppose this compulsion. Mind you, on the level of behavior, not experience. It is argued that theories that postulate a similar event between patient and practitioner are not medical treatments and therefore cannot be psychoanalytical. However, they do have a significant effect on personality development and can be used, for example, in teaching analyses.

*Keywords:* repetition compulsion, micro affective Behavior, empirical research against arbitrariness of conceptions.

*Classification:* NLM Code: WM 460

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# The Many Psychoanalysis

Rainer Krause

## ZUSAMMENFASSUNG

*In dieser Arbeit werden verschiedene Konzepte, die sich als psychoanalytisch verstehen, beschrieben und es wird der Frage nachgegangen, wie es sein kann, dass solche sich gegenseitig ausschließenden Vorstellungen dennoch unter dem Dach der "Psychoanalytik" Zuflucht gefunden haben. Unter Rückgriff auf empirische Studien zum mikroaffektiven Verhalten wird gezeigt, dass etwas, das man als Wiederholungszwang bezeichnen kann, der Kern des Krankheitsprozesses ist, und dass der Erfolg der Psychoanalytiker damit einhergeht, dass Psychoanalytiker sich diesem Zwang entgegenstellen können. Wohlgemerkt, auf der Ebene des Verhaltens, nicht der Erfahrung. Es wird argumentiert, dass Theorien, die ein gleiches Geschehen beim Patienten und Behandler postulieren, keine Krankenbehandlungen sind und nicht psychoanalytisch sein können. Sie haben jedoch einen signifikanten Einfluss auf die Persönlichkeitsentwicklung und können z.B. in Lehranalysen eingesetzt werden.*

**Keywords:** wiederholungszwang, mikroaffektives Verhalten, empirische Forschungen, Beliebigkeit von Konzeptionen.

## SUMMARY

*In this thesis, various concepts that see themselves as psychoanalytic are described, and the question is asked how it can be that such mutually exclusive conceptions have nevertheless found shelter under the umbrella of "psychoanalytic". With recourse to empirical studies on micro affective behavior, it is shown that something that can be called repetition compulsion is the core of the disease process, and that the success of psychoanalysts goes hand in hand with the fact that psychoanalysts can oppose this compulsion. Mind you, on the level of behavior, not experience. It is argued that*

*theories that postulate a similar event between patient and practitioner are not medical treatments and therefore cannot be psychoanalytical. However, they do have a significant effect on personality development and can be used, for example, in teaching analyses.*

**Keywords:** repetition compulsion, micro affective Behavior, empirical research against arbitrariness of conceptions.

**Author:** Prof. Dr. phil. Approbierter psychologischer Psychotherapeut. Saarländisches Institut für Psychoanalyse. 1942, Forscher, DPG, IPV, Schweizer Gesellschaft für Psychoanalyse, Psychotherapeut und Psychoanalytiker in eigener Praxis, Publikationen über Affekte.

## I. DIE VIELEN PSYCHOANALYSEN

Es gibt verschiedene analytische Gruppierungen denen eigene Namen gegeben wurden. Sie folgten den Gründungs Figuren, Z. B. Klassisch Freudianisch, Kleinianisch. Dieser Rückgriff auf Personen geschah im Allgemeinen in Abhebung von anderen. Andere Einteilungen orientierten sich eher an theoretischen Konzepten wie dem Selbst dem Ich oder dem Objekt. Sie heißen demnach Selbst,- Ich oder Objektpsychologisch. Manche sind an Kulturräume gebunden z.B. die im französischen Raum beheimateten Lacanianer. Genuin deutschsprachigen Konzepte und Behandlungsmethoden verstehen sich als interaktiv (Heigl Evers, Heigl F. & Ott, 1993) Sie konnten sich international nur beschränkt durchsetzen. Die Kontroversen, ehemals sehr heftig, sind im Moment abgeflaut allerdings um den Preis, dass sich die Gruppierungen gar nicht mehr wahrnehmen. Das mag daran liegen, dass manche Konzepte unvereinbar scheinen, z. B. der Selbstpsychologische und der Objektpsychologische und sie sich gegenseitig das Prädikat *analytisch* absprechen müssten, was aber nur heimlich geschieht. Nun haben Neuentwicklungen die unter dem Namen des bipersonalen

Feldes (Baranger & Baranger 2018) firmierten geltend gemacht sie würden eine Integration der verschiedenen Sichtweise ermöglichen. Dies geschah unter Rückgriff auf die Gestalttheorie der akademischen Psychologie und neue Behandlungstechniken. Hier werden Erfolg oder Misserfolg des therapeutischen Geschehens großenteils an der impliziten Kommunikation in der therapeutischen Beziehung festgemacht. (Doering, 2022, Bürgin, 2022) Ob und inwieweit diese implizite Kommunikation an spezifischen Mustern der unbewussten Konflikte und Strukturniveaus und an Übertragung und Bindungsmustern festgemacht werden können, wurde nicht offiziell untersucht.

## II. GRÜNDE FÜR DIE MANGELNDEN KOHÄRENZ

Das Phänomen einer mangelnden Kohärenz psychoanalytischer Sichtweisen ist nicht neu. Freuds Sichtweisen und Behandlungstechniken änderten sich im Laufe seine Schaffens radikal. Wie sollte das anders sein, wenn die Psychoanalyse sich als Wissenschaft verstehen will. Freud hat seine frühen wissenschaftlichen Schriften bis zu seinem Tod geheim gehalten, weil er meinte herausgefunden zu haben, dass die Art der Wissenschaft nicht dem Gegenstand, dem kranken Menschen, angemessen war. Sie hat allerdings das Denken Freuds weiterhin, wenn auch implizit geprägt.

Heute werden Sie allerdings sehr geschätzt und haben einen großen Einfluss auf das Denken. (Solms 2021) Gleichwohl ist der beklagenswerte wissenschaftsfeindliche Dogmatismus mancher Strömungen auch auf die ambivalente Haltung Freuds gegenüber seiner eigenen Grundlagenforschung zurückzuführen. Die „Richtigkeit“ des analytischen Zugriffs wurde an seiner Person festgemacht, was zur Langeweile einer nur beschränkt lernfähigen Disziplin führte (von Braun, Held 2025) Nun mag es sein, dass verschiedene Krankheitsbilder verschiedene Theorien und Techniken benötigen. Dann wäre die mangelnde Kohärenz auf neue Krankheitsbilder die wir gar nicht kannten zurückzuführen. In der Zusammenfassung einer allgemeinen psychoanalytischen Krankheitslehre

durch Fenichel (1946, 1974) wurden explizit die traumatischen Neurosen von den Psychoneurosen getrennt und auch verschiedene Behandlungstechniken für sie empfohlen. Dann aber wurde die traumatischen Neurosen zugunsten einer einheitlichen Sichtweise des unbewussten Konfliktes, die aber sehr dogmatisch daherkam fallengelassen. (Eissler 1953I) In den Konzeptionen, die ich erwähnt habe, wurden nur sehr beschränkt gleiche Behandlungstechniken verwendet obgleich früher schon theoretische Entwicklungen entwickelt wurden, die auf übergreifende Behandlungstechniken Einfluss hatten, wie die Idee der projektiven Identifikation (Krause, Goetzmann Gruettner (2022), Ogden 1979).

## III. PSYCHOANALYSE VS. ANALYTISCHE PSYCHOTHERAPIE

Die Unterscheidung von analytischer Psychotherapie und Psychoanalyse, die sich im Versorgungskontext durchgesetzt hat, wurde einerseits am Setting (Sitzend oder liegend), an der Frequenz (2 bis 5) oder an den Zielen (Symptomreduktion vs. Persönlichkeitsentwicklung) festgemacht. Gibeault (2002) hat eine weitere Unterscheidung nämlich einen interpersonellen und einen Intrapsychischen Zugang geltend gemacht., Ist die Übertragungs-Gegenübertragungsbeziehung mit einer zwischenmenschlichen Beziehung im Hier und Jetzt verbunden. oder weist diese Beziehung eher auf eine intrapsychische Dimension, die Zugang zu Objekten aus der Vergangenheit ermöglicht und die psychische Realität in eine wiedergefundene materielle Realität einbettet. Seite 4) „

Der analytische Prozess sei unabhängig von der therapeutischen Modalität einheitlich. Diese Einheitlichkeit würde durch die Haltung des Analytikers der technisch Neutral und abstinente sei und auf der Einhaltung des Rahmens bestehe, gewährleistet. Eben diese Parameter werden aber von manchen Gruppierungen, als schädlich beschrieben. weil der Analytiker unempathisch agiere

#### IV. EMPIRISCHE GRUNDLAGEN EINER TRENNUNG VON PSYCHOANALYSE UND PSYCHOANALYTISCHE PSYCHOTHERAPIE

Durch Rückgriff auf die Forschung ist mittlerweile eine Entscheidung, was als analytisch zu gelten habe möglich (Krause, 2012, Krause, R& Merten, J. 1999, Hufnagel et. Al. 1993) zeigte, dass Menschen mit psychischen Störungen einen starken Einfluss auf das nonverbale Verhalten ihrer gesunden Interaktionspartner hatten, die nicht wussten, dass ihre Interaktionspartner gestört waren. Die sogenannten frühen schweren Störungen, wie Psychosen, psychosomatische Patienten, zeigten eine sehr ausgeprägte Reduktion von Gesichts- und anderen Körperbewegungen, die von ihren Partnern kopiert wurde. Darüber hinaus wurde das nonverbale Verhalten durch die unbewussten Konflikte beeinflusst, unter denen die Patienten litten. Dies wurde für Individuation vs. Abhängigkeit und ödipale Konflikte gezeigt. Auch die unbewusste Beeinflussung ihrer Partner ist sehr stark.

#### V. SCHLUSSFOLGERUNGEN

Wir zogen die folgenden Schlussfolgerungen. Es gibt spezifische unbewusste Konflikte, die zu spezifischen Übertragungs- und Gegenübertragungsmustern führen. Auf der strukturellen Ebene kommt es zu einer sehr starken Verringerung des Gesichtsaffekts und anderer nonverbaler Verhaltensweisen entsprechend der strukturellen Ebene der Patienten. (Arbeitskreis OPD 2025).

Beides hängt mit dem Wiederholungszwang zusammen, der Weiss und Sampson zu Folge eine Testfunktion habe, um herauszufinden ob sich die gegenwärtigen Interaktionspartners ebenso verhalten wie die vergangenen. (Weiss und Sampson 1986).

Wir haben gezeigt, dass die heilende Kraft der psychoanalytischen Behandlung auf der Fähigkeit des Analytikers beruht, den Übertragung angeboten seiner Patienten auf einer Verhaltensebene nicht zu folgen. Dies wird als

Neutralität begriffen. Verhaltensbezogen zeigt sich dies in einer starken Verringerung des Gesichtsaffekts und anderer nonverbaler Körperverhaltensweisen des Analytikers. Das bedeutet nicht, dass der Analytiker keine Auswirkungen erlebt. Sie sind jedoch dem inneren Leben des Analytikers vorbehalten und können nur auf einer introspektiven Ebene entschlüsselt werden. (Krause, R. 2012)

Inzwischen wurden diese Ergebnisse von mehreren Forschungsgruppen bestätigt. (Beutel, Leithold & Rasting (2005) Sie konnten anhand von 20 Therapeuten und ihren Patienten die Über ein Jahr an einer Ambulanz behandelt wurden, zeigen dass eine hohe Korrelation des mimischen Ausdrucks zwischen Therapeuten und Patient mit Erfolglosigkeit einherging wohingegen negative Korrelationen mit Erfolg einherging. Der Gewinn beruht darauf, dass den projektiven Prozessen die Wirkung entzogen wird. Die Therapeuten handeln nicht wie empathische Laien affektiv in das unbewusste interaktive Feld hinein. Auf jeden Versuch des Patienten eine Wiederholung zu erzwingen, reagiert der Therapeut mit Abstinenz, also *nichts*. Es handelt sich in Termini der Verhaltenstherapie um ein time out. Das muss sehr oft wiederholt werden.

*Diese Affektive Abstinenz geht mit folgenden Problemen einher:*

Die Patienten erleben den Therapeuten als unempathisch. Deshalb ist es unumgänglich die Patienten auf die Technik durch die Erklärung der psychoanalytischen Grundregel vorzubereiten. Man versucht die reziproke Affektinduktion auf der Verhaltensebene durch eine komplementäre innere zu ersetzen.

Theoretische Entwürfe, die annehmen, dass das Geschehen vom Therapeuten gleich beeinflusst werde, wie vom Patienten halte ich nicht für eine psychoanalytische Krankenbehandlung. Sie mögen aber für die Entwicklung der Persönlichkeit sehr notwendig sein und in Lehranalysen die ja zumindest im deutschen juristischen Umfeld Gesunden vorbehalten ist zur Anwendung kommen.

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# Antibiotic Stewardship in Nursing- A Comprehensive Review

*Nandeesh Kumar P R*

## ABSTRACT

Antibiotic stewardship is at the center of the healthcare system of the future, in a world where antimicrobial resistance (AMR) is a rapidly growing threat. The primary causes of resistance have been the abuse and overuse of antibiotics in clinical, community, and agricultural settings. As a result, patient outcomes have been negatively impacted, leading to longer illness durations, higher death rates, and higher healthcare expenses. Antibiotic stewardship programs (ASPs) employ evidence-based guidelines, diagnostics, surveillance, and interdisciplinary collaboration to prevent needless antibiotic use. Antibiotic use during direct patient care, surveillance, infection prevention, and health education can be greatly influenced by nurses, who make up the majority of the healthcare workforce. It also discusses how to strengthen nursing leadership and stewardship capacity in the future.

*Keywords:* antibiotic stewardship, antimicrobial resistance, nursing practice, infection control, surveillance, antibiotic misuse.

*Classification:* NLM Code: WY 100

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# Antibiotic Stewardship in Nursing- A Comprehensive Review

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## ABSTRACT

*Antibiotic stewardship is at the center of the healthcare system of the future, in a world where antimicrobial resistance (AMR) is a rapidly growing threat. The primary causes of resistance have been the abuse and overuse of antibiotics in clinical, community, and agricultural settings. As a result, patient outcomes have been negatively impacted, leading to longer illness durations, higher death rates, and higher healthcare expenses. Antibiotic stewardship programs (ASPs) employ evidence-based guidelines, diagnostics, surveillance, and interdisciplinary collaboration to prevent needless antibiotic use. Antibiotic use during direct patient care, surveillance, infection prevention, and health education can be greatly influenced by nurses, who make up the majority of the healthcare workforce. It also discusses how to strengthen nursing leadership and stewardship capacity in the future.*

**Keywords:** antibiotic stewardship, antimicrobial resistance, nursing practice, infection control, surveillance, antibiotic misuse.

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## I. INTRODUCTION

Antibiotics have transformed medicine since penicillin was discovered in 1928. Surgical procedures, organ transplants, cancer chemotherapy, and critical care rely heavily on effective antimicrobial therapy. Unfortunately, in the middle of the huge success of antibiotics, the problem of antimicrobial resistance (AMR) is becoming worse and overshadowing this success. The main reason for this situation is that the use of antibiotics has been generally inappropriate, excessive, and in the majority of cases,

broad-spectrum agents have been used, thus the selective pressure has been created which in turn promotes the survival and multiplication of resistant organisms. As a result, infections that were once easily treatable now pose major clinical challenges.

One of the most urgent problems of the planet, according to the World Health Organization (WHO), is AMR that is among the top ten global public health threats of the 21st century [2]. There are millions of deaths caused by resistant microorganisms like MRSA, ESBL-producing organisms, VRE, and multidrug-resistant *Pseudomonas* and *Acinetobacter* species. These also lead to significant economic losses. Antibiotic misuse is common in many countries, particularly in low- and middle-income nations. This happens due to weak regulations, self-medication, and easy access to over-the-counter drugs. To prevent antibiotic resistance from getting worse, we need to practice antibiotic stewardship. This means using antibiotics in a way that provides the greatest benefit to patients and minimizes harm to the medications.

Nurses who provide continuous patient monitoring and form the interface between patients and healthcare systems are in a unique position to facilitate this program. Most certainly, their contribution to the program is beyond giving medication - they are now the core of surveillance, prompt spotting of symptoms, quick communication, and patient education.

## II. CONCEPT AND PRINCIPLES OF ANTIBIOTIC STEWARDSHIP

Antibiotic stewardship includes the policies, strategies, and practices that promote the responsible use of antibiotics in healthcare. Dellit et al. describe stewardship as a well-planned

method to ensure that patients receive the correct antibiotic, in the right dose, by the right route, for the right duration, and for the right reason [3].

*The essential principles of antibiotic stewardship are:*

**Optimizing antibiotic therapy.** It is about choosing the most effective antibiotic for the pathogen that is either suspected or confirmed, at the same time ensuring the patient has adequate drug exposure by the correct dosing, and also by not allowing unnecessary usage of broad-spectrum agents.

**Preventing misuse and overuse.** Researches reveal that half of the antibiotic uses worldwide are done inappropriately. AMR is exacerbated by overprescribing for viral infections, using prolonged courses, and prescribing without culture data.

**Using microbiological and diagnostic tools.** Culture and sensitivity tests, biomarkers like procalcitonin, and radiological investigations improve the accuracy of diagnostic and therapeutic decisions. Promoting evidence-based practice. Antibiotic prescribing is made more efficient through the use of clinical guidelines, hospital antibiograms, and standardized treatment protocols.

**Monitoring outcomes and modifying therapy.** De-escalation based on culture results, IV-to-oral switch, and antibiotic "time-out" reviews are the necessary steps that lead to the therapy of choice and thus should always be present in the chain of patient care.

Stewardship, by combining these tenets, not only saves the clinical outcomes but also ensures the continuation of antibiotic efficacy to the descendants.

### III. GLOBAL BURDEN AND CONSEQUENCES OF ANTIMICROBIAL RESISTANCE

Antimicrobial resistance (AMR) threatens to lead to disastrous consequences on a global scale. The World Health Organization (WHO) estimates that, at present, AMR is the cause of around five million deaths every year. Their projections

indicate that, by 2050, fatalities related to AMR will double to reach a total of 10 million deaths annually unless immediate action is taken [2]. Most of the burden goes to developing countries. Poor healthcare infrastructure, inadequate infection prevention practices, and the overuse of antibiotics without proper regulation are major factors that lead to resistance in these countries.

The implications of AMR are very serious. Treatment failure is increasing, forcing doctors to rely on last-line or toxic antibiotics. Patients with resistant infections often stay in the hospital longer. Many of these patients are admitted to intensive care units, and their death rates are rising. Additionally, resistant infections create a large burden on healthcare systems that are already struggling. The reason for this is that they result in increased medicine use, prolonged therapies, additional investigations, and repeated hospital visits.

Several reasons are given for the rise of AMR, among them are: the prescribing of medicines irrationally, self-medication, not finishing one's treatments, bad sanitation, the sale of antibiotics without regulation, and the use of antibiotics in animals. High population density, overcrowded hospitals, and the absence of antibiotic guidelines in India are factors that have a major impact on resistance patterns [5]. Nurses have a key role in realizing the objectives that are set to lessen the driving forces of AMR, most especially in healthcare settings.

### IV. NURSES' ROLE IN ANTIBIOTIC STEWARDSHIP

The role of nurses in antibiotic stewardship is beyond that of a simple drug administration one. Their almost continuous contact with patients and the medical facilities makes their contribution to the antibiotic stewardship program indispensable.

#### 4.1 Ensuring Rational Antibiotic Administration

Nurses carry out the antibiotics administration that is accurate and in time according to the schedule that was prescribed. The effectiveness of the intervention will be reduced and resistance

promoted if any time deviation, in particular for drugs with a narrow therapeutic range, is done. Nurses also check for drug allergies, patient identifiers, and compatibility with other medications. They are controlling the infusion speed and ensuring that the dilution is correct so that the patient is safe from, for example, phlebitis or drug interactions.

#### 4.2 Surveillance and Monitoring

Moreover, nurses are the first to notice how patients respond to the antibiotic therapy. To achieve this, they monitor vital signs, check laboratory parameters and refer to the infection markers such as fever, WBC count, and inflammatory markers. The very first exposure to drug toxicity (renal, hepatic, haematological) and allergic reaction symptoms is what helps to avert these problems altogether. Nurses are often in a position to spot happening of the disease more quickly than other members of the team, thus they become very important in making antimicrobial decisions.

#### 4.3 Infection Prevention and Control

Nurses, free from doubt, are at the frontlines in the fight against hospital-acquired infections (HAIs), which, among others, are the main factors contributing to the use of antibiotics. Infection prevention methods that include hand hygiene, aseptic wound care, catheter care, environmental cleaning, isolation protocols contribute to lowering infection rates in a direct way. The fewer the number of HAIs, the lesser the number of antibiotic prescriptions, and the risk of resistance is dropped accordingly. Pittet's pioneering work provides evidence that hand hygiene compliance can lead to a HAI incidence rate drop of around 40% [7].

#### 4.4 Diagnostic Stewardship Support

Diagnostic stewardship is a method of using lab results to guide decision-making in the use of antibiotics. Nurses are very instrumental in specimen gathering—blood cultures, urine samples, sputum, wound swabs—before antibiotic therapy is started. Correct collection methods not

only avoid contamination but also enhance diagnosis and minimize unnecessary changes of antibiotics. Moreover, nurses take care of ensuring that the samples are sent without delays, which is a prerequisite for accurate culture growth.

#### 4.5 Patient and Family Education

Education is one of the most effective means by which antibiotic misuse can be lowered. Patients very often misunderstand antibiotics, and one of their fallacies is that they are effective for viral infections. Nurses narrow this knowledge gap by educating patients on drug adherence, the wrong doing of self-medication, and the necessity of using the drug until the end of the course. Public awareness campaigns run by nurses have had great success in lowering the rates of improper antibiotic use [8].

#### 4.6 Interprofessional Collaboration

Nurses are among the key contributors of antimicrobial stewardship teams. Their feedback is instrumental in decisions of therapy duration, symptoms of recovery, side effects, and the readiness of the patient for discharge or IV-to-oral conversion. Multidisciplinary rounds cannot do without the help of nurses who provide them with accurate clinical assessments.

The Functioning and Different Parts of Antibiotic Stewardship Programs.

Antibiotic stewardship programs are intensified by nursing contributions through various coordinated parts.

#### 4.7 Guideline-Based Prescribing

Practice guidelines based on hospital antibiograms direct clinicians in choosing the best antibiotics for standard conditions. Nurses make certain that prescriptions follow these guidelines and report any violations.

#### 4.8 Culture-Directed Therapy

At the core of any diagnostic is absolute precision. Nurses facilitate proper specimen collection, assist in accurate labeling, and ensure the

transport process is not interrupted. After the cultures are performed, they become the first to check the therapeutic changes and also inform the result quickly.

#### 4.9 De-escalation and therapy Modification

The narrowing of the broad-spectrum drugs is possible if the cultures sensitivity patterns indicate such. Nurses give the daily clinical data which helps in making the decision whether the de-escalation is feasible or not.

#### 4.10 Antibiotic Time-Out

An antibiotic time-out refers to a voluntary review 48–72 hours after the beginning of the therapy. The evidence nurses have regarding patient progress is their participation in reassessment discussions.

#### 4.11 Dose Optimization

Nurses keep an eye on the levels of antibiotics in the body such as for vancomycin and aminoglycosides. The changes in dosage are guided by the kidney/liver condition, which nurses monitor through patient evaluations and lab reports.

#### 4.12 IV-to-Oral Switch

The change from IV to oral antibiotics not only lowers the risks of complications but also raises the patient's freedom of movement and is a great cost-saving for the health care system. Nurses play a major role in the identification of patients who can safely undergo the switch therapy by evaluating oral tolerance, vital stability, and infection improvement [10].

## V. CLINICAL IMPACT OF NURSING-DRIVEN STEWARDSHIP

Nurse involvement is one of the main factors that improves the success of overall efforts to conserve resources. Better surveillance allows for quick detection of sepsis, reactions, and complications like *Clostridioides difficile* infection. This means that interventions can be carried out promptly. Additionally, nurses reduce medication errors,

ensure correct dosing intervals, and prevent situations of overdosing or underdosing.

Nurses who are empowered to carry out stewardship initiatives also experience less illness and thus, their hospital stays become shorter. Patient satisfaction rises, mortality rates fall, and the healthcare dollar is stretched more efficiently. Fishman emphasized that stewardship efforts lead to cost savings by cutting down on unnecessary prescriptions, hospital readmissions, and prolonged therapies [11].

Barriers to Nursing Participation in Stewardship.

*Nurses, being the main contributors, encounter several systemic obstacles:*

Firstly, heavy workloads and nursing shortages make it hard to find time for proper documentation and monitoring. Secondly, the lack of formal training in stewardship can lead to a hesitation to question prescriptions. Thirdly, a nurse with limited authority in a strictly hierarchical healthcare setting may find that their contribution to decision-making is minimal. Moreover, limited access to laboratory data, poor communication channels, and lack of institutional support completely enwrap the nurses' involvement in a quagmire. Therefore, it can be concluded that without going through these obstacles nurses cannot fully unleash their potentials.

#### 5.1 Strategies to Strengthen Nursing Involvement

There is no doubt that the healthcare sector needs to put in efforts to get nurses actively involved in their work. Various educational activities such as seminars, simulated scenarios for training purposes and the inclusion of stewardship topics in the nursing curriculum are all means that help in nurse training. Besides empowering nurses with policy changes and well-established-seamless communication networks, the hospital work environment becomes collaborative. Also, modern-day innovations such as electronic health records, decision support tools, and automated alerts ease the process for nurses to rapidly spot inconsistencies within prescribing.

One of the ways to support the infection prevention programs is to be rigorous with the audit process and feedback, thus compliance improves and hospital-acquired infections lessen. Leadership support, having enough staff, and being recognized for one's contribution to the nursing field all work together to bring about active stewardship participation.

## 5.2 Future Directions

The use of antibiotics will be closely monitored by advanced diagnostics, Artificial Intelligence, and Precision Medicine. The rapid diagnostic test can locate the pathogen in a very short time, and thus, the target therapy can be started immediately. Besides, machine-learning tools can foresee resistance patterns and suggest empirical options. In order to stay relevant and competitive, nurses have to undergo professional development to keep up with these innovations. In addition, by the gradual expansion of nursing roles in the community, the fight against AMR will not only concern hospitals but also the general public.

## VI. CONCLUSION

Antibiotic stewardship remains a key part of healthcare in the present times, the primary goal being the fight against antimicrobial resistance. As such, nurses that are closest to patients, are clinically proficient, and have the capabilities for monitoring, thus, they must be considered as the most valuable partners in stewardship programs. By expanding the nursing engagement with education, support from the institution, and cooperation among different professions, not only the correct use of antibiotics will be greatly facilitated but also the patient's safety will be elevated and the fight against microbes will be prolonged through the conservation of antibiotics for the next generations.

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# A Rare Benign Multilobulated Floor of Mouth Lesion

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## INTRODUCTION

Rhabdomyomas are a rare and benign, slow growing tumour of the skeletal muscles. They are even further classified into cardiac and extracardiac types according to their location. Extracardiac rhabdomyomas can be further divided based on cellular differentiation, such as; fetal, genital, and adult subtype [1]. Adult Type Rhabdomyomas shown to have clinical predominance towards adult males and more commonly reported in the head and neck region as compared to other parts of the body. This type of benign tumour also has a high recurrence rate. In this case review we discuss a rare case of floor of mouth rhabdomyoma.

*Keywords:* NA

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# A Rare Benign Multilobulated Floor of Mouth Lesion

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## I. INTRODUCTION

Rhabdomyomas are a rare and benign, slow growing tumour of the skeletal muscles. They are even further classified into cardiac and extracardiac types according to their location. Extracardiac rhabdomyomas can be further divided based on cellular differentiation, such as; fetal, genital, and adult subtype [1]. Adult Type Rhabdomyomas shown to have clinical predominance towards adult males and more commonly reported in the head and neck region

as compared to other parts of the body. This type of benign tumour also has a high recurrence rate. In this case review we discuss a rare case of floor of mouth rhabdomyoma.

## II. CASE REPORT

We present this case a 67-year-old gentleman with a recurrent swelling of the floor of mouth with intact mucosa. The swelling was gradually increasing in size over the past 3 years causing drooling of saliva and speech articulation disorder, but no interference with mastication and no difficulty in swallowing. Clinical examination revealed non-pulsatile, soft, non-cystic, smooth surface mucosa with noticeable elevation of floor of mouth. The mass was occupying the right floor of mouth extending to anterior two third of tongue and laterally over the left extending to posterior two third of tongue with no involvement of base of tongue.



Figure 1



Figure 2

Figure 1 & 2: Demonstrates Patient's Presentation with a Floor of Mouth Mass

The patient was a referred case from another tertiary centre and at the time of consultation the patient has had a Computerized Tomography (CT) scan done. The images from the CT scan showed a lobulated enhancing floor of mouth mass with no bony involvement. A Magnetic Resonance Imaging (MRI) was then ordered for a precise evaluation of soft tissue and muscle involvement.

MRI rendered the mass as hyperintense on T1W/T2W measuring 6.3 x 4.6 x 7.3 (AP x W x CC) cm with involvement of lingula septum, bilateral sublingual glands, mylohyoid and genioglossus/geniohyoid complexes with elevation and posterior displacement of tongue causing narrowing oral cavity and oropharynx.

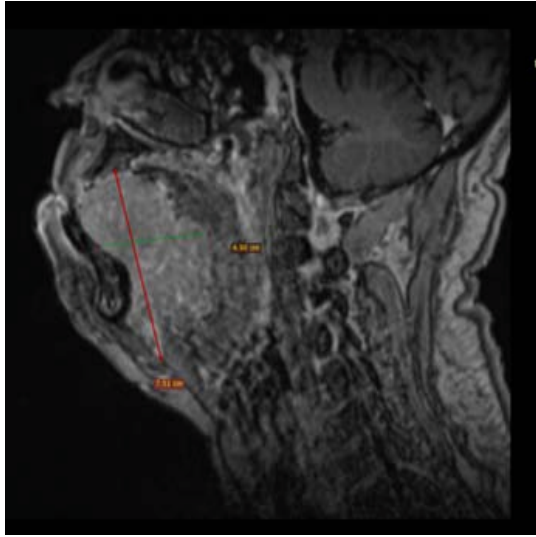


Figure 3

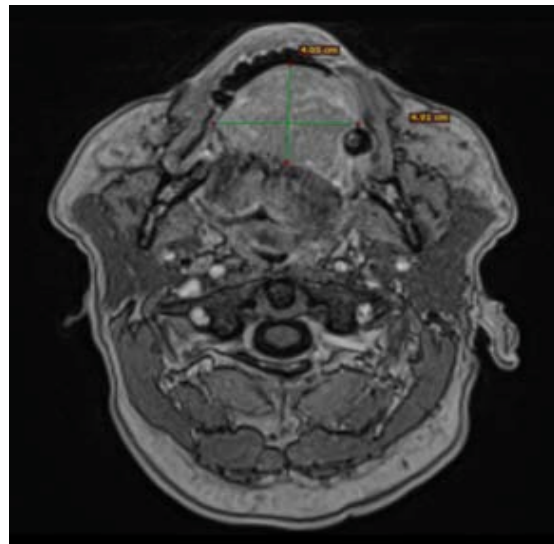


Figure 4

Figure 3 & 4: Figure 3 (Sagittal View) and Figure 4 (Axial View) Demonstrates Mri Images at T1w/T2w

Patient then underwent a surgical excision of the mass via a combined transoral and transcervical approach. Intra-operative findings revealed a non-vascularized multilobulated mass originating

from the submucosa of the floor of the mouth not involving the surrounding muscles. The mass was excised completely.



Figure 5: Illustrates the Intra-Operative Findings of the Tumour Itself

In the histopathological examination, the mass is described microscopically as benign circumscribed tissue composed of irregularly arranged sheets of large polyhedral cells separated by fibrovascular septa into lobules. The cells also display vesicular nuclei, mild nuclear

pleomorphism, occasional prominent nucleoli, and very minimal evident of mitotic activity. Immunohistochemically, many of these cells possess intracytoplasmic glycogen and expresses desmin.

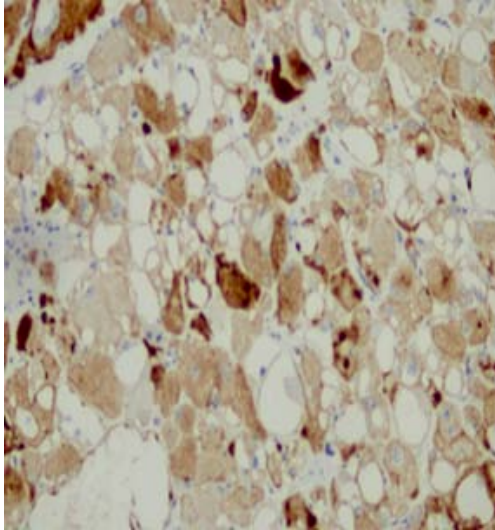


Figure 6

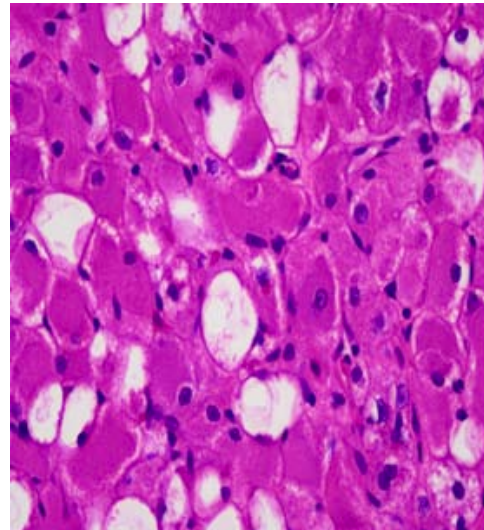


Figure 7

Figure 6 and 7 Illustrates Light Microscopy Images

*Figure 6:* Magnification 200x showed cells mostly stain positive towards Desmin and negative stain for S-100

*Figure 7:* Magnification 400x with Hematoxylin and Eosin stain; shows cells irregularly arranged. No necrosis observed

About half was stained positive for SMA, and <1% of these cells are immunoreactive towards myogenin and KI-67. These cells were stained negative for calretinin, CD68, EMA, inhibin, MyoD1, NSE and S100. These are findings consistent with adult type rhabdomyoma.

### III. DISCUSSION

Adult type extracardiac rhabdomyomas are rare, slow growing benign tumours which accounts less than 2% of all skeletal muscle tumours. In spite of this rarity, it is most commonly reported (90%) in the head and neck region with a predominance seen among middle aged males irrespective of racial background<sup>[1]</sup>. Generally, Adult Type Rhabdomyoma are reported as solitary mass, however some literatures have documented rare cases of multilobulated lesions.

The symptoms of rhabdomyomas are a result of mass on the site and the size of tumour itself. Presenting complaints from patients is usually due to a mass effect of the tumour on the surrounding tissues, commonly dysphonia, dysphagia and sometimes airway compromise<sup>[1]</sup>. In view of the nature of it being a painless and slow growing tumour, patients tend to present clinically with already a significantly large mass and a history of subacute progression of symptoms<sup>[3]</sup>.

Radiological imaging of choice for adult type rhabdomyomas are CT scans and MRI. Due to the rarity of extracardiac rhabdomyomas in the head and neck region, the appearance of this neoplasm is not very well described from radiological imaging in literatures. However, studies have shown these imaging are useful in determining

the site, extent, appearance and the characteristic of the tumour. In a CT scan adult type rhabdomyoma may mimic a malignant lesion due to the indistinct borders between the tumour and adjacent structures. A MRI would aid in a better evaluation of the soft tissues. In contrast to malignant lesions, benign lesions do not show invasions into surrounding soft tissues.

Adult type Rhabdomyomas of the head and neck regions are treated with surgical excision of the tumour and regular surveillance follow-up. In a multilobulated tumour there is an incidence of recurrence up to 42% of cases.

Histologically, the features of adult type rhabdomyomas are very characteristic. In the histopathologic staining these cells characteristically stain positive to myoglobin, desmin, MSA and stain negative to S100, distinguishing them from granular cell tumours and hibernoma [3]. Desmin being the most reliable marker as it is found in both primitive and mature cells expressing skeletal or smooth muscle differentiation [2].

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