AMP

ACTA MÉDICA PORTUGUESA

A Revista Científica da Ordem dos Médicos

ACTA MED PORT. ISSN 0870-399X e-ISSN 1646-0758

1 | 23

Número 1
Série II
Lisboa

Volume 36
Janeiro 2023
Publicação Mensal

FICHA TÉCNICA

AMP ACTA MÉDICA PORTUGUESA

A Revista Científica da Ordem dos Médicos

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Propriedade: Ordem dos Médicos (NIPC 500 984 492)

Sede do Editor / Redação: Av. Almirante Gago Coutinho, 151. 1749-084 Lisboa, Portugal. Tel: +351 21 151 71 00 E-mail: secretariado@actamedicaportuguesa.com

ISSN:0870-399X | e-ISSN: 1646-0758

Assinaturas: Nacional: 300 Euros; Internacional: 350 Euros

AMP36(1) - Janeiro de 2023

Registo: Inscrito na Entidade Reguladora para a Comunicação Social com o Nº 106 369

Depósito legal: 20 957/88

Estatuto Editorial: http://www.actamedicaportuguesa.com/estatuto-editorial

Conselho Científico

ACTA MÉDICA PORTUGUESA
A Revista Científica da Ordem dos Médicos

Promoção da Qualidade do Ar Interior em Portugal para a Prevenção e Controlo de Doenças

Promoting Better Indoor Air Quality in Portugal for Disease Prevention and Control

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Acta Med Port 2023 Jan;36(1):1-4 ▪ https://doi.org/10.20344/amp.18897

Palavras-chave: Controlo de Infeções; COVID-19/prevenção e controlo; Monitorização Ambiental; Poluição do Ar em Ambientes Fechados/prevenção e controlo; Portugal; Saúde Ambiental; Ventilação
Keywords: Air Pollution, Indoor/prevention & control; COVID-19/prevention & control; Environmental Health; Environmental Monitoring; Infection Control; Portugal; Ventilation

INTRODUÇÃO

A ventilação, enquanto promotora de uma adequada qualidade do ar interior (QAI), tem vindo progressivamente a ser reconhecida como uma medida não-farmacológica fundamental para a abordagem à COVID-19[1-4] a par de outras, como o uso de máscaras, o distanciamento físico ou a higienização das mãos e de superfícies. Num momento em que a conjuntura epidemiológica permitiu o levantamento da obrigatoriedade de medidas, é importante o investimento em estratégias de prevenção de risco ambiental, como a promoção da QAI.

O outono e o inverno podem ser críticos no que diz respeito à proliferação de doenças respiratórias em ambientes fechados, nomeadamente pelo aumento do tempo passado em espaços interiores pouco ventilados. Uma ventilação adequada deve ser uma das principais estratégias de redução do risco de transmissão dos agentes infeciosos transmitidos por aerossóis, como o SARS-CoV-2.[5-8]

Revisão da legislação

Neste artigo analisamos a evolução da legislação sobre a QAI (Fig. 1), enquadrada no Sistema de Certificação Energética de Edifícios (SCE), atendendo às atualizações a propósito da COVID-19, e identificamos, com base nas evidências existentes, oportunidades de melhoria para a correta implementação de uma estratégia nacional de controlo da QAI e de prevenção de doenças respiratórias infeciosas.

Existem pontos-chave da legislação a nível nacional a destacar.[9] Em 2013, o legislador considerou importante privilegiar a ventilação natural à ventilação mecânica. Todavia, definiu a eliminação da obrigatoriedade das auditorias da QAI, apesar de manter a necessidade de controlo das fontes de poluição e a adoção de medidas preventivas, a fim de reduzir riscos para a saúde pública (Decreto-Lei n.º 118/2013, de 20 de agosto). Devido às evidências geradas no âmbito da pandemia, esta posição tem vindo a mudar desde 2020, com a reintrodução de modelos de avaliação da QAI. O Decreto-Lei n.º 101-D/2020, de 7 de dezembro, alterado pelo Decreto-Lei n.º 102/2021, de 19 de novembro, determinou a necessidade de uma adequada qualidade do ar interior em todos os edifícios novos ou renovados e em edifícios de comércio e serviços.

Apresenta-se também uma avaliação simplificada anual (ASA) da QAI, com requisitos específicos sobre limiares de proteção e condições de referência, a realizar por técnicos de saúde ambiental. Esta aplica-se aos grandes edifícios de comércio e serviços (GES) ou similares, em funcionamento, com área útil de pavimento (não considerando os espaços interiores não úteis) igual ou superior a 1000 m^2 ou igual ou superior a 500 m^2 no caso de conjuntos comerciais, hipermercados, supermercados e piscinas cobertas e, ainda, a edifícios de comércio e serviços que abranjam creches, estabelecimentos de educação pré-escolar e do primeiro ciclo do ensino básico e estruturas residenciais para pessoas idosas (ERPIs).

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Recebido/*Received*: 28/07/2022 - **Aceite/*Accepted*:** 04/11/2022 - **Publicado *Online*/*Published Online*:** 25/11/2022 - **Publicado/*Published*:** 02/01/2023

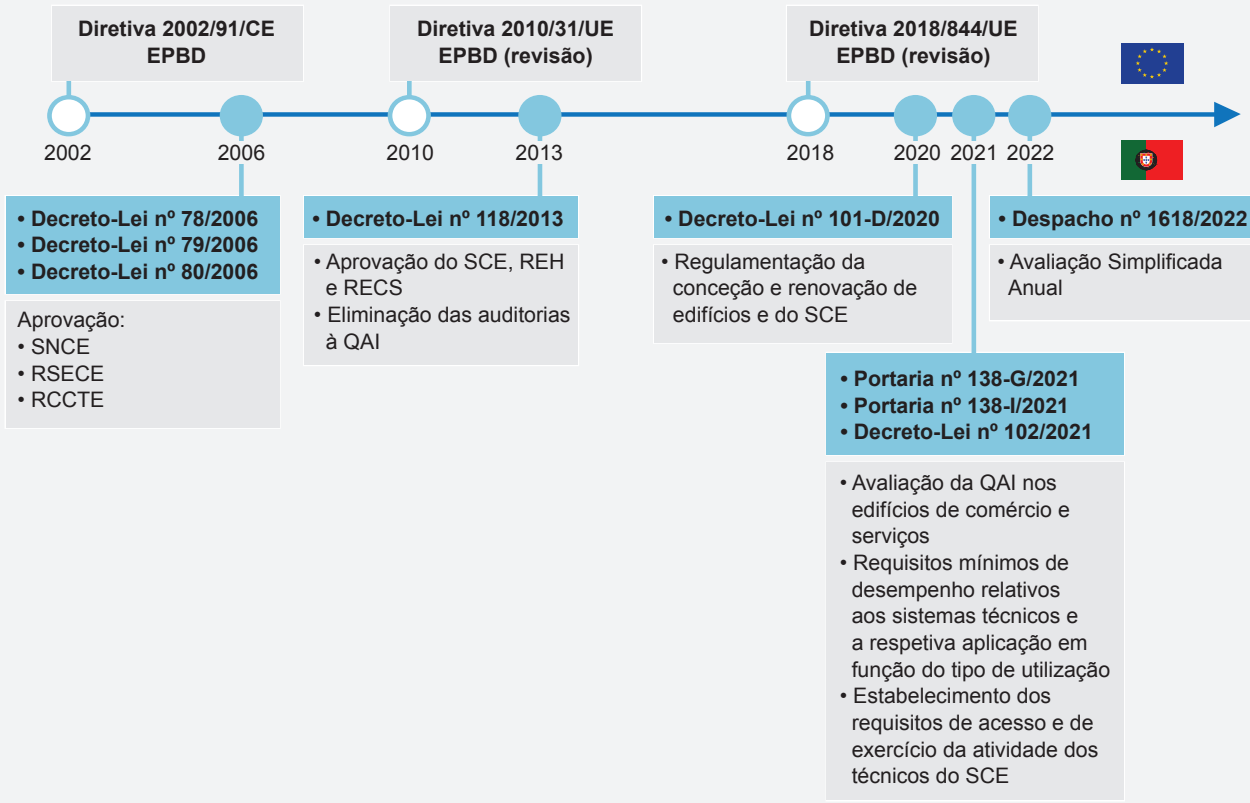

Figura 1 – Evolução do enquadramento legal e regulamentar da QAI nos últimos 20 anos [Adaptada de https://www.sce.pt/legislacao/, consulta web em julho de 2022]
SNCE: Sistema Nacional de Certificação Energética e da Qualidade do Ar Interior nos Edifícios; RSECE: Regulamento dos Sistemas Energéticos de Climatização em Edifícios; RCCTE: Regulamento das Características de Comportamento Térmico dos Edifícios; SCE: Sistema de Certificação Energética dos Edifícios; REH: Regulamento de Desempenho Energético dos Edifícios de Habitação; RECS: Regulamento de Desempenho Energético dos Edifícios de Comércio e Serviços; QAI: qualidade do ar interior

A partir de 2021, introduziu-se a Portaria n.º 138-G/2021, de 1 de julho, que estipula requisitos para a avaliação da QAI em edifícios de comércio e serviços, tais como limiares de proteção, condições de referência e critérios de conformidade, estabelecendo a metodologia para a medição de poluentes e para a fiscalização do cumprimento das normas nesse tipo de edifícios. O artigo 7.º estabelece a obrigatoriedade de recurso a laboratórios acreditados pelos operadores que, voluntariamente, pretendam proceder à avaliação da QAI. Só em 2022, com o Despacho n.º 1618/2022, de 9 de fevereiro, são estabelecidos os procedimentos de registo das obrigações previstas no Decreto-Lei n.º 101-D/2020, de 7 de dezembro, e determinado o regime da ASA.

É urgente atualizar o atual quadro legislativo, a fim de integrar as evidências técnico-científicas geradas em contexto pandémico. Como exemplo, o atual diploma continua a referir um limiar de proteção substancialmente superior (1250 ppm), apesar da comunidade científica e profissional ter vindo a suportar valores-limite de exposição ao dióxido de carbono (CO_2) de 1000 ppm, como forma de evitar que o ar exalado potencialmente contaminado se acumule no interior dos edifícios.[10]

Discussão e análise

Apesar deste enquadramento legislativo, há desafios que requerem atenção. Uma apreciação da informação disponível da situação nacional permite observar que não estão disponíveis dados públicos, nomeadamente quanto à QAI nos edifícios, o que dificulta o desenvolvimento de uma estratégia nacional robusta e de medidas corretivas. Ao contrário do distanciamento e das regras de higiene, a resposta aos requisitos de ventilação e respetivas medidas corretivas constitui um ato de engenharia que exige processos de avaliação-adaptação específicos. As necessidades de ventilação de ambientes interiores dependem de múltiplos fatores: taxa de ocupação do espaço, atividades realizadas, características do espaço e estado do tempo. A avaliação da ventilação requer conhecimentos técnicos e a definição de medidas de correção é multifatorial, devendo

ter em conta múltiplos aspetos, tais como a natureza do edifício, o tipo de atividade desenvolvida, os equipamentos disponíveis, o número de ocupantes, entre outros. Assim, é da maior importância que se considere a criação de uma plataforma de registo padronizado, centralizado e partilhado do resultado das avaliações da QAI nos edifícios em território nacional.

A implementação de uma estratégia de comunicação de risco e de envolvimento comunitário que promova a gestão da QAI nos diferentes contextos da vida quotidiana permitirá desenvolver uma cultura comunitária de preservação da QAI.

Existem alguns problemas associados aos mecanismos de garantia da QAI. Por um lado, há uma baixa adesão à avaliação da QAI nos contextos de risco/estratégicos. Por outro, a cessação da obrigatoriedade das auditorias da QAI em 2013 e o défice de recursos humanos (técnicos de saúde ambiental) para esta avaliação dificultam a operacionalização de um modelo com efeitos a curto prazo. Importaria também avaliar a retoma de funções dos peritos qualificados em QAI, anteriormente existentes no SCE de edifícios e qualificados.

As avaliações periódicas à QAI são essenciais para assegurar que os limiares de proteção estabelecidos são cumpridos, identificar situações de risco e orientar a recomendação de medidas de melhoria a implementar. Estas avaliações devem incluir a medição, em condições representativas, dos níveis dos principais poluentes tóxicos, como o material particulado em suspensão ($PM_{2.5}$ e PM_{10}), compostos orgânicos voláteis, formaldeído, monóxido de carbono, e CO_2 (indicador de condições de ventilação em espaços fechados ocupados), como demonstrado em estudos recentes.[11,12]

Em complementaridade, existem também soluções de diagnóstico de fácil implementação que podem ser acomodadas. Neste contexto, os sensores de CO_2 fornecem uma abordagem económica e objetiva que permite medir, indiretamente, as condições de ventilação de espaços com elevada taxa de ocupação. Embora sem consenso quanto ao uso dos níveis de CO_2 como indicador da concentração de aerossóis infeciosos, os benefícios do uso de sensores de CO_2 parecem superar, em muito, tais limitações.[13,14] A sua utilidade está reconhecida por comités técnicos, científicos e instituições internacionais, devido à sua capacidade para medir a qualidade do ar ao longo do tempo.[2,15] Isto possibilita a implementação de medidas corretivas, bem como a avaliação da sua efetividade no imediato, contribuindo para a segurança nos ambientes interiores e evitando intervenções mais dispendiosas.

CONCLUSÃO

Munidos de um enquadramento legal que está a retomar o sentido certo, impõe-se a criação de uma cultura de manutenção da QAI, de uma estratégia de controlo e fiscalização adequada e atualizada, e a melhoria da literacia populacional. A atuação ao nível da QAI será fundamental na preparação do próximo inverno, garantindo, por um lado, a promoção de atos inspetivos e de fiscalização (e implementação de medidas corretivas quando necessário) e a publicação dos resultados e, por outro, o correto funcionamento dos sistemas de ventilação, assim como uma crescente cultura de autoavaliação e controlo da QAI. Estas medidas poderão trazer ganhos no controlo de infeções respiratórias e de outras doenças associadas à QAI (ex., síndrome do edifício doente), mas também em outras áreas, nomeadamente no desempenho escolar e nas condições laborais.

CONTRIBUTO DOS AUTORES

Todos os autores contribuíram de igual forma para a conceptualização, pesquisa bibliográfica, escrita e revisão crítica do trabalho.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial atualizada em 2013.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Ana Aguiar é bolseira de doutoramento (Referência: 2020.09390.BD) cofinanciada pela Fundação para a Ciência e a Tecnologia (FCT) e pelo Programa Fundo Social Europeu (FSE).

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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SARS-CoV-2 Seroprevalence Following a Large-Scale Vaccination Campaign in Portugal: Results of the National Serological Survey, September - November 2021

Seroprevalência de SARS-CoV-2 em Portugal após a Campanha de Vacinação em Larga Escala: Resultados do Inquérito Serológico Nacional, Setembro - Novembro 2021

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Acta Med Port 2023 Jan;36(1):5-14 ▪ https://doi.org/10.20344/amp.18528

ABSTRACT

Introduction: Following a COVID-19 mass vaccination campaign, it is important to evaluate the population level of SARS-CoV-2 antibodies. The aim of this study was to estimate the seroprevalence rate of SARS-CoV-2 specific antibodies acquired due to infection or vaccination in the Portuguese population.

Material and Methods: The National Serological Survey (third wave – ISN3COVID-19) is a cross-sectional nationwide epidemiological study developed on a sample of 4545 Portuguese residents aged one year or older, between the 28th September 2021 and the 19th November 2021. The SARS-CoV-2 anti-nucleoprotein and anti-spike IgG antibody levels were determined in serum samples using Abbott Chemiluminescent Microparticle Immunoassays. Seroprevalence estimates were stratified by age group, sex, administrative region and self-reported chronic conditions. Medians and respective 95% confidence intervals were used to describe the distribution of SARS-CoV-2 specific antibodies in specific population subgroups.

Results: The total seroprevalence rate of SARS-CoV-2 was 86.4% (95% CI: 85.2% to 87.6%). A higher seroprevalence rate was estimated for women (88.3%), 50 to 59 years-old (96.5%) and in those with two or more self-reported chronic conditions (90.8%). A higher IgG (anti-Spike) concentration was observed in individuals vaccinated with the booster dose (median = 1 2601.3 AU/mL; 95% CI: 4127.5 to 19 089.1).

Conclusion: There was a significant increase in SARS-CoV-2 seroprevalence following the mass vaccination campaign in Portugal. It is important to continue to monitor the distribution of specific SARS-COV-2 antibody at the population level to further inform public health policies.

Keywords: COVID-19; COVID-19 Vaccines; Portugal; SARS-COV-2; Seroepidemiologic Studies

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Recebido/*Received*: 05/05/2022 - **Aceite/*Accepted*:** 23/08/2022 - **Publicado *Online*/*Published Online*:** 26/10/2022 - **Publicado/*Published*:** 02/01/2023

RESUMO

Introdução: Após uma campanha de vacinação em larga escala contra a COVID-19 é importante avaliar o nível de anticorpos anti-SARS-CoV-2 na população. O objetivo deste estudo foi estimar a taxa de seroprevalência dos anticorpos específicos contra SARS-CoV-2 adquiridos após infeção ou vacinação na população portuguesa.

Material e Métodos: O Inquérito Serológico Nacional COVID-19 (terceira fase ISN3COVID-19) é um estudo epidemiológico transversal de âmbito nacional que foi desenvolvido numa amostra de 4545 residentes em Portugal com idade igual ou superior a um ano recrutados entre 28 de setembro e 19 de novembro de 2021. Procedeu-se à deteção de anticorpos IgG contra a proteína da nucleocápside e contra a subunidade 1 da proteína da espícula (anti-S) em amostras de soro usando os ensaios quimioluminiscentes de micropartículas (Abbott). As estimativas de seroprevalência foram estratificadas por grupo etário, sexo, região e presença de doenças crónicas. As medianas e os respetivos intervalos de confiança de 95% foram usados para descrever a distribuição de anticorpos específicos contra SARS-CoV-2 em subgrupos populacionais.

Resultados: A taxa de seroprevalência total de SARS-CoV-2 foi de 86,4% (IC 95%: 85,2% a 87,6%). Uma maior taxa de seroprevalência foi estimada para mulheres (88,3%) entre os 50 e os 59 anos (96,5%) e naquelas que reportaram ter duas ou mais doenças crónicas (90,8%). Uma concentração de IgG (anti-S) mais elevada foi observada em indivíduos vacinados com a dose de reforço (mediana = 12 601,3 UA/mL; IC 95%: 4127,5 a 19 089,1).

Conclusão: Verificou-se um aumento significativo na seroprevalência de SARS-CoV-2 após a campanha de vacinação em Portugal. É importante continuar a monitorizar a distribuição de anticorpos específicos contra SARS-COV-2 ao nível da população para informar futuras políticas de saúde pública.

Palavras-chave: COVID-19; Estudo Seroepidemiológico; Portugal; SARS-COV-2; Vacinas Contra a COVID-19

INTRODUCTION

Since the beginning of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, Portugal experienced several waves, accounting for 1 117 451 confirmed SARS-CoV-2 infections and 18 300 deaths reported by the National Surveillance System (SINAVE) up to 19 November 2021.[1] The COVID-19 vaccination campaign started in late December 2020, prioritizing those with a higher risk of exposure or complications due to age or medical conditions.[2] In subsequent months, vaccination was extended to the general population and rolled out by age criteria, starting with those aged 80 years or more in February 2021 and reaching the 12 to 15 years-old group in August 2021. Four vaccine brands have been administrated in Portugal: Comirnaty® (Pfizer-BioNTech), Spikevax® (Moderna), Vaxzevria® (Astrazeneca) and JCovden®, previously called COVID-19 vaccine Janssen (Johnson & Johnson) vaccines.[3] By week 46/2021, with 17 216 507 doses administered,[4] Portugal reached the highest primary vaccination coverage among European Union countries.[4] Since September 2021 a booster dose with mRNA vaccines was administered, primarily for high-risk groups and later for those aged 50 and over, which was extended to all the adult population in December 2021. Since the 15th May, 2022 a second booster dose has been administered to all individuals aged 80 years and older and those that are institutionalized.

The systematic monitoring of the distribution of SARS-CoV-2 specific antibodies in the population is an essential tool to understand pandemic dynamics, to evaluate the burden of SARS-CoV-2 infection, to identify susceptible population subgroups and to guide public health decisions to contain the spread of the pandemic. In vaccinated populations, serological surveys remain useful to evaluate the implementation of the vaccination campaigns and monitor population-level immune responses over time.[5] Seroprevalence studies are also indicative of the levels of population protection and are widely used to establish imputed parameters for mathematical modelling of scenarios,[6,7] planning national public health and pandemic response policies.

Seroprevalence rates varied considerably by time and country.[8,9] A recent systematic review covering 97 of 194 World Health Organisation (WHO) Member States, in all six WHO regions, published in July 2021 estimated a worldwide seroprevalence of 45.2%, [95% Confidence Interval (CI); 40.7% to 49.8%].[9] A higher seroprevalence rate was reported for the European region, 72% (95% CI: 55% to 84%), corresponding to a 16-fold increase since the first wave of COVID-19 pandemic.[9]

Based on the WHO guidelines,[10] Portugal has implemented repeated cross-sectional serological surveys aiming at monitoring the seroprevalence of SARS-CoV-2 antibodies in the population during the course of the pandemic. The first survey (ISN COVID-19) showed that, by July 2020, 2.9% (95% CI: 2.0% to 4.2 %) of the population[11] had SARS-CoV-2 specific antibodies. The second survey (ISN-2COVID-19), conducted during the early stages of the vaccination campaign (March 2021), estimated the seroprevalence of SARS-CoV-2 specific antibodies in the Portuguese population to have increased to 15.5% (95% CI: 14.6% to 16.5%).[12]

Following a mass vaccination campaign, this study aimed at estimating the seroprevalence rate of SARS-CoV-2 specific antibodies acquired due to infection or vaccination in the Portuguese population between September and November 2021, and also at characterizing the distribution of the SARS-CoV-2 IgG (anti-Spike) antibodies levels in the population by vaccination status, known previous infection and time since vaccination.

MATERIAL AND METHODS

Study design and settings

The third cross-sectional serological survey (ISN3COVID-19) was conducted between the 28th September 2021 and the 19th November 2021 and targeted Portuguese residents aged one year old or above. Survey participants (n = 4545) were recruited using a two-stage non-probability quota sampling design, described elsewhere.[11,12] The survey included 38 private Clinical Pathology Laboratories and

36 public hospitals and primary health care units of the Portuguese National Health System, comprising a total of 305 data collection sites with nationwide geographical distribution (Fig. 1). Individuals seeking routine blood tests for reasons unrelated to COVID-19 in the above-mentioned sites were invited to participate.

Data collection and processing

All participants filled in a short questionnaire on sociodemographic information, chronic conditions (diabetes, cardiovascular disease, hypertension, hematologic disease, chronic pulmonary disease excluding asthma, autoimmune diseases, obesity, chronic hepatic disease, immunodeficiency or other), previous SARS-CoV-2 exposure, COVID-19 symptoms, and COVID-19 vaccination history (date and brand of each vaccine dose).[13]

Participants were classified as symptomatic, pauci-symptomatic or asymptomatic, based on reported COVID-19 related symptoms using the definition proposed by Pollan *et al*.[14] Individuals were considered vaccinated if they reported to have received at least one dose of any COVID-19 vaccine. In addition, vaccination exposure was classified as partial (one dose of two-dose scheme vaccines), complete vaccination (single dose of JCovden®, previously called COVID-19 vaccine Janssen or two doses of Comirnaty®, Spikevax® or Vaxzevria®) and booster vaccination (uptake of booster dose of Comirnaty® or Spikevax® following primary vaccination).

For all participants, qualitative detection of immunoglobulins (Ig) of type G against the Nucleocapside protein (IgG anti-N; SARS-CoV-2 IgG I, Abbott Diagnostics, IL, USA) and quantitative determination of IgG against the Spike protein (IgG anti-S; SARS-CoV-2 IgG II, Abbott Diagnostics, IL, USA) were performed using Chemiluminescent Microparticle Immunoassays (CMIA) on the ARCHITECT i2000S.[15,16] Based on manufacturer recommendations, a positivity cut-off of 50 AU/mL was used for the quantitative IgG anti-S test, for qualitative IgG anti-N test cut-off of 1.40 Index (S/C) was used. IgG determinations in serum samples were performed by a single laboratory.

Outcomes definitions

Once in contact with SARS-CoV-2, the immune system generates detectable anti-SARS-CoV-2 antibodies. Anti-S antibodies prevent the virus from entering the cell, while anti-N antibodies prevent the proliferation of the virus if it penetrates the cell.

mRNA and viral vector vaccine induce immune response against Spike protein, whereas an infection induces production of both anti-N and anti-S SARS-CoV-2 antibodies. Therefore, detectable anti-N antibody levels imply that the individual was previously infected.

We estimated post-infection and total seroprevalence that combines seropositivity due to infection and vaccination. Any individual who had specific IgG antibodies against SARS-CoV-2 (anti-S and/or anti-N) was considered seropositive for SARS-CoV-2. Any individual who reported not being vaccinated and had specific IgG antibodies against SARS-CoV-2 (anti-S and/or anti-N) and any individual who reported being vaccinated or with unknown vaccination status with positive IgG (anti-N) was considered seropositive for SARS-CoV-2 due to infection.

Statistical analysis

SARS-CoV-2 seroprevalence (total and post-infection) was estimated for the overall sample and stratified by sex, age group (1 – 9, 10 – 19, 20 – 29, 30 – 39, 40 – 49, 50 – 59, 60 – 69, ≥ 70 years old), region (North, Center, Lisbon and Tagus Valley, Alentejo, Algarve, Madeira, Azores), education level (without formal education/elementary school, middle school, secondary school, higher education), any contact with suspected or confirmed case of COVID-19, presence of symptoms compatible with COVID-19 (symptomatic, pauci-symptomatic, asymptomatic), self-reported previous SARS-CoV-2 infection, presence of self-reported chronic conditions (0 – 1, ≥ 2 conditions) and vaccination status. For all point estimates, the respective 95% CI were calculated using the logit method. Seroprevalence estimates were compared among the above-mentioned population subgroups using the design adjusted Rao-Scott chi-square test.[17]

The distributions of SARS-CoV-2 IgG (anti-S) antibody levels by vaccination status and previous infection were described in terms of medians with respective 95% CI determined based on the method proposed by Woodruff.[18] Taking into account the roll-out of the national vaccination campaign (from older to younger age groups and with specific vaccine brands for each age group and sex), we considered several subsamples of the study population. Firstly, we restricted our analysis to those aged 20 to 69 years old with complete vaccination scheme and without previous infection, in order to evaluate the effect of vaccine brand on IgG (anti-S) antibody levels, adjusting for time since vaccination, sex and age group.

Secondly, the distribution of IgG (anti-S) antibodies by time since vaccination was analyzed in a subsample of those aged 20 to 69 years old (to exclude individuals with a booster dose) without known previous infection and fully vaccinated with Comirnaty®. This specific brand was the most administrated in Portugal in our analysis period and, hence, was selected in order to exclude the effect of vaccination brand on the analysis, while maximizing statistical power.

Finally, the effect of age on IgG (anti-S) antibody levels was assessed on a subsample of adults aged 20 or more years old without known previous infection and fully

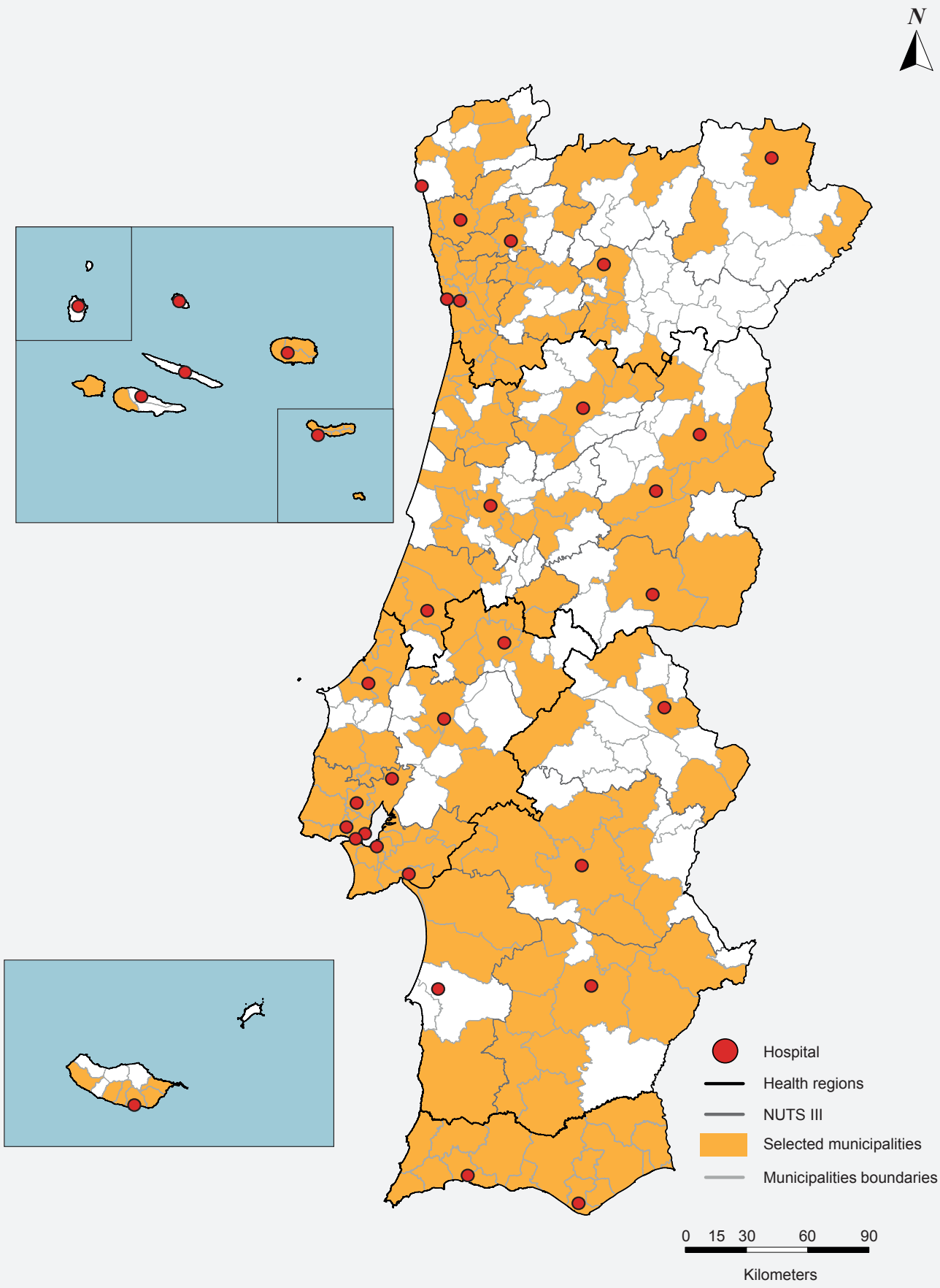

Figure 1 – Distribution of data collection sites ISN3COVID-19

vaccinated with Comirnaty® in July - August 2021. Quantile regression was used to estimate confounder-adjusted difference in medians (MD) between population subgroups with respective 95% CI.

All estimates were weighted for the distribution of the Portuguese resident population by post-stratification by administrative region, sex and age group. Statistical analysis was performed using Stata software, version 15.1 for Windows®.[19] The level of significance was set at 5%.

Ethical procedures

The study protocol had received clearance from the Ethics Committee and the Data Protection Officer of the Portuguese National Institute of Health (INSA). All participants or their legal representatives signed an informed consent form to allow their leftover serum sample, after routine clinical testing, to be used in the study for SARS-CoV-2 antibodies determination and answered a short questionnaire. All data were pseudoanonymized for the study and the participants have the right to receive their serological results according to their will.

RESULTS

Seroprevalence rates

Between September 28th 2021 and November 19th 2021 we collected data and serum samples on 4 545 individuals. The distribution of ISN3COVID-19 participants by sex, age group, region, history of COVID-19 exposure is shown in Table 1.

For the general population, we estimated a total seroprevalence rate of 86.4% (95% CI: 85.2% to 87.6%) and post-infection seroprevalence of 7.5% (95% CI: 6.6% to 8.5%) (Table 2). Total seroprevalence estimates varied significantly by sex, age group, administrative region, education, self-reported chronic condition and previous history of COVID-19 exposure (contact and previous infection). A higher total prevalence rate was observed among women (88.3%; 95% CI: 86.7% to 89.6%), 50 to 59 years-old (96.5%; 95% CI: 94.1% to 98.0%), residents of the North region (88.4%; 95% CI: 86.3% to 90.2%) and among those with two or more chronic conditions (90.8%; 95% CI: 88.2% to 92.9%). Among participants aged 20 or more years old, we estimated a total seroprevalence rate of 70.1% (95% CI: 67.2% to 72.8%) for those with low levels of education, in contrast with the higher education group where the seroprevalence rate was 96.1% (95% CI: 94.3% to 97.3%).

The post-infection seroprevalence rate was higher amongst individuals aged between one and nine years old (17.9%; 95% CI: 14.0% to 22.6%), residents in the North (8.8%; 95% CI: 7.1% to 10.9%) and Algarve regions (8.8%; 95% CI: 6.7% to 11.4%), those without formal education or who completed elementary school (10.3%; 95% CI: 8.6% to 12.4%), as well as among those reporting previous contact

Table 1 – Distribution of ISN3COVID-19 participants by sex, age group, region, history of COVID-19 exposure (population one year of age or older, between 28th September and 19th November 2021 Portugal)

Participants characteristics	n	%
Sex		
Male	2047	47.1
Female	2498	52.9
Age group (years)		
1 – 9	486	7.8
10 – 19	591	10.2
20 – 29	546	10.9
30 – 39	549	11.9
40 – 49	579	15.3
50 – 59	568	14.6
60 – 69	563	12.9
≥ 70	663	16.5
Region of residence		
North	884	34.7
Center	671	16.1
Lisbon and Tagus Valley	815	35.7
Alentejo	585	4.5
Algarve	580	4.2
Madeira	431	2.5
Azores	579	2.4
Education level*		
Without formal education/ Elementary school	828	24.4
Middle school	740	21.6
Secondary school	898	24.7
Higher education	971	29.3
Self-reported chronic condition		
0 – 1	3415	80.5
≥ 2	773	19.5
Vaccination		
Unvaccinated	875	14.6
Vaccinated with at least 1 dose	3642	85.4
Self-reported previous SARS-CoV-2 infection		
No	3864	87.1
Yes	466	12.9
Self-reported symptoms§		
Asymptomatic	1979	46.2
Pauci-symptomatic	1312	28.7
Symptomatic	1116	25.1
Previous contact with COVID-19 case		
No	3089	64.8
Yes	1157	27.2
Unknown	299	8.0

*: only for participants aged 20 years old or above; §: definition proposed by Pöllan *et al*

Table 2 – Seroprevalence rate of specific IgG SARS-CoV-2 antibodies (population one year of age or older, between 28th September and 19th November 2021 Portugal)

	Post-infection % (95% CI)†	Total % (95% CI)†
Overall (n = 4545)	7.5 (6.6 to 8.5)	86.4 (85.2 to 87.6)
Sex (n = 4545)	***p* = 0.900**	***p* = 0.001**
Male	7.5 (6.2 to 9.1)	84.4 (82.4 to 86.2)
Female	7.4 (6.2 to 8.8)	88.3 (86.7 to 89.6)
Age group (years) (n = 4545)	***p* < 0.001**	***p* < 0.001**
1 – 9	17.9 (14.0 to 22.6)	17.9 (14.0 to 22.6)
10 – 19	9.6 (7.0 to 13.1)	76.8 (72.4 to 80.8)
20 – 29	7.1 (4.8 to 10.4)	92.2 (88.8 to 94.6)
30 – 39	7.6 (5.1 to 11)	94.6 (91.9 to 96.4)
40 – 49	6.9 (4.6 to 10.2)	94.3 (91.2 to 96.4)
50 – 59	5.0 (3.2 to 7.7)	96.5 (94.1 to 98.0)
60 – 69	6.1 (4.0 to 9.1)	93.8 (90.9 to 95.8)
≥ 70	5.2 (3.5 to 7.7)	93.0 (90.2 to 95.0)
Region of residence (n = 4545)	***p* = 0.020**	***p* = 0.024**
North	8.8 (7.1 to 10.9)	88.4 (86.3 to 90.2)
Center	6.2 (4.6 to 8.3)	85.8 (83.1 to 88.1)
Lisbon and Tagus Valley	7.4 (5.8 to 9.4)	85.8 (83.3 to 88.0)
Alentejo	4.8 (3.3 to 6.8)	85.8 (82.8 to 88.4)
Algarve	8.8 (6.7 to 11.4)	80.2 (76.9 to 83.2)
Madeira	2.8 (1.5 to 5.1)	86.3 (79.1 to 91.2)
Azores	4.4 (3.0 to 6.5)	84.0 (81.0 to 86.5)
Self-reported chronic conditions (n = 4188)	***p* = 0.498**	***p* < 0.001**
0 – 1	7.7 (6.7 to 9.0)	85.5 (84.1 to 86.8)
≥ 2	6.8 (4.9 to 9.4)	90.8 (88.2 to 92.9)
Education level (n = 3437)*	***p* = 0.745**	***p* < 0.001**
Without formal education/ Elementary school	10.3 (8.6 to 12.4)	70.1 (67.2 to 72.8)
Middle school	6.5 (4.9 to 8.7)	91.4 (89.1 to 93.2)
Secondary school	6.3 (4.6 to 8.6)	93.2 (90.7 to 95.0)
Higher education	6.1 (4.4 to 8.4)	96.1 (94.3 to 97.3)
Previous contact with COVID-19 case (n = 4545)	***p* < 0.001**	***p* < 0.001**
Unknown	4.4 (2.2 to 8.4)	94.5 (91.0 to 96.7)
No	3.9 (3.1 to 4.9)	86.0 (84.5 to 87.4)
Yes	16.7 (14.3 to 19.5)	85.4 (82.9 to 87.6)
Self-reported previous SARS-CoV-2 infection (n = 4330)	***p* < 0.001**	***p* < 0.001**
No	3.2 (2.6 to 3.9)	84.9 (83.5 to 86.2)
Yes	38.9 (33.8 to 44.3)	98.3 (96.6 to 99.2)
Self-reported symptoms (n = 4407)§	***p* < 0.001**	***p* < 0.001**
Asymptomatic	5.8 (4.6 to 7.3)	88.9 (87.1 to 90.4)
Pauci-symptomatic	6.4 (5.0 to 8.3)	84.7 (82.3 to 86.9)
Symptomatic	12.0 (9.8 to 14.6)	84.1 (81.4 to 86.4)
Vaccination status (n = 4517)	***p* < 0.001**	***p* < 0.001**
Unvaccinated	24.7 (21.1 to 28.7)	24.7 (21.1 to 28.7)
Vaccinated with at least one dose	4.5 (3.7 to 5.5)	97.0 (96.2 to 97.6)

†: weighted proportion; *: only for participants aged 20 years old or above; §: definition proposed by Pöllan *et al*

with a COVID-19 case, previous SARS-CoV-2 infection or COVID-19 related symptoms (Table 2). Among individuals vaccinated with at least one dose of a COVID-19 vaccine, the proportion of seropositivity was 97.0% (95% CI: 96.2% to 97.6%), and post-infection seroprevalence was 4.5% (95% CI: 3.7% to 5.5%). No statistically significant differences in the infection-induced seroprevalence estimates were observed by sex and self-report of chronic conditions.

SARS-CoV-2 IgG anti-Spike antibody distribution

Table 3 shows the medians of SARS-CoV-2 IgG (anti-S) antibody concentrations by previous infection and vaccination status among individuals eligible for vaccine uptake. The highest levels (median) of IgG anti-S were observed among those with a booster dose but without previous infection (median = 12 601.3 AU/mL; 95% CI: 4127.5 to 19 089.1).

Restricting the analysis to individuals aged 20 to 69 years old with a complete vaccination scheme and without previous infection or booster dose, we compared medians of IgG anti-S antibody concentrations by vaccine brand, adjusting for time since vaccination, sex and age group (Table 4). The median of IgG anti-S varied from 237.5 AU/ml (95% CI: 177.5 to 297.4) for those who reported complete primary vaccination with JCovden®, previously called COVID-19 vaccine Janssen, to 7012.7 AU/mL (95% CI: 5568.8 to 8456.6) for those with primary vaccination with Spikevax®. Considering complete vaccination with Comirnaty® as a reference group, we estimated statistically significant lower IgG anti-S antibody concentrations for both viral vector vaccines (Vaxzevria® and JCovden®, previously called COVID-19 vaccine Janssen®) and higher for the Spikevax® (MD = 4300.8 AU/mL; 95% CI: 3290.9 to 5310.8).

Regarding the time since vaccination and restricting the analysis to those fully vaccinated with Comirnaty® and without previously known infection or booster dose, we observed statistically significant confounder-adjusted differences in medians, indicating higher IgG concentrations among those vaccinated closer to the date of data collection, compared to those vaccinated between January and February 2021 considered as the reference (Table 4).

To assess the effect of age, we additionally restricted analysis to those aged 20 or more years old without recorded infection and vaccinated with Comirnaty® (complete vaccination scheme). Considering 20 – 29 years old as a reference, we estimated statistically significant lower median of IgG (anti-S) antibodies in the older age groups, with confounder-adjusted differences in medians ranging between -1624.3 AU/mL (95% CI: -2845.3 to -403.4) and -3710.9 AU/mL (95% CI: -4795.6 to -2626.2) for 30 – 39 years old and ≥ 70years-old, respectively (Table 4).

Table 3 – Medians of SARS-CoV-2 IgG anti-S antibodies by vaccination and previous infection status

Characteristics	n	Median (AU/mL) (95% CI)
Unvaccinated, previous infection	192	521.3 (340.8 to 720.8)
Partial, without infection	39	554.9 (0 to 1153.3)
Complete, without infection	3198	1547.2 (1429.4 to 1665.0)
Booster dose, without infection	44	12 601.3 (4127.5 to 19 089.1)
Vaccinated after infection	270	8013.6 (6411.8 to 9326.7)

DISCUSSION

In this nationwide survey of a sample of the Portuguese population aged one year old or above conducted between September and November 2021, following a mass vaccination campaign, we estimated the seroprevalence rate of SARS-CoV-2 antibodies and characterized the population-level distribution of IgG anti-S antibodies.

The estimated total seroprevalence rate (post-infection or vaccination) was 86.4% (95% CI: 85.2% to 87.6%), which is consistent with the vaccine coverage achieved in Portugal during that period.[4] Our results show that the seroprevalence rate varied by age group and administrative region, with lower rates in the Algarve region (80.2%; 95% CI: 76.9% to 83.2%) and in the pediatric population 1 – 9 years (17.9%; 95% CI: 14.0% to 22.6%). Regional differences may be related to the lower vaccine coverage achieved in the Algarve when compared with the other regions, whilst in children there was no vaccine recommendation for those aged below 12 years old at the time of the survey.[2] As expected, the highest seroprevalence rate was observed among individuals aged between 50 – 59 years old (96.5%; 95% CI: 94.1% to 98.0 %), since this age group also had the highest accumulated incidence of SARS-CoV-2 infection, combined with high vaccination coverage.[4] The gender pattern in seroprevalence observed in our study is similar to that previously described in blood donors of the USA population[20] and may be related to higher vaccine coverage among women, as reported in the literature for COVID-19.[21] These results are in line with a study on COVID-19 vaccination adherence conducted in Portugal, which found lower odds of vaccine hesitancy for women, which may, reflect higher engagement of women in preventive behaviors.[22]

A higher seroprevalence rate was also found in those with high education (96.0%; 95% CI: 94.3% to 97.3%), which was also the group with the lowest post-infection seroprevalence (6.1%; 95% CI: 4.4% to 8.4%) rate. A similar result was observed in a population-based serological survey in Switzerland.[23] Considering the differences in the risk of infection according to the socio-economic level de-

Table 4 – Median of SARS-CoV-2 anti-S IgG titers by age group, vaccination brand and time since vaccination

	n	Median AU/mL (95% CI)†	Confounder-adjusted difference in medians (95% CI)
Vaccine brand (n = 2195)§			
Comirnaty®	1385	2126.1 (1898.8 to 2353.3)	ref.
JCovden®	259	237.5 (177.5 to 297.4)	-2045.1 (-2303.5 to -1786.5)
Spikevax®	196	7012.7 (5568.8 to 8456.6)	4300.8 (3290.9 to 5310.8)
Vaxzevria®	355	515.3 (414.9 to 615.7)	-1180.3 (-1417.6 to -943.1)
Month of 2nd dose uptake (n = 1382)§§			
Jan – Feb 2021	108	574.4 (402.3 to 746.4)	
Mar – Apr 2021	65	1212.8 (656.4 to 1769.1)	784.5 (433.9 to 1134.9)
May – Jun 2021	446	1284.9 (1125.6 to 1444.2)	976.6 (685.8 to 1267.5)
Jul – Aug 2021	648	2942.3 (2566.8 to 3317.8)	2509.3 (2130.4 to 2888.2)
Sep – Out 2021	115	8465.8 (6691.9 to 10 239.7)	6654.4 (5222.9 to 8085.8)
Age group (n = 678)§§§			
20 – 29	90	6075.1 (4188.5 to 7961.7)	ref.
30 – 39	153	3976.6 (3008.1 to 4945.1)	-1624.3 (-2845.3 to -403.4)
40 – 49	228	2306.2 (1800.4 to 2812.0)	-2684.7 (-3780.5 to -1588.9)
50 – 59	144	2483.7 (2006.6 to 2960.8)	-2409.6 (-3551.4 to -1267.8)
60 – 69	33	1747.5 (428.8 to 3066.2)	-3581.6 (-4693.2 to -2470.0)
≥ 70	30	1618.2 (817.7 to 2418.7)	-3710.9 (-4795.6 to -2626.2)

†: weighted estimates; §: estimated by quantile regression adjusted for age group, sex, time since vaccination on a sample of individuals aged 20 - 69 years old without previous infection with complete vaccination scheme; §§: estimated by quantile regression adjusted for age group, sex on a sample of individuals aged 20 - 69 years old without previous infection with complete vaccination scheme with Comirnaty® in 2021; §§§: estimated by quantile regression adjusted for sex and month of vaccination on a sample of individuals aged 20 or more years old without previous infection fully vaccinated with Comirnaty® in July - August 2021

scribed in previous research,[24,25] the seroprevalence patterns observed according to educational level possibly indicate a greater adherence to public health measures in subgroups-with a higher level of education. Our results may also reflect lower adherence to vaccination by those with lower health literacy which is correlated with lower levels of education. In a Portuguese study, higher odds of vaccine hesitancy were found within individuals with no education/basic education and secondary education, when compared to those with a university degree, hence corroborating this hypothesis.[22] In addition, during the COVID-19 pandemic, Portugal experienced a significant shift to digital technology in the health sector. A web-based appointment system for vaccination was implemented and the European Union (EU) digital vaccination certificate was introduced. Although vaccines were offered free of charge, digital barriers associated with socioeconomic status may have led to lower adherence to vaccination among those with a lower education level.

At national level, the estimated post-infection seroprevalence rate in this survey (7.5%; 95% CI: 6.6% to 8.5%) was below the estimate from the second survey (ISN2COVID-19) carried out in February - March 2021 (13.5%; 95% CI: 12.6% to 14.4%),[12] while the cumulative percentage of COVID-19 confirmed cases in Portugal increased from 7.9% to 10.9%, between the two surveys.[26] This result may be explained by the shorter half-life of IgG anti-NP antibodies[27,28] that, at the time of the present survey, was already undetectable for infections that occurred in the early stages of the pandemic. In fact, in the present survey, just over a third (38.9%; 95% CI: 33.8% to 44.3%) of participants who reported having had a previous SARS-CoV-2

infection had serological signs of infection. Higher post-infection seroprevalence in the Algarve and Azores, which experienced an intense wave of COVID-19 during the summer of 2021,[26] and lower seropositivity among those who reported infection more than 90 days prior to the sample collection observed in the second survey[12] also corroborate this hypothesis.

Like in previous studies, we observed a more robust IgG antibody response in individuals vaccinated with a booster dose, and in those who reported having been vaccinated with an mRNA vaccine.[29,30] This suggests that the amount of antibodies could be correlated with vaccine protection as mRNA vaccines were also the ones that resulted in higher effectiveness estimates against infection, hospitalization and death.[31-34]

Considering the immune response to specific vaccine brands, the levels of IgG anti-S antibodies were higher among those vaccinated with Spikevax® compared to those vaccinated with Comirnaty®. This result may be explained by the product characteristics (mRNA concentration of 30µg for Comirnaty®, compared to 100 µg for Spikevax®).

Higher IgG anti-S antibody levels were observed in people vaccinated more recently. These results are consistent with previous research on IgG antibodies kinetics following vaccination[35] and corroborate a decrease in IgG antibodies over time.

Our study has several limitations. First, we should mention the non-random sampling scheme used to recruit participants and that the recruitment strategy had the lower odds of including institutionalized individuals which may have led to selection bias. Individuals of low socio-economic status may also have lower accessibility to health care and therefore may be less likely to perform blood tests and consequently to participate in this study. Another limitation of this study is the possible memory bias, given that all the collected data is self-reported by the participants. Third, due to quick waning of the IgG anti-NP antibodies below the detectable levels we were not able to provide a reliable estimate of the cumulative number of SARS-CoV-2 infections in Portugal. Due to collinearity between age, time since vaccination and vaccine brand used associated with the vaccination campaign roll-out, we were not able to estimate differences in IgG anti-S median concentrations by including all variables in the model simultaneously. To overcome this limitation, we restricted the analysis to those without previous infection and with complete vaccination scheme or to a single brand, which reduced the sample size and the study power, leading to gains in internal validity.

CONCLUSION

The data from the third national COVID-19 serological survey showed a significant increase in the total SARS-CoV-2 seroprevalence rate following the mass vaccination campaign. Besides the universal and free of charge vaccination, some population subgroups (lower level of education, Algarve region, male individuals) had lower seroprevalence. Higher IgG anti-S titers in individuals vaccinated with the booster dose of the vaccine support the implementation of this measure in the Portuguese population. Continuous monitoring of the population-level IgG response after vaccination remains important to guide further public health measures (recommendation for vaccination, duration of certificates among others).

AUTHOR CONTRIBUTIONS

IK collaborated in conceptualization of the study, performed statistical analysis of the data, and wrote the first draft of the manuscript.

PG, SR, MB, ART, VG, VG, RS, RG collaborated in the conceptualization and development of the study, interpretation of results and critically reviewed the manuscript.

CM, JAS, SS, AM, CH performed laboratory testing, collaborated in the interpretation of results and critically reviewed the manuscript.

APR coordinated the study, interpreted results, and critically reviewed the manuscript. ISNCOVID-19 group members participated in the data collection, laboratory testing and provided critical comments on the manuscript.

All authors read and approved the final version of the manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

PG is a member of the Disease Network Coordinating Committee of the European Legionnaire's Disease Surveillance Network.

All other authors have declared that no competing interests exist.

FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ACTA MÉDICA PORTUGUESA
A Revista Científica da Ordem dos Médicos

The COVID-19 Impact on Oral Healthcare Demand and Performance: The Experience of a Clinical and Academic Centre in Portugal (EU)

O Impacto da COVID-19 na Procura e Desempenho dos Cuidados de Saúde Oral: A Experiência de um Centro Académico e Clínico em Portugal (UE)

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Acta Med Port 2023 Jan;36(1):15-24 ▪ https://doi.org/10.20344/amp.18280

ABSTRACT

Introduction: The SARS-CoV-2 pandemic has reshaped the global landscape as we know it and had a tremendous effect on healthcare systems around the world. However, its impact on oral healthcare is still to be fully assessed. The aim of this study was to understand if and how COVID-19 affected the demand and performance of oral healthcare, taking the Clinical and Academic Centre of Coimbra as an example, more specifically, the Department of Stomatology of the Coimbra Hospital and University Centre and the Dentistry Department of the Faculty of Medicine of the University of Coimbra.

Material and Methods: An observational study was designed for collecting the data of a series of key oral healthcare indicators: number of appointments; referrals from primary healthcare; missed appointments; number of surgeries performed in the operating room; number of biopsies; number of patients admitted through the emergency department and epidemiologic parameters over two 18-month periods between September 2018 and August 2021: pre-COVID-19 and during the COVID-19 pandemic, with the latter divided in four stages. A statistical analysis which included descriptive and inferential procedures was then performed, with an established significance level of 5% and the application of parametric tests, *t*-Student test for a sample and for independent samples and One-Way ANOVA for the variance analysis.

Results: There was a general decline in all indicators comparing the pre-COVID-19 with the COVID-19 period, with a reduction of 50.61% in the number of appointments, 44.06% in referrals, 24.41% in surgeries, 26.30% in biopsies and 32.33% in patients seen in the Emergency Room. The number of missed appointments also increased by 181.82%. All variations revealed statistically significant differences ($p < 0.05$). The individual COVID-19 stage analysis, when compared with the pre-COVID-19 reference, and variance analysis of these different stages also showed statistically significant differences ($p < 0.05$ and $p < 0.001$), except for the number of biopsies during the third and fourth stages.

Conclusion: The results of this study suggest that the SARS-CoV-2 pandemic has had a considerable impact on oral healthcare demand and performance. However, results also show a remarkable adjustment and improvement in the provided care, with a positive evolution throughout the COVID-19 period.

Keywords: COVID-19; Dental Care; Health Services Accessibility; Pandemics; Portugal; SARS-CoV-2

RESUMO

Introdução: A pandemia por SARS-CoV-2 provocou repercussões globais, influenciando os sistemas de saúde por todo o mundo. Contudo, o seu impacto a nível da prestação de cuidados de saúde oral não foi completamente demonstrado. Este estudo tem como objetivo compreender se, e como, a pandemia da COVID-19 afetou a procura e o desempenho dos cuidados de saúde oral, tendo como exemplo o Centro Académico Clínico de Coimbra, mais concretamente do Serviço de Estomatologia do Centro Hospitalar e Universitário de Coimbra e da Área de Medicina Dentária da Faculdade de Medicina da Universidade de Coimbra.

Material e Métodos: Realizou-se um estudo observacional com a análise das seguintes variáveis: número de consultas; referenciação pelos cuidados de saúde primários; faltas injustificadas a consultas; número de cirurgias em bloco operatório; número de biópsias; número de doentes admitidos pelo serviço de urgência e indicadores epidemiológicos; durante dois períodos de 18 meses, de setembro de 2018 a agosto de 2021: pré-COVID-19 e durante a COVID-19, com o último a subdividir-se em quatro fases. Posteriormente, realizou-se a análise estatística dos dados, descritiva e inferencial, com um nível de significância determinado de 5% e aplicação de testes paramétricos, do teste *t-Student* para uma amostra e amostras independentes e do teste *One-Way* ANOVA para análise de variância.

Resultados: Os resultados mostraram um declínio generalizado em todos os indicadores, entre os períodos pré-COVID-19 e COVID-19, com uma redução de 50,61% no número de consultas, 44,06% na referenciação, 24,41% nas cirurgias, 26,30% nas biópsias, 32,33% nos doentes admitidos nos Serviços de Urgência e um aumento de 181,82% nas faltas injustificadas. Todas as variações revelaram diferenças estatisticamente significativas ($p < 0,05$). A análise das fases individuais da COVID-19, quando comparada à referência pré-COVID-19, e da variância destes, mostraram igualmente existência de diferenças estatisticamente significativas ($p < 0,05$ e $p < 0,001$), exceto para o número de biópsias durante a terceira e quarta fases.

Conclusão: Os resultados deste estudo sugerem que a pandemia por SARS-CoV-2 tem tido um impacto considerável nos cuidados de saúde oral. Os resultados obtidos demonstraram que as medidas implementadas se refletiram na melhoria dos cuidados prestados e sua evolução favorável ao longo de todo o período COVID-19.

Palavras-chave: Acesso aos Serviços de Saúde; COVID-19; Cuidados Dentários; Pandemia; Portugal; SARS-CoV-2

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Recebido/*Received*: 18/03/2022 - **Aceite/*Accepted*:** 01/08/2022 - **Publicado *Online*/*Published Online*:** 10/10/2022 - **Publicado/*Published*:** 02/01/2023

INTRODUCTION

The Clinical and Academic Center of Coimbra (CACC), which integrates the Coimbra Hospital and University Centre (CHUC) and the University of Coimbra (UC), is responsible for providing healthcare services to the Centre Region of Portugal.[1] Apart from being a member of the M8 Alliance (a network of 30 leading health centers and research institutions in 20 countries, dedicated to global health improvement and development of science based solutions to global health challenges),[2] the CACC is recognized nationally and internationally for having within its structure eighteen Reference Centers for the treatment of a multitude of specific conditions, such as cystic fibrosis, congenital cardiopathies and hepatobiliary/pancreatic cancer.[3,4]

In this center, oral healthcare services are provided through a partnership between the Stomatology Department of CHUC and the Dentistry Department, which is part of the Faculty of Medicine of the University of Coimbra (FMUC).[1] It reaches over two million people ranging from zero to over 99 years old, and integrates several areas such as surveillance, diagnosis and treatment of a multitude of oral conditions, as well as a differentiated surgical activity and an Emergency Department (ER).[5,6]

Like many centers around the globe, for the past two years, it has had to deal with the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pandemic. SARS-CoV-2 is a virus from the *Coronaviridae* family, responsible for the COVID-19 disease.[7,8]

Among humans, it is transmitted directly through air droplets and aerosol particles or indirectly by contact with contaminated surfaces, and is responsible for causing symptoms like fever, cough, dyspnea, fatigue, anosmia and dysgeusia.[7]

It is estimated that, without vaccination, as much as 81% of COVID-19 patients have mild to moderate disease, 14% could develop a serious disease requiring hospital care and 5% present with critical disease requiring admission to an Intensive Care Unit (ICU).[9] Thankfully, the effectiveness of vaccines against SARS-CoV-2 and its variants brought a new hope, reducing transmissibility, risk of serious illness, hospitalizations and deaths.[10]

The first cases of COVID-19 were reported on the 29th of December 2019 in Wuhan, China.[7,8,11] By the 30th of January

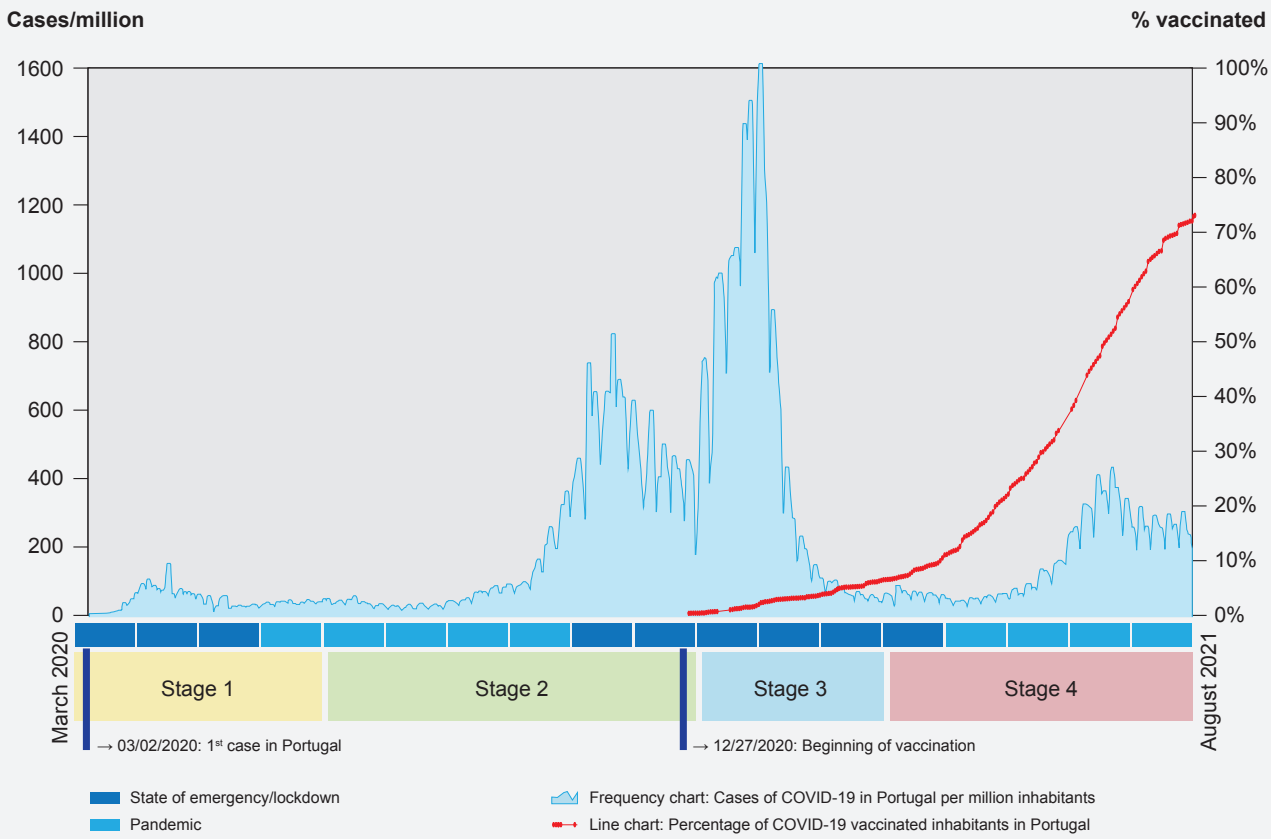

Figure 1 – Evolution of the COVID-19 pandemic in Portugal. The evolution of the COVID-19 pandemic in Portugal, between March 2020 and August 2021, regarding number of cases/million; percentage of vaccinated population; state of emergency/lockdown implementation; and stage definition for study purpose.

2020, the World Health Organization (WHO) declared the state of Public Emergency and on the 11th March 2020 a Global Pandemic was acknowledged.[11-13]

In Portugal, the first patient was diagnosed with SARS-CoV-2 on the 2nd of March 2020 and a peak number of infections were registered between October 2020 and December 2020, January 2021 and March 2021 and from December 2021.[14,15] The first state of emergency declared by the Portuguese Government lasted from the 19th of March, until the 2nd of May 2020 and the second occurred between the 9th of November 2020 and the 30th of April 2021.[16,17] These periods were marked by important limitations of individual rights, mainly by enforcing variable and evolving types of lockdowns, which had significant impact on commerce, services as well as leisure activities (Fig. 1).[18]

From the 16th of March to the 4th of May 2020, by governmental order, oral health practitioners, such as Stomatologists and Dentists, had their professional activity restricted to emergency appointments.[19] During this period, the Directorate-General of Health, as well as professional associations and societies, published guidelines that guided all clinical activity involving oral healthcare and still regulate clinical practice to this date.[20-22]

With an expectation of an increasing number of new infections, during the first wave, the CACC also put in practice its own strategy to deal with the pandemic by implementing teleconsultations for non-urgent patients and restricting surgical activity. To reduce cross-contamination between healthcare workers, schedules were reorganized, and fixed teams were created. These measures were put in practice or suspended according to the direct impact of the pandemic, predominantly assessed by the number of hospital beds occupied and patients admitted to the ICU.

The next big step for trying to control the pandemic was the start of the Portuguese COVID-19 vaccination program on the 27th of December 2020, which followed predefined criteria of eligibility, starting with healthcare professionals, followed by risk groups.[23] By the 31st of August 2021 approximately 85% of all population had already received the second dose of the vaccine, thus making the Portuguese vaccination program as one of the most successful worldwide (Fig. 1).[14,15]

The COVID-19 pandemic has had a tremendous impact across the globe and has created catastrophic financial and logistical challenges for healthcare systems and facilities.[24] For healthcare workers, the pandemic caused a heightened risk of occupational exposure to a new fast spreading disease and created the need to adapt new roles and responsibilities for a wide range of tasks and professional settings, which led to anxiety, depression, sleep problems, and distress among professionals.[25,26] Other dimensions of healthcare such as initial screening, referral to specialists, diagnosis, treatment initiation, surgery and ongoing care were also affected. However, its full effect is still being studied, with the impact it took on oral healthcare yet to completely be assessed.[24,27–29]

Therefore, the aim of this study was to understand if and how the COVID-19 pandemic affected the demand and performance of oral healthcare services provided to the Portuguese population, using the CACC as an example, more precisely the Department of Stomatology of the Coimbra Hospital and University Centre and the Dentistry Department of Faculty of Medicine of the University of Coimbra.

MATERIAL AND METHODS

A longitudinal observational retrospective study was designed for collecting the data of key oral healthcare indicators from the CACC database, and epidemiologic parameters, over a 36-month period (from September 2018 to August 2021). This study was assigned the number CE-135/2021 and approved by the Ethics Committee of the Faculty of Medicine of the University of Coimbra.

For study assessment purposes, the 36 months were analyzed in two continuous 18 month-periods: a pre-COVID-19 period, between September 2018 and February 2020, and a COVID-19 period, between March 2020 and August 2021.

The authors considered the start of the COVID-19 period on March 2020, after the first patients were diagnosed in Portugal on the 2nd of March.[14,15] The COVID-19 period was then divided in four stages according to the following parameters: (a) beginning of the pandemic, (b) peak infection rates in Portugal, (c) states of emergency/lockdown, (d) vaccination onset and percentage of immunized population. The first stage, from the 1st of March 2020 to the 30th of June 2020 was marked by the first state of emergency and restriction of activity in Stomatology and Dental Medicine.[16,19] The second stage, from the 1st of July 2020 to the 31st of December 2020, comprised a normalization period after the first lockdown.[21,22] The third stage, from the 1st of January 2021 to the 31st of March 2020, represented the second state of emergency and a peak in infection rates and overload of healthcare services.[14,15,17] The fourth stage, from the 1st of April 2021 to the 31st of August 2021, was characterized by the reduction of cases and significant increase in vaccination with approximately 75% of the Portuguese population with two doses and 85% with one dose by the end of this stage (Fig. 1).[14,15,18]

For every stage, the variables that were studied and considered representative of the clinical workload of oral healthcare were: total number of appointments (first and follow-up) performed in all areas and specialties; referrals from primary healthcare; missed appointments; number of surgeries performed in the operating room (OR); number of biopsies; and patients admitted through the ER.

After collecting the data, the information was uploaded

to a database for subsequent statistical analysis which included descriptive and inferential procedures, utilizing IBM SPSS Statistics Version 28.0.1.0 (142)®.

Descriptive statistics were used considering the most adequate statistical parameters for the study variables, like distribution of frequencies (absolute and relative), central tendency measures [mean ($\bar{\chi}$), median and mode] and dispersion measures [standard deviation (sd) and range of variation]. With the goal of analyzing oral healthcare demand and performance evolution during the different COVID-19 stages and comparing them to the pre-COVID-19 period, the authors considered as reference the values that preceded the pandemic, as well as the equivalent number of months for each specific stage.

The distribution of variables was verified for symmetry through the ratio between the skewness (Sk) value and standard error (SE), flattening, kurtosis [(K), ratio of K and the standard error]. Due to the heterogeneous sample size for each key indicator both Kolmogorov-Smirnov e Shapiro-Wilk tests were used to assess the normality of variables.

For inferential statistics, the significance level of 5% was established and parametric tests, *t*-Student test for a sample and for independent samples, and One-Way ANOVA for the variance analysis were used.

RESULTS

For comparison purposes, the results were organized in two continuous 18-month periods – a pre-COVID-19 period (1st of September 2018 to 28th of February 2020) and a COVID-19 period (1st of March 2020 to 31st of August 2021) (Table 1). The latter was then divided in 4 stages (1st of March 2020 to 30th of June 2020; 1st of July 2020 to 31st of December 2020; 1st January 2021 to 31st of March 2021; 1st of April 2021 to 31st of August 2021) (Table 2).

Pre-COVID-19 period

Between the 1st of September 2018 and the 28th of February 2020, a total of 18 months, 58 601 consultations were made ($\bar{\chi}$ = 3255.61 per month; sd = 89.21), 11 687 of which were first time appointments ($\bar{\chi}$ = 649.28 per month; sd = 24.31), and 46 914 were follow-up appointments ($\bar{\chi}$ = 2606.33 per month; sd = 72.78) of which 4769 ($\bar{\chi}$ = 264.94 per month; sd = 13.64) resulted from primary care referral. Missed appointments accounted for a total of 2200 consultations ($\bar{\chi}$ = 122 per month; sd = 6.23) not carried out. During the same period, 1102 patients were surgically treated in the OR ($\bar{\chi}$ = 61.22 per month; sd = 4.56), 3774 patients were seen in the ER ($\bar{\chi}$ = 209.67 per month; sd = 9.56) and 327 diagnostic biopsies were made ($\bar{\chi}$ = 18.17 per month; sd = 6.3).

Table 1 – Oral healthcare performance: pre-COVID-19 *versus* COVID-19

Key oral healthcare indicators	pre-COVID-19			COVID-19				*t*-test	*p*-value
	Total	$\bar{\chi}$	Sd	Total	$\bar{\chi}$	Sd	%		
Appointments	58 601	3255.61	89.21	28 944	1608	716.17	-50.61%	9.69	< 0.001
First app.	11 687	649.28	24.31	6465	359.17	151.56	-44.68%	8.02	< 0.001
Follow-up app.	46 914	2606.33	72.78	22 479	1249.83	569.74	-52.61%	10.03	< 0.001
Referrals	4769	264.94	13.64	2668	148.22	45.80	-44.06%	10.37	< 0.001
Missed appointments	2200	122.22	6.23	6200	344.44	36.00	181.82%	-25.81	< 0.001
Surgeries	1102	61.22	4.56	833	46.28	20.83	-24.41%	2.97	0.008
Biopsies	327	18.17	6.30	241	13.39	5.23	-26.30%	2.48	0.018
Emergencies	3774	209.67	9.56	2554	141.89	26.82	-32.33%	10.01	< 0.001

$\bar{\chi}$: monthly mean; sd: standard deviation; %: variation; app.: appointments; referrals: primary healthcare referrals
Key oral healthcare indicators comparison between pre-COVID-19 and COVID-19 selected periods, through descriptive statistical analysis and *t*-Student test application. Based on the data of the CACC.

Table 2 – Oral healthcare performance: pre-COVID-19 *versus* COVID-19 stages

Key oral healthcare indicators	Pre-COVID-19		COVID-19 Stage 1			COVID-19 Stage 2			COVID-19 Stage 3			COVID-19 Stage 4		
	$\bar{\chi}$	sd	$\bar{\chi}$	sd	%	$\bar{\chi}$	sd	%	$\bar{\chi}$	sd	%	$\bar{\chi}$	sd	%
Appointments	3255.61	89.21	594	35.55	-81.75%	1331.17	43.14	-59.11%	2226.67	26.58	-31.61%	2380.20	24.39	-26.89%
First app.	649.28	24.31	150.50	9.88	-76.82%	307.33	18.84	-52.67%	419	9.85	-35.47%	552.40	14.22	-14.92%
Follow-up app.	2 606.33	72.78	443.50	25.70	-82.98%	1023.83	27.93	-60.72%	1807.67	17.62	-30.64%	1827.80	11.42	-29.87%
Referrals	264.94	13.64	78.75	4.65	-70.28%	148.67	7.42	-43.89%	146.33	7.64	-44.77%	204.40	5.32	-22.85%
Missed app.	122.22	6.23	367	27.39	200.27%	350	16.30	186.36%	382.67	11.50	213.09*%	296.80	7.66	142.84%
Surgeries	61.22	4.56	18.25	2.22	-70.19%	41.67	3.33	-31.94%	47.33	6.51	-22.69%	73.60	7.30	20.22%
Biopsies	18.17	6.30	7.75	1.71	-57.34%	11	2.61	-39.45%	16.67	3.22	-8.26%	18.80	3.90	3.49%
Emergencies	209.67	9.56	124.25	8.26	-40.74%	148.17	8.01	-29.33%	100.67	5.51	-51.99%	173.20	6.34	-17.39%

$\bar{\chi}$: monthly mean; sd: standard deviation; %: variation; app.: appointments; referrals: primary healthcare referrals
Key oral healthcare indicators comparison between the selected COVID-19 stages and the equivalent pre-COVID-19 period. Based on the data of the CACC. All variations showed statistically significant differences ($p < 0.05$) on *t*-Student test application, except for the number of biopsies performed in the 3rd ($p = 0.547$) and 4th ($p = 0.670$) stages.

COVID-19 period

In the COVID-19 period, between the 1st of March 2020 to the 31st of August 2021, a total number of 28 944 appointments were made ($\bar{\chi}$ = 1608 per month; sd = 716.17), 6465 of which were first appointments ($\bar{\chi}$ = 359.17 per month; sd = 151.56) and 22 479 follow-up appointments ($\bar{\chi}$ = 1249.83 per month; sd = 569.74). There were 2668 ($\bar{\chi}$ = 148.22 per month; sd = 45.80) and 6200 ($\bar{\chi}$ = 344.44 per month; sd = 36) referrals from primary healthcare and missed appointments, respectively.

During the same period, 833 patients were surgically treated in the OR ($\bar{\chi}$ = 46.28 per month; sd = 20.83), 241 diagnostic biopsies were carried out ($\bar{\chi}$ = 13.39 per month; sd = 5.23), and 2554 patients were admitted through the ER ($\bar{\chi}$ = 141.89 per month; sd = 26.82).

COVID-19 stages

The individual analysis of each selected stage was also performed (Table 2 and Fig. 2).

In the first stage, comprising the period between the 1st of March and the 30th of June 2020 (four months), 2376 appointments were made ($\bar{\chi}$ = 594 per month; sd = 35.55), 73 surgeries were performed ($\bar{\chi}$ = 18.25 per month; sd = 2.22) and 31 biopsies were taken ($\bar{\chi}$ = 7.75 per month; sd = 1.71). The total number of patients seen in the ER was 497 ($\bar{\chi}$ = 124.25 per month; sd = 8.26) and 315 patients were referred from primary healthcare ($\bar{\chi}$ = 78.75 per month; sd = 4.65). The number of missed appointments was 1468 ($\bar{\chi}$ = 367 per month; sd = 27.39).

During the second stage, between the 1st of July 2020 and the 31st of December 2020 (six months), 7987 consultations were carried out ($\bar{\chi}$ = 1331.17 per month; sd = 43.14), 250 surgeries were performed ($\bar{\chi}$ = 18.25 per month; sd = 2.22) and 31 biopsies were taken ($\bar{\chi}$ = 41.67 per month; sd = 3.33). The total number of patients seen in the ER was 889 ($\bar{\chi}$ = 148.17 per month; sd = 8.01) and 892 patients were referred from primary healthcare ($\bar{\chi}$ = 148.67 per month; sd = 7.42). The number of missed appointments was 2100 ($\bar{\chi}$ = 350 per month; sd = 16.30).

In the third stage considered, between the 1st of January 2021 and the 31st of March 2021 (three months), 6680 consultations were carried out ($\bar{\chi}$ = 2226.67 per month; sd = 26.58), 142 surgeries were performed ($\bar{\chi}$ = 47.33 per month; sd = 6.51) and 50 biopsies were taken ($\bar{\chi}$ = 16.67 per month; sd = 3.22). The total number of emergencies was 302 ($\bar{\chi}$ = 100.67 per month; sd = 5.51) and 439 patients were referred from primary healthcare ($\bar{\chi}$ = 146.33 per month; sd = 7.64). The number of missed appointments was 1148 ($\bar{\chi}$ = 382.67 per month; sd = 11.50).

In the last stage, between the 1st of April 2021 and the 31st of August 2021 (five months), 11 901 consultations were carried out ($\bar{\chi}$ = 2380.20 per month; sd = 24.39), 368

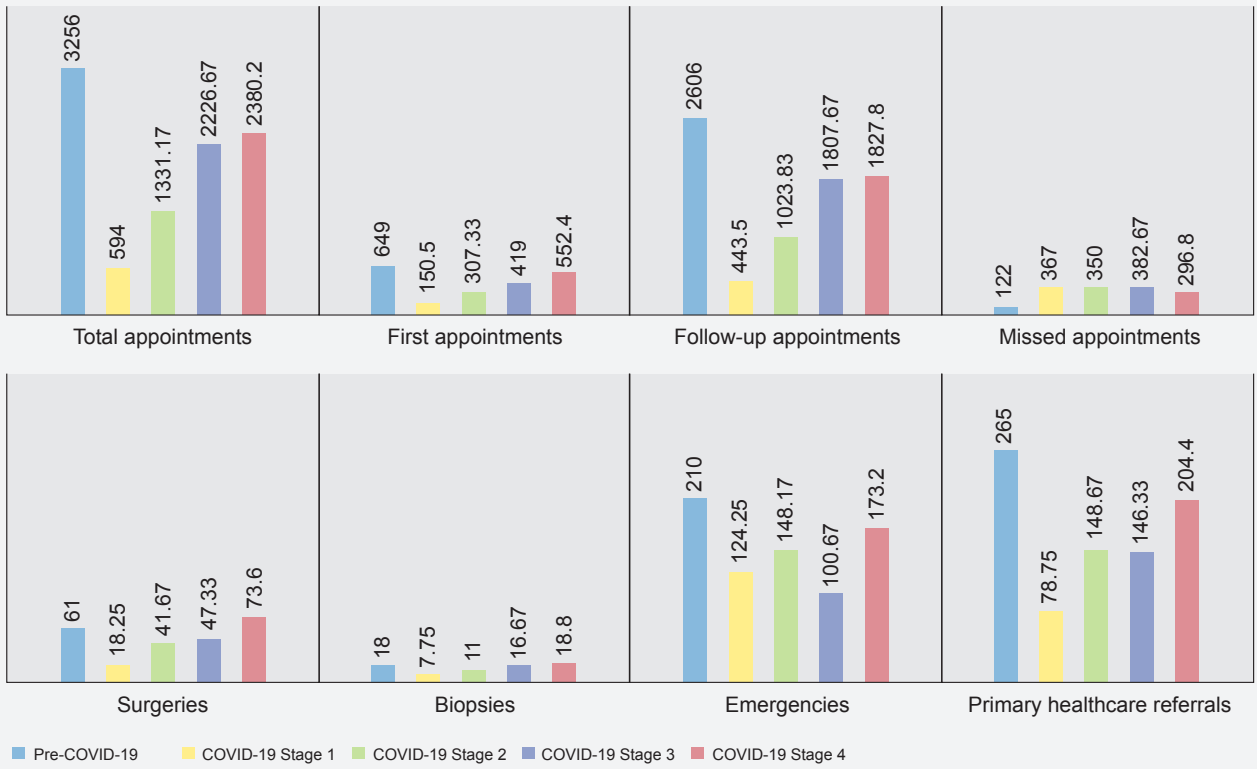

Figure 2 – Oral healthcare performance: pre-COVID-19 *versus* COVID-19 Stages. Key oral healthcare indicators monthly mean comparison bar charts between the selected COVID-19 stages and pre-COVID-19 period. Based on the data of the CACC.

surgeries were performed ($\bar{\chi}$ = 73.60 per month; sd = 7.30) and 94 biopsies were performed ($\bar{\chi}$ = 18.80 per month; sd = 3.90). The total number of emergencies was 866 ($\bar{\chi}$ = 173.20 per month; sd = 6.34) and 1022 patients were referred from primary healthcare ($\bar{\chi}$ = 204.40 per month; sd = 5.32). The number of missed appointments was 1484 ($\bar{\chi}$ = 296.80 per month; sd = 7.66).

Pre-COVID-19 *versus* COVID-19

When comparing the COVID-19 period to the pre-COVID-19 period, the data analysis revealed the existence of statistically significant differences ($p < 0.05$) for all the parameters, with a decrease of 50.61% in the total number of appointments carried out and an increase of 181.82% in missed appointments. There was also a 44.06% reduction in the number of referrals from primary healthcare and of 24.41% in the number of surgeries performed in the OR. The number of diagnostic biopsies was also reduced by 26.30% and there was a decrease of 32.33% in the number of patients admitted through the ER (Table 1).

When examining the results of the different COVID-19 stages, compared with the pre-COVID-19 equivalent period, there was also a clear decline within most variables, except for the number of biopsies during the third (-8.26%) and fourth (3.49%) stages and the number of surgeries (20.22%) in the fourth stage. In addition, the data analysis revealed statistically significant differences ($p < 0.05$) for the great majority of parameters, in all stages, except for the number of biopsies during the third and fourth stages ($p > 0.05$) (Table 2 and Fig. 2).

Furthermore, individual stage assessment shows a clear tendency for a greater severity of the effects of the pandemic during the first stage, with 81.75% less appointments in total, 70.28% fewer primary healthcare referrals and an increase over 200.27% in the number of missed appointments. During this time, the number of patients surgically treated in the OR, biopsies performed, and patients admitted through the ER were also reduced by 70.19%, 57.34%, and 40.74%, respectively.

The opposite can be observed in the fourth stage, with a less significant impact being observed across all variables.

However, outliers for this trend can be identified in the third stage, specifically the number of missed appointments (213%) and patients admitted through the ER (-52%).

Variance analysis between the different stages of the defined parameters was also considered. Therefore, by per-

Table 3 – One-way ANOVA variance analysis of the COVID-19 selected stages

		Sum of Squares	df	Mean square	Z	Sig.
Appointments	Between groups	8 702 313.7	3	2 900 771.23	2404.67	< 0.001
	Within groups	16 888.3	14	1206.31		
	Total	8 719 202	17			
First app.	Between groups	387 722.97	3	129 240.99	650.03	< 0.001
	Within groups	2783.53	14	198.82		
	Total	390 506.5	17			
Follow-up app.	Between groups	5 510 893.2	3	1 836 964.4	3517.5	< 0.001
	Within groups	7311.3	14	522.236		
	Total	5 518 204.5	17			
Referrals	Between groups	35 097.16	3	11 699.05	287.37	< 0.001
	Within groups	569.95	14	40.71		
	Total	35 667.11	17			
Missed app.	Between groups	17 952.98	3	5984.33	20.55	< 0.001
	Within groups	4077.47	14	291.25		
	Total	22 030.44	17			
Surgeries	Between groups	7005.66	3	2335.22	88.85	< 0.001
	Within groups	367.95	14	26.28		
	Total	7373.61	17			
Biopsies	Between groups	340.06	3	113.35	12.78	< 0.001
	Within groups	124.21	14	8.87		
	Total	464.28	17			
Emergencies	Between groups	11 480.73	3	3826.909	71.72	<.001
	Within groups	747.05	14	53.36		
	Total	12 227.78	17			

App.: appointments; referrals: primary healthcare referrals.
Variance analysis between the COVID-19 selected stages regarding selected key oral healthcare indicators. Based on the data of the CACC.

forming one-way ANOVA (Table 3), statistically significant differences were encountered across all studied variables ($p < 0.001$) (Table 2).

DISCUSSION

As an important part of the Portuguese national healthcare system, the CACC ensures the care of over two million people.[1,6] With a pre-pandemic monthly average of approximately 3256 oral healthcare appointments, 265 referrals from primary healthcare, 61 patients surgically treated in OR and 3774 patients seen in the ER, this center may represent the only oral healthcare unit available to thousands of patients. The CACC also plays an important role in the diagnosis and treatment of oral cancer by performing a monthly average of 18 biopsies.

The SARS-CoV-2 pandemic dates back to the 29th of December 2019 in Wuhan, China,[7,8,11] and has had a tremendous effect on healthcare systems around the world, leading to various restrictive measures and reorganization of human and material resources to accommodate the increasing number of COVID-19 patients.[30,31]

During this time, several articles exposing the diverse impacts of COVID-19 on the multiple dimensions of healthcare and oral health were published.[21,24,29,32] An Australian study analyzed a four-month period from March to June 2020 and saw a substantial decrease in healthcare activity in New-South Wales, compared with the same period in 2019. For example, primary care face-to-face consultations decreased by 22.1%, breast cancer screening activity by 51.5%, emergency department visits by 13.9% and public hospital planned surgical activity by 32.6%.[29]

Another study conducted in China explored the impact of the COVID-19 pandemic on the use of emergency dental services in two equivalent 10-day periods, one in January 2020, pre-COVID-19 and another in February 2020 during the pandemic. The authors found that 38% fewer patients visited the ER and that the distribution of dental problems had changed significantly: dental and oral infections raised from 51.0% to 71.9% during COVID-19, and dental trauma decreased from 14.2% to 10.5%.[32]

However, there is a lack of similar studies, reflecting the concrete influence of COVID-19 on parameters like the ones that were analyzed in this study. Therefore, the authors consider this article directly relevant, by exposing the concrete effects of the pandemic on the Portuguese population's oral healthcare demand and performance, and indirectly, for drawing attention to possible future consequences, such as a growing number of patients with undiagnosed, or advanced oral cancer.

Taking CACC as an example, for the considered eighteen-month period of pandemic, a clear and statistically significant impact ($p < 0.05$) was observed in all the analyzed parameters, characterized by a sharp reduction in oral healthcare performance and demand (Table 1).

However, as shown in the results, the encountered differences between each stage and the compared pre-COVID-19 period were highly variable (Table 2). Nevertheless, for almost every parameter, a statistically significant difference ($p < 0.05$) was present. The variance analysis among the different stages also showed statistically significant differences ($p < 0.001$) (Table 3).

The major variations occurred in the first stage, in which, for example, the total number of appointments, surgeries and biopsies was tremendously reduced, leaving many potential oncological patients undiagnosed or having their diagnosis delayed, thus limiting the possible therapeutic intervention. The enormous reduction of the number of patients being referred from primary healthcare, 70.28% in this stage, is another concerning result that could translate the impact primary care services suffered by stopping their activities, and then being overwhelmed with the diagnosis and surveillance of ambulatory COVID patients. When compared to the pre-COVID period, in the first stage, the number of patients admitted through the ER also dropped by 40.74%, for reasons still to be clarified.

Stage two was a period of normalization after the first lockdown, with a significant reduction of COVID-19 cases and the relief of most of the restrictive measures. Consequently, as expected, these alleviated the healthcare system and professionals, allowing for an improvement on all parameters, that was, however, still distant from pre-pandemic numbers.

Stage three was marked by the second state of emergency. The results show that despite having a similar impact on most parameters, as seen previously on stage one, the percentual decrease compared to the pre-COVID-19 period was lower. This could be explained by the measures taken after the first wave, allowing the healthcare system and professionals to better cope with the impact of the COVID-19 pandemic.

By contrast, in the fourth stage a smaller variation among all stages was seen, a clear sign of success of the vaccination process, the decrease in total number of cases and the relief of restrictive measures.

Therefore, the obtained results suggest that the empirical selection of the stages under study, based on legislative, epidemiological and sanitary factors, was adequate and essential for correct analysis of how the pandemic has evolved and in direct correlation with the burden inflicted by COVID-19 on the healthcare system, which affected clinical practice directly and substantially.

The outliers ($p > 0.05$) we encountered were the number of biopsies performed during the third and fourth stages approaching pre-pandemic values. Another exception, although statistically significant ($p < 0.05$), was the number of surgeries in the fourth stage, which surpassed the pre-COVID-19 levels by 20%. Therefore, these portray the exceptional effort from the professionals involved in order to overcome the impact of the first three stages, as well as a normalization of the healthcare system activity and the implementation of productivity programs which include of carrying out additional surgeries and consultations. The reinforcement of these programs could also be a valuable measure to counteract the healthcare impact of future waves and other pandemics, serving as a proved and successful experience.

However, although these results are encouraging, the emergence of new variants like Alpha, Beta, Gamma, Delta and Omicron, as well as the discovery of new lineages, like BA.4 and BA.5 from Omicron, prove that viral transmissibility, virulence and rate of reinfection, by escaping natural and vaccine-induced immunity, are highly susceptible to modifications.[33-35] Therefore, the recovery of pre-pandemic clinical activity levels and oral healthcare performance can still be endangered, and future vaccination programs, regarding the need of administering booster doses, remain to be fully improved pending further analysis of new relevant data.

One important limitation of this study is related with the number of referrals, one of the parameters under analysis. First appointments result from four types of referrals: primary care; internal (same institution); other public institutions (excluding primary care); and private sector. However, in this article the authors focused only on primary care referrals, as a way to indirectly evaluate the oral healthcare demand in the general population. This information also explains the number of first and missed appointments when consultations were restricted to urgent care and emergencies by government decree.

The authors also felt that results like the substantial decrease in the number of patients seen in the ER, especially during stage one and three are susceptible to multiple interpretations and lack a clear explanation, thus constituting another limitation. Speculation and common sense could point to the motives like a natural reduction in false

emergencies and the avoidance of going to the hospital, during periods of rising number of cases. However, further studies need to be conducted so concrete explanations can be given.

CONCLUSION

Taking CACC as an example, the findings suggest that there was a negative preliminary impact of COVID-19 on oral healthcare demand and performance, which appeared not only to be directly associated with epidemiological factors, but also with the implementation of restrictive and sanitary measures.

This study also raises concerns about the possible impact of COVID-19 on oral cancer patients, with the number of biopsies representing just the tip of the iceberg in the characterization of the problem, leaving elements like cancer staging at the time of diagnosis unknown.

Therefore, it intends to be a valid contribution to foster further studies within the area of oral sciences and COVID-19, as well as contribute the creation of more effective and responsible health policies that could guide future public health emergencies.

ACKNOWLEDGMENTS

The authors would like to thank and recognize all healthcare workers for their effort, support and leadership during the difficult period that is the COVID-19 pandemic.

AUTHOR CONTRIBUTIONS

All authors were involved and contributed equally during the design of this study, data collection and result interpretation. All authors read and approved the final manuscript.

JMA, IC, MIB, AQ, TN: Major contributors in writing the manuscript.

FV, FM, JF: Responsible for the revision of the written manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication. All data supporting the findings of this study was procured from the Clinical and Academic Centre of Coimbra (CACC) (Coimbra, Portugal) and used under the license for the current study. Public availability must be accessed upon reasonable request and with permission of CACC and in compliance with the national database protection legislation.

COMPETING INTERESTS

All authors report no conflicts of interest.

FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ACTA MÉDICA PORTUGUESA
A Revista Científica da Ordem dos Médicos

Repercussão da Pandemia de COVID-19 nos Serviços de Saúde e na Saúde Mental dos Profissionais dos Cuidados de Saúde Primários

The Impact of the COVID-19 Pandemic on the Healthcare System and on the Mental Health of Primary Health Care Providers

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Acta Med Port 2023 Jan;36(1):25-33 ▪ https://doi.org/10.20344/amp.17632

RESUMO

Introdução: A pandemia de COVID-19 forçou a reorganização dos serviços dos cuidados de saúde primários. Com este estudo pretendemos descrever como responderam os serviços de saúde às solicitações organizacionais, como envolveram e apoiaram os seus colaboradores; como os profissionais percecionaram o seu envolvimento nos procedimentos e que apoio lhes foi fornecido. Pretendemos também avaliar os níveis de ansiedade e depressão dos profissionais e a sua associação não só com o apoio sentido pelos profissionais, mas também com a disponibilidade de equipamentos de proteção individual e com o seu envolvimento nas tarefas relacionadas com a pandemia.

Material e Métodos: Estudo transversal analítico dirigido aos profissionais de três agrupamentos de centros de saúde usando um questionário *online*. Colhemos dados sociodemográficos, informação sobre o acesso a equipamento de proteção individual, apoio percecionado, carga de trabalho e níveis de ansiedade e depressão. Entre cada variável e os níveis de ansiedade e depressão aplicou-se regressão logística multivariada.

Resultados: Responderam 237 profissionais (83,8% mulheres; idade média 43,7 anos; 43,2% de médicos). Quase 60% trabalhou com doentes COVID-19. A disponibilidade de equipamento de proteção individual em março *versus* junho de 2020 aumentou (17,7% *vs* 55,3%). Existia plano de gestão do risco em 86% dos locais. Identificou-se uma alta carga de trabalho (90%) e pressão do tempo (74,6%). Médicos e enfermeiros apresentavam maior prevalência de depressão associada à carga de trabalho e fadiga ($p < 0,001$). Ter espaço para falar dos problemas, apoio sentido perante esses problemas e dispor na unidade de saúde de um espaço para relaxar foram alguns fatores protetores de ansiedade. Foi encontrado menor riso de depressão no grupo do secretariado clínico, nos profissionais que se sentiram apoiados, e nos que tiveram participação ativa nos planos de contingência.

Conclusão: A pandemia de COVID-19 levou a grandes alterações na dinâmica dos CSP. A pressão do tempo para realização de tarefas e a concentração exigida associaram-se a maior risco de desenvolvimento de patologia mental. O apoio sentido pelos profissionais perante os seus problemas e preocupações, e a existência de espaços para relaxar nas USF foram identificados como fatores protetores. A promoção da saúde, a manutenção dos contactos sociais dos profissionais e o seu envolvimento nos processos deverão ser tidos em conta na dinâmica organizacional das instituições.

Palavras-chave: Ansiedade; COVID-19; Cuidados de Saúde Primários; Depressão; Gestão do Risco; Pandemia

ABSTRACT

Introduction: The COVID-19 pandemic forced the reorganization of primary health care services. The aim of this study was to describe how the health services responded to organizational requests; how the health services involved and supported their employees; how professionals perceived their involvement in the procedures and what support was provided to them. Additions aims included assessing the levels of anxiety and depression of professionals and their association with the perceived support, availability of personal protective equipment and involvement in pandemic-related tasks.

Material and Methods: Cross-sectional, analytical study directed at professionals from three health center groups using an online questionnaire. We collected information from sociodemographic data, access to personal protective equipment, perceived support, workload and levels of anxiety and depression. Between each variable and the levels of anxiety and depression, multivariate logistic regression was applied.

Results: There were responses from 237 professionals (83.8% women; mean age 43.7 years; 43.2% physicians). Almost 60% worked with COVID-19 patients. The availability of personal protective equipment in March *versus* June 2020 increased (17.7% *vs* 55.3%). There was a risk management plan in 86% of the workplaces. A high workload (90%) and time pressure (74.6%) were identified. Physicians and nurses had a higher prevalence of depression associated with workload and fatigue ($p < 0.001$). Protective anxiety factors were having space to talk about problems, support in face of these problems and having a place to relax in the health unit. A lower risk of depression was found in the administrative staff group, in those who felt supported, and in those who actively participated in the contingency plans.

Conclusion: The COVID-19 pandemic led to considerable changes in the dynamics of primary health care. The time pressure to carry out tasks and the level of concentration required were associated with a higher risk of mental disease. The support felt by healthcare professionals regarding their problems and concerns and the existence of places to relax in the health units were identified as protective factors. Health promotion, the maintenance of the social contacts of healthcare professionals and their involvement in the processes should be taken into account in the organizational dynamics of the institutions.

Keywords: Anxiety; COVID-19; Depression; Health Services; Pandemics; Primary Health Care; Risk Management

INTRODUÇÃO

Desde o final de 2019 fomos assistindo à instalação da pandemia de COVID-19 a nível mundial. A rápida disseminação da doença e a taxa de letalidade associada[1] tornaram imperiosa a implementação de planos de resposta de

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Recebido/*Received*: 03/12/2021 - **Aceite/*Accepted*:** 17/06/2022 - **Publicado *Online*/*Published Online*:** 27/07/2022 - **Publicado/*Published*:** 02/01/2023

modo a conter a doença[2,3] e minimizar os danos.

Os planos de emergência alteram as condições de normalidade estabelecidas e implicam o reajustamento de procedimentos. A sua gestão pressupõe a criação de uma estrutura que leve as instituições a reduzir a sua vulnerabilidade ao perigo e as capacite para lidar com os efeitos do perigo emergente, criando ambientes mais seguros e resilientes.[4] Esta governação deve ser assente numa coordenação de processos e ser integradora, tendo em conta as estruturas e os recursos humanos.[3,4]

Está descrita a associação entre as condições psicossociais de trabalho e o desenvolvimento de exaustão emocional ou *burnout.*[5] A pandemia de COVID-19 colocou pressões sem precedentes nos profissionais e sistemas de saúde em todo o mundo, com impacto profundo na saúde mental dos profissionais tal como ocorreu durante pandemias anteriores.[6,7]

Evidência anterior mostra que os fatores organizacionais, tais como a existência de protocolos de segurança definidos, têm um impacto positivo na saúde mental dos trabalhadores.[8] Assim, as estruturas de controlo ou comando, centrais ou locais, devem acautelar a criação de um processo de comunicação eficaz interno e externo[9] para apoio dos profissionais envolvidos e dos destinatários dos seus serviços. Em relação aos profissionais de saúde e no âmbito de um surto de doença infeciosa, para além da comunicação sobre as orientações técnicas atualizadas sobre o surto (clínica da doença, cadeias de transmissão, dados epidemiológicos e procedimentos de intervenção) são fundamentais as orientações sobre segurança pessoal e com os pacientes/pessoas. Deve ser desenvolvido um processo de apoio clínico/técnico à decisão e discussão interpares,[8] fomentando o espírito de colaboração e evitando o isolamento e a exaustão dos profissionais e promovendo o seu bem-estar físico e mental.[8,10,11]

As instituições mundiais como a Organização Mundial de Saúde (OMS)[12] vêm emitindo recomendações e orientações, cabendo a cada país adaptá-las à sua realidade e aos recursos disponíveis. Na mesma linha atuam as organizações de saúde nacionais[3] e regionais, as academias[13] e as ordens profissionais.[14-16]

Importa assim saber como responderam os serviços dos cuidados de saúde primários (CSP) a esta realidade, como estão os profissionais de saúde dos CSP portugueses a lidar com a situação, qual o seu nível de envolvimento no processo e que apoio lhes é fornecido.

Com este estudo pretendemos descrever, em contexto pandémico e numa amostra de três agrupamentos de centros de saúde (ACeS), como responderam os serviços de saúde às solicitações organizacionais; como envolveram e apoiaram os seus colaboradores; como os profissionais percecionaram o seu envolvimento nos procedimentos e que apoio lhes foi fornecido. Pretendemos ainda avaliar os níveis de ansiedade e depressão dos profissionais de saúde através da escala *Hospital Anxiety and Depression Scale* - HADS[17] e a sua associação, apoio sentido pelos profissionais, disponibilidade de equipamentos de proteção individual (EPI) e o envolvimento dos profissionais nas tarefas e procedimentos determinados pelo Plano de Contingência COVID-19.

MATERIAL E MÉTODOS

Em junho de 2020, realizámos um estudo observacional analítico e transversal através da aplicação de um questionário de autopreenchimento disponibilizado *online*, com uso da ferramenta *Google Forms*, aos profissionais de três agrupamentos de centros de saúde (ACeS) (Porto Ocidental, Matosinhos e Gaia). Foi solicitado o consentimento informado aos participantes.

Obteve-se autorização dos ACeS envolvidos e parecer positivo das comissões de ética da Administração Regional de Saúde do Norte e da Unidade Local de Saúde de Matosinhos.

O questionário recolheu informação sociodemográfica (género, idade); informação relacionada com a profissão (categoria profissional, descrição da atividade relacionada com COVID-19 [trabalho em área dedicada COVID-19-comunidade (ADC-C)], informação relacionada com a existência de planos de contingência/gestão do risco, com a pressão sentida pelos profissionais, com a sua capacidade de decisão, cansaço/fadiga no trabalho, disponibilidade de EPI, obtenção de informação relativa à pandemia, apoio sentido pelos profissionais e perceção das chefias relativamente ao apoio fornecido, envolvimento dos colaboradores na implementação do plano de contingência e organização dos serviços durante a pandemia (reuniões de serviço e formação, existência de local para relaxar, existência de apoio psicológico) – variáveis independentes. O questionário integra a escala *Hospital Anxiety and Depression Scale* (*HADS*) (versão portuguesa validada).[14] Esta escala permite obter três *scores* separados para ansiedade e depressão, classificando os indivíduos como: normal (0 - 7 pontos), *borderline* (8 - 10 pontos) e anormal (11 - 21 pontos) – variáveis dependentes.[17]

Análise e procedimentos estatísticos

Utilizámos o programa IBM SPSS®, versão 22. Na descrição das variáveis consideraram-se frequências absolutas (n) e relativas (%) nas variáveis categóricas e médias (M) e desvios padrão (DP) nas variáveis contínuas, após confirmação da simetria das suas distribuições pela observação do histograma. A normalidade das variáveis contínuas foi avaliada com o teste Kolomogorov-Smirnov e observação do histograma. Na associação das variáveis categóricas foi utilizado o teste χ-quadrado ou teste de Fisher e nas variáveis contínuas o ANOVA-1 *factor.*

Para avaliação das associações da ansiedade e depressão (variáveis dependentes), normal *versus borderline* e normal *versus* anormal criaram-se quatro modelos logísticos multivariáveis. Os modelos logísticos foram ajustados para as variáveis independentes (dicotomizadas) que apresentaram associação univariada estatisticamente significativa ($p < 0,05$) ansiedade ou depressão (normal *versus borderline* ou normal *versus* anormal). Estimaram-se os *odds ratio* ajustados e os respetivos intervalos de confiança a 95%. Consideraram-se resultados estatisticamente significativos para $p < 0,05$. A variável cansaço/fadiga associou-se de forma univariada com a ansiedade/depressão mas não foi incluída nos modelos multivariados porque apresentava pouca variabilidade em algumas categorias.

RESULTADOS

Os dados foram colhidos a partir de uma população de 1326 profissionais dos ACeS Porto Ocidental (n = 505), Gaia (n = 271) e Matosinhos (n = 550).

No sentido de promover a representatividade de cada ACeS na amostra, garantiu-se que esta fosse constituída por pelo menos 10% de respondentes de cada ACeS. Assim, a amostra final foi constituída por 237 profissionais, 96 (19,0%) do ACeS Porto Ocidental, 61 (22,5%) do ACeS Gaia e 80 (14,5%) do ACeS Matosinhos.

Caracterização da amostra

A amostra foi composta por 83,8% de profissionais do sexo feminino, sendo os médicos a profissão mais representada (43,2%), seguida pelos enfermeiros (32,2%), secretários clínicos (13,1%) e outros (11,4%). A idade variou entre os 18 e os 68 anos, com média de 43,74 (DP = 10,33) (Tabela 1).

Mais de metade da amostra não trabalhou em área dedicada COVID-19-comunidade (ADC-C) (60,9%). Cerca de metade fez automonitorização por suspeita de infeção por COVID-19 (48,9%), um quarto foi suspeito de infeção por COVID-19 (25,1%) e 57% fez monitorização/vigilância diária de utentes com suspeita de infeção por COVID-19. Cerca de 40% dos respondentes trabalhou em ADC-C (65,8% dos médicos; 34,2% dos enfermeiros).

Relativamente à capacidade de decisão e apoio no contexto de pandemia, a "capacidade de decisão" foi percecionada como pelo menos "algo capaz" (29,5%), "bastante capaz" (49,4%) e "muito capaz" (17,7%). A probabilidade esperada de ter ajuda nessa decisão concentrou-se nas respostas das categorias "alguma" (24,2%), "bastante" (41,1%) e "muita" (20,3%). A perceção de ajuda dos colegas para apoiarem no caso de dificuldades distribuiu-se principalmente pelas categorias "algumas vezes" (20,7%), "bastantes vezes" (42,2%) e "muitas vezes" (29,5%).

Já na perceção do encorajamento por parte das chefias observou-se uma tendência para maior concentração de respostas nas categorias "nunca" (19,4%), "raras vezes" (22,8%) e novamente na categoria "algumas vezes" (30,0%).

No que respeita à atenção e gentileza verificou-se que cerca de 80% referiram ter conseguido ser gentis com os colegas de trabalho "frequentemente" ou "sempre", embora quase 50% considerem que conseguiram ser gentis consigo próprios, apenas "algumas vezes".

Reorganização dos serviços

A maior parte dos profissionais referiu que existe um plano na sua unidade de saúde para a gestão de risco de contágio (86,0%), sendo as unidades de saúde familiares (USF) quem mais desenvolveu esse plano (60,2%), seguidas pelos ACeS (33,3%), serviços de saúde ocupacional (4,5%) e outros serviços (2,0%).

Em junho de 2020 havia mais disponibilidade de EPI (55,5%) nos serviços do que na segunda ou terceira semana de março (17,7%).

Segundo 63% dos inquiridos existe ou foi criado um serviço de apoio psicológico aos profissionais a exercerem atividade em contexto desta pandemia. Contudo, apenas um profissional referiu que utilizou este serviço, e fê-lo raras vezes.

A frequência da divulgação de orientações/informações científicas atualizadas sobre a pandemia de COVID-19 e dos respetivos procedimentos atualizados a desenvolver na USF mostraram uma distribuição positiva, com maior concentração de respostas nas categorias "frequentemente" e "sempre" (75,4% e 70,8%, respetivamente).

Envolvimento dos colaboradores

De um modo geral, os profissionais foram envolvidos (60,5%) nas tarefas necessárias à implementação do plano de contingência ("frequentemente" = 35,2%; "sempre" = 25,4%). O menor envolvimento foi detetado no grupo profissional dos secretários clínicos ("nunca" = 12,9%) e outros profissionais ("nunca" = 23,1% e "raras vezes" = 11,5%).

No que respeita à participação ativa em tarefas relativas ao plano de contingência implementado, a distribuição sugeriu uma perceção de participação ativa, embora quase 25% da amostra refira sentir-se apenas "algumas vezes", "raramente" ou "nunca" envolvido.

Apoio aos profissionais

Em relação à perceção da presença das chefias na orientação e apoio dos profissionais em qualquer etapa do trabalho, 63,7% sentem-no "nunca", "raras" ou "algumas vezes" e 36,3% sentem-no "frequentemente" ou "sempre". A maioria (65%) sente que pode contar com os seus colegas se surgirem dificuldades e que houve espaço na sua unidade de saúde para falar sobre as suas preocupações (47,4%), sendo que 47,7% sente que teve apoio sempre

Tabela 1 – Características sociodemográficas e distribuição dos profissionais de saúde por ACeS

		N.º		Idade			
		M	H	Média	DP	Mínima	Máxima
ACeS Porto Ocidental	Médicos de MGF	28	5	43,09	12,55	30,00	68,00
	Internos FE	4	1	28,60	1,82	26,00	31,00
	Médicos de SP	1	0	59,00		59,00	59,00
	Enfermeiros	25	7	45,13	8,63	33,00	61,00
	Técnico SS	5	0	50,20	10,87	42,00	64,00
	SC/administrativos	15	1	46,69	8,80	29,00	63,00
	Outros	4	0	47,25	6,02	42,00	55,00
	Total	82	14	44,32	10,72	26,00	68,00
	Sem dados	0			0		
ACeS Gaia	Médicos de MGF	11	4	46,13	9,34	30,00	65,00
	Internos FE	4	3	26,71	1,50	25,00	29,00
	Médicos de SP	1	1	48,00	21,21	33,00	63,00
	Enfermeiros	17	3	44,57	7,33	36,00	62,00
	Técnico SS	2	0	62,00	2,83	60,00	64,00
	SC/administrativos	8	3	41,55	9,31	18,00	52,00
	Outros	1	1	35,50	9,19	29,00	42,00
	Total	44	15	42,72	10,64	18,00	65,00
	Sem dados	2			1		
ACeS Matosinhos	Médicos de MGF	27	4	42,84	10,33	29,00	65,00
	Internos FE	2	2	27,75	3,10	25,00	32,00
	Médicos de SP	2	0	65,00	0,00	65,00	65,00
	Enfermeiros	22	1	44,14	7,36	36,00	66,00
	Técnico SS	1	0	39,00		39,00	39,00
	SC/administrativos	11	1	47,50	4,80	41,00	55,00
	Outros	5	1	44,83	8,86	32,00	55,00
	Total	70	9	43,81	9,66	25,00	66,00
	Sem dados	1			1		

MGF: Medicina Geral e Familiar; SP: Saúde Pública; FE: formação específica; SC: secretários clínicos; Técnico SS: técnico do Serviço Social

que expôs os seus problemas e preocupações "frequentemente" ou "sempre". No entanto 81,3% dos inquiridos referem ter-se sentido "nunca", "raramente" ou apenas "algumas vezes" encorajados a manter os contactos sociais e 70% referem que, "nunca", "raramente" ou apenas "algumas vezes", ter sido relembrado para se manter saudável para além do trabalho.

Relativamente às chefias, 46% referem que incentivaram "frequentemente" ou "sempre" os seus colaboradores a reconhecerem e discutirem as suas preocupações e cerca de 33% referiu ter incentivado os seus colaboradores a manter os contactos sociais "frequentemente" ou "sempre".

Para a maior parte dos colaboradores não foi criado, nem existe na sua unidade de saúde, um espaço para relaxar/repousar (71%).

Apoio à formação e atualização

Mais de 50% revelou que o seguimento e atualização dos procedimentos relativos à pandemia foi feito "frequentemente" ou "sempre". Relativamente à frequência com que os inquiridos se sentiram incentivados pelas chefias a procurar informação sobre a pandemia de COVID-19 foi "nunca", "raramente" ou "algumas vezes" para 60,8% e "frequentemente" ou "sempre" para 39,2% dos inquiridos.

Carga de trabalho

A maioria dos inquiridos referiu que o seu trabalho exige muita concentração, como por exemplo, gerir e fazer muitas coisas ao mesmo tempo, esforço mental intenso, reter várias coisas ao mesmo tempo. A categoria de resposta "bastantes vezes" foi reportada por 35,0% dos inquiridos e a categoria "muitas vezes" por 54,9% dos inquiridos.

O cansaço/fadiga ("bastante", 48,7%, "extremo", 29,2%) assim como a pressão do tempo na realização das tarefas ("bastante", 39,0%, "extremo", 35,6%) foram as respostas mais frequentes nesta amostra.

Reuniões de serviço e formação

As atividades formativas no âmbito do desenvolvimento profissional de base/formação pós-graduada, no âmbito da pandemia de COVID-19 e as reuniões de serviço mantiveram-se, mas com frequência tendencialmente reduzida, apenas menos marcada no que respeita à primeira (formação pós-graduada). As respostas dos inquiridos concentraram-se mais na metade esquerda da escala, num total de respostas das categorias "não aplicável", "nunca" e "raras vezes" de 68,4% (formação pós-graduada), 48,5% (formação COVID-19) e 57,8% (reuniões de serviço) de respostas.

Da análise entre as variáveis descritivas observou-se que níveis de cansaço/fadiga mais elevados (bastante/extremo) se associaram a proporções mais elevadas de respostas na categoria "muitas vezes", relativamente à concentração exigida no trabalho ($p < 0,001$). Níveis de cansaço/fadiga mais elevados ("bastante/extremo") também se associaram com pressão do tempo para a realização das tarefas, classificada como "extrema" ($p < 0,001$).

A regularidade do seguimento e atualização de procedimentos/protocolos de atualização associou-se de forma positiva com a regularidade das reuniões de serviço/clínicas ($p < 0,001$) e com a regularidade das atividades de formação e atualização no âmbito da pandemia de COVID-19 ($p < 0,001$).

Ansiedade e depressão

Identificou-se uma prevalência de 29,5% de ansiedade *borderline* e 30,0% de ansiedade anormal. Quanto à depressão, a sua prevalência foi de 27,4% (*borderline*) e 19,8% (anormal).

Nas Tabelas 2 e 3 são apresentados os resultados das associações entre as diferentes variáveis estudadas e ansiedade e depressão, respetivamente.

Quando comparado com "inexistente"/"pouca"/"alguma", uma pressão de tempo "bastante"/"extrema" para realização de tarefas associou-se positivamente com ansiedade (normal *versus borderline*, OR = 2,80, IC 95%: 1,34 - 5,86;

Tabela 2 – Regressões logísticas multivariáveis para ansiedade (normal *versus borderline*/anormal)

	Normal *vs* *Borderline*			**Normal *vs* Anormal**		
	OR*	*p*-valor	IC 95%	OR*	*p*-valor	IC 95%
Pressão do tempo para a realização das tarefas						
Inexistente / Pouca / Alguma	**1**			**1**		
Bastante / Extrema	**2,80**	**< 0,01**	**1,34 - 5,86**	**3,68†**	**< 0,01**	**1,48 - 9,16**
O trabalho exige muita concentração						
Nunca / Raras vezes / Algumas vezes	-	-	-	**1**		
Muitas vezes / Sempre	-	-	-	**2,31†**	**0,03**	**1,07 - 5,00**
Chefias presentes na orientação e apoio dos profissionais						
Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente ou sempre	-	-	-	0,69	0,40	0,29 - 1,62
Incentivo aos colaboradores no reconhecimento e discussão de preocupações						
Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	0,56	0,14	0,26 - 1,20
Espaço para falar dos problemas que o preocupam na sua unidade de saúde						
Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	0,54	0,16	0,23 - 1,28
Apoio sentido quanto a problemas e preocupações						
Nunca / Raras vezes / Algumas vezes	**1**			1		
Frequentemente / Sempre	**0,46**	**0,02**	**0,24 - 0,88**	0,60	0,23	0,26 - 1,38
Foi criado um espaço onde possa relaxar na sua unidade de saúde						
Não / Desconheço	-	-	-	**1**		
Sim	-	-	-	**0,30†**	**0,04**	**0,10 - 0,94**

*: OR ajustados para as variáveis apresentadas na tabela, de acordo com significância estatística ($p < 0,05$) obtida na análise univariada de cada variável independente com ansiedade (normal *versus borderline* ou normal *versus* anormal); NA: não aplicável; †: $p < 0,05$

normal *versus* anormal, OR = 3,68, IC 95%: 1,48 - 9,16) e com depressão (normal *versus* anormal, OR = 3,17, IC 95%: 1,16 - 8,72).

Sentir "frequentemente"/"sempre" apoio quanto a problemas ou preocupações, quando comparado com "nunca"/"raras vezes"/"algumas vezes", associou-se negativamente com ansiedade (normal *versus borderline*, OR = 0,46, IC 95%: 0,24 - 0,88).

A existência de um espaço para relaxar na unidade de saúde associou-se de forma negativa com ansiedade (normal *versus* anormal, OR = 0,30, IC 95%: 0,10 - 0,94).

A existência de um espaço para falar dos problemas associou-se negativamente com depressão (normal *versus borderline*, OR = 0,18, IC 95%: 0,07 - 0,44).

DISCUSSÃO

O presente estudo descreveu o processo de adaptação dos serviços de CSP à realidade pandémica, bem como o impacto desta adaptação nos níveis de ansiedade e depressão dos seus profissionais. Revelou-se assim como uma ferramenta de apoio à governação clínica em contexto de mudanças forçadas e profundas na orgânica dos

Tabela 3 – Regressões logísticas multivariáveis para depressão (normal *versus borderline*/anormal)

	Normal *vs* *Borderline*			**Normal *vs* Anormal**		
	OR*	*p*-valor	IC 95%	OR*	*p*-valor	IC 95%
Pressão do tempo para a realização das tarefas						
Inexistente / Pouca / Alguma	-	-	-	**1**		
Bastante / Extrema	-	-	-	**3,17†**	**0,025**	**1,16 - 8,72**
Chefias presentes na orientação e apoio dos profissionais						
NA / Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente ou sempre	-	-	-	0,93	0,89	0,33 - 2,66
Espaço para falar dos problemas que o preocupam na sua unidade de saúde						
Nunca / Raras vezes / Algumas vezes	**1**			1		
Frequentemente / Sempre	**0,18†**	**< 0,001**	**0,07 - 0,44**	0,57	0,27	0,21 - 1,55
Apoio sentido quanto a problemas e preocupações						
NA / Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	0,44	0,09	0,17 - 1,14
Relembrado para a necessidade de se manter saudável						
Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	0,57	0,34	0,18 - 1,82
Foi criado um espaço onde possa relaxar na sua unidade de saúde						
Não / Desconheço	-	-	-	1		
Sim	-	-	-	0,41	0,12	0,13 - 1,26
Disponibilidade de EPIs na 2ª e 3ª semana de março de 2020						
Completamente disponível / Bastante disponível / Disponível	-	-	-	1		
Pouco disponível / Indisponível	-	-	-	2,46	0,06	0,97 - 6,23
Disponibilidade de EPIs atualmente						
Completamente disponível / Bastante disponível / Disponível	-	-	-	1		
Pouco disponível / Indisponível	-	-	-	1,34	0,61	0,43 - 4,18
Envolvimento nas tarefas do plano de contingência						
NA / Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	1,55	0,44	0,51 - 4,69
Participação ativa nas tarefas do plano de contingência						
NA / Nunca / Raras vezes / Algumas vezes	-	-	-	1		
Frequentemente / Sempre	-	-	-	0,50	0,22	0,17 - 1,50

*: OR ajustados para as variáveis apresentadas na tabela, de acordo com significância estatística ($p < 0,05$) obtida na análise univariada de cada variável independente com depressão (normal *versus borderline* ou *normal versus* anormal); NA: não aplicável; †: $p < 0,05$

serviços.

O estudo foi baseado numa amostra de conveniência que englobou exclusivamente ACeS do Grande Porto, que poderá não ser inteiramente representativa da realidade do país. Para maximizar a representatividade da amostra, incluíram-se todos os profissionais a exercer funções nos três ACeS envolvidos. No entanto, os resultados podem não espelhar a realidade de outros ACeS.

O estudo utilizou um questionário elaborado pelos autores, com base nas recomendações de grupos de consenso da OMS,[12] que não está, no entanto, validado. Não obstante, o questionário foi alvo de análise independente e sequencial por cinco investigadores, com decisão final baseada em consenso. O questionário foi baseado em ocorrências passadas, introduzindo assim a possibilidade de ocorrência de viés de memória. O facto das questões mais remotas se reportarem ao início da pandemia, momento marcante na vida dos profissionais de saúde, poderá minimizar esse viés neste caso específico.

Na amostra estudada, cerca de 40% dos respondentes foi mobilizado para trabalhar em ADC-C e cerca de metade realizou tarefas relacionadas com utentes suspeitos/infetados com o vírus SARS-CoV2, traduzindo uma grande alocação de recursos humanos para estas tarefas, o que poderá ter negligenciado outras e demonstra o grande impacto das alterações na atividade dos profissionais dos CSP, tal como aconteceu noutros países.[18-20] Evidência anterior mostra que os trabalhadores da linha da frente têm, de facto, maior risco de desenvolver ansiedade e depressão,[8,21] ao contrário do que se revelou no nosso estudo, sendo que na nossa amostra os médicos foram os que mais assumiram tarefas em ADC-C, traduzindo o tipo de tarefas adstritas a estes centros de atendimento clínico.[22]

A maioria dos serviços elaborou um plano de gestão do risco nos primeiros três meses após a declaração do estado de emergência em Portugal. As USF, seguidas pelos ACeS, foram as estruturas mais ativas, sendo que as primeiras o fizeram em mais de metade dos casos (60,2%). Os profissionais sentiram que foram chamados a participar ativamente (53,3%) nas tarefas relativas ao plano de contingência implementado nas suas unidades de saúde, sendo envolvidos nas atividades para a sua implementação (60,6%). Menor envolvimento foi sentido pelo grupo dos secretários clínicos. Estes dados salientam a autonomia, dinâmica de trabalho com ênfase no trabalho em equipa e a capacidade de resposta das USF e dos órgãos de gestão locais.[23]

Relativamente ao apoio sentido pelos profissionais e assumido pelas chefias parece ter sido dada maior ênfase à discussão das preocupações e problemas do que ao incentivo na manutenção dos contactos sociais e ao incentivo para se manter saudável. Este facto pode estar relacionado com o contexto pandémico em si, que não era facilitador dos contactos sociais e de atividades de lazer. No entanto, a evidência mostra que intervenções que se focam no suporte pela família e suporte social e a escuta ativa dos colaboradores são importantes na prevenção da patologia mental associada à COVID-19 e à manutenção do bem-estar global dos indivíduos.[24-27] Por outro lado, o isolamento social associa-se a pior prognóstico, pelo que as intervenções futuras deverão focar-se também no bem-estar dos profissionais fora do ambiente laboral.[27,28]

Os dados mostram que os serviços divulgaram frequentemente orientações e informações científicas atualizadas sobre a pandemia de COVID-19 aos seus profissionais, bem como procedimentos atualizados a aplicar na própria unidade de saúde. Evidência anterior mostra que a existência de protocolos de atuação bem definidos aumenta a confiança e a satisfação dos profissionais, reduzindo o risco de desenvolver patologia mental.[8] No entanto, no presente estudo não se verificaram associações estatisticamente significativas entre estas variáveis e o desenvolvimento de ansiedade ou depressão. Este achado poderá estar relacionado com o facto de inicialmente terem sido, na maioria dos casos, as próprias unidades de saúde a elaborarem os seus planos de contingência.

Foi percecionado que as chefias incentivaram os seus colaboradores a manterem-se atualizados relativamente à pandemia. Por outro lado, observou-se uma redução na frequência das reuniões de serviço e de formação no âmbito do desenvolvimento profissional de base/formação pós-graduada. Parece, assim, terem sido encontradas formas alternativas de atualização relativas à pandemia, provavelmente utilizando canais como o *e-mail*, plataformas de saúde, formações *online*, etc.[29-31] Verificou-se ainda uma associação entre a regularidade das reuniões de serviço e a regularidade das atividades de formação e atualização no âmbito da pandemia de COVID-19 com a atualização de procedimentos neste âmbito, demonstrando que provavelmente muitos desses momentos de reunião foram utilizados em prol da pandemia. Esta realidade foi, certamente, fruto da necessidade premente de fazer frente aos desafios impostos pela situação pandémica, mas poderá ter prejudicado a formação global dos profissionais.[29,31,32]

No que respeita aos profissionais e ao modo como lidaram com a situação vemos que a carga de trabalho globalmente foi alta, exigindo muita concentração, e a realização de várias tarefas em simultâneo, com esforço mental intenso. Uma revisão sistemática aponta a grande carga de trabalho como um fator predisponente de patologia mental.[6,26] Os nossos resultados corroboram esta informação ao demonstrarem uma associação positiva entre a pressão do tempo para a realização das tarefas diárias e o maior risco de desenvolver ansiedade e depressão.[27,33-35] No entanto, a capacidade de tomar decisões de trabalho rápidas parece não ter sido afetada pelo contexto de pandemia

passados três meses da sua instalação, o que poderá traduzir a adaptabilidade dos profissionais.

Identificámos uma prevalência de 30,0% de ansiedade e de 19,8% de depressão em profissionais de saúde, prevalências superiores à da população portuguesa geral (16,5% para ansiedade; 6,8% para as perturbações depressivas *major*, em 2013).[36] Estes valores encontram-se dentro dos intervalos relatados em outros estudos em contextos pandémicos que, no entanto, relatam prevalências muito dispares consoante o contexto geográfico e a população incluída.[8,29,37]

No nosso estudo, a prevalência da ansiedade é maior que a da depressão, o que vai ao encontro dos resultados de outros estudos.[38]

Maior risco de ansiedade foi associado a pressão do tempo para a realização das tarefas diárias. Por outro lado, foram identificados como fatores protetores de ansiedade anormal a existência na USF de um espaço para relaxar e o apoio sentido perante a exposição a problemas e preocupações. Relativamente à depressão, demonstrou-se maior risco quanto à pressão do tempo para realização de tarefas. Estes resultados estão de acordo com os encontrados em estudos anteriores que mostraram que a existência de um local para relaxar[33] e o apoio dos pares[39-41] são fatores protetores relativamente ao desenvolvimento de patologia mental. Num ambiente hostil, quer em termos de carga de trabalho, quer de carga emocional, o suporte laboral e as relações pessoais e sociais são também determinantes na manutenção da saúde mental.[8,26,27]

CONCLUSÃO

A pandemia de COVID-19 levou a grandes alterações na dinâmica dos CSP. A pressão do tempo para realização de tarefas e a concentração exigida associaram-se a maior risco de desenvolvimento de patologia mental. O apoio sentido pelos profissionais perante os seus problemas e preocupações, e a existência de espaços para relaxar nas USF foram identificados como fatores protetores. Intervenções futuras nesta área devem, assim, ter em conta estas dimensões, focando-se no bem-estar profissional e pessoal dos profissionais de saúde para os melhor preparar para situações de emergência.

AGRADECIMENTOS

Os autores gostariam de agradecer aos ACeS envolvidos que aceitaram colaborar divulgando o questionário a todos os seus profissionais através da sua *mailing list.*

CONTRIBUTO DOS AUTORES

CO: Conceção e desenho do estudo. Coordenação do estudo. Articulação da divulgação dos questionários para recolha de dados. Análise de dados. Redação inicial do manuscrito e revisão do manuscrito final.

RB, JCG, LA, AMC: Conceção e desenho do estudo. Análise de dados. Redação do manuscrito inicial, revisão do manuscrito final.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial atualizada em 2013.

CONFIDENCIALIDADE DOS DADOS

Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação de dados.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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Debriefing or Feedback: Exploring the Impact of Two Post-Scenario Discussion Methods in the Acquisition and Retention of Non-Technical Skills

Debriefing ou Feedback: Estudo Exploratório do Efeito de Dois Métodos de Discussão Pós-Cenário na Aquisição e Retenção de Competência Não-Técnicas

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Acta Med Port 2023 Jan;36(1):34-41 ▪ https://doi.org/10.20344/amp.16898

ABSTRACT

Introduction: There is a paucity of quantitative studies objectively comparing debriefing and feedback as methods for post-scenario discussion and its impact on healthcare teams' acquisition and retention of non-technical skills. The main purpose of this study is to provide some insight on this research question, using a sample of medical students. A secondary objective explores students' opinion and preference on the post-scenario discussion.

Material and Methods: Forty-five medical students were distributed among 15 teams, and randomly allocated to two groups. Each team participated in three different simulated scenarios, with similar levels of difficulty and opportunities to apply specific non-technical skills: leadership, communication, and task management. To assess the acquisition and retention of skills, scenarios occurred on days one (baseline), two (acquisition) and 20 (retention). Team performance was objectively evaluated by an observer, using scenario recordings. Students individually assessed different aspects of debriefing and feedback.

Results: Both debriefing and feedback groups showed similar overall increase in objective scores, with significant increase between days one and two (acquisition), and a smaller increase between days two and 20 (retention). Students indicated debriefing as the preferred discussion method.

Conclusion: Debriefing and feedback are effective post-scenario discussion methods, promoting acquisition and retention of non-technical skills, by undergraduate students. Allying debriefing reflexive practice with feedback directive style, and shifting appropriately between facilitation and instruction, can be a good compromise to achieve a timely and educationally meaningful discussion.

Keywords: Clinical Competence; Formative Feedback; Patient Care Team; Simulation Training; Students, Medical

RESUMO

Introdução: Há uma escassez de estudos quantitativos comparando objetivamente o *debriefing* e o *feedback* como métodos de discussão pós-cenário e o seu impacto na aquisição e retenção de competências não-técnicas pelas equipas de saúde. O objetivo principal deste estudo é explorar esta questão de investigação, usando uma amostra de estudantes de medicina. Adicionalmente, foi analisada a opinião e preferência dos estudantes sobre o método de discussão pós-cenário.

Material e Métodos: Quarenta e cinco estudantes de medicina foram distribuídos em 15 equipas e alocados aleatoriamente a dois grupos. Cada equipa participou em três cenários de simulação diferentes, com níveis de dificuldade semelhantes e as mesmas oportunidades para aplicar as seguintes competências não-técnicas específicas: liderança, comunicação e gestão de tarefas. Para avaliar a aquisição e retenção de competências, os cenários decorreram nos dias um (linha de base), dois (aquisição) e 20 (retenção). O desempenho de cada equipa foi avaliado objetivamente por um observador, através da análise das gravações dos cenários e de uma *checklist*. Os estudantes foram ainda convidados a avaliar individualmente a condução do *debriefing* e do *feedback*.

Resultados: Ambos os grupos (*debriefing* e *feedback*) demonstraram um incremento semelhante nas pontuações objetivas, com um aumento acentuado entre os dias um e dois (aquisição) e um aumento ligeiro entre os dias dois e 20 (retenção). Os estudantes indicaram o *debriefing* como método de discussão preferencial.

Conclusão: O *debriefing* e o *feedback* são métodos eficazes de discussão pós-cenário, promovendo a aquisição e retenção de competências não-técnicas por estudantes pré-graduados. A aliança da prática reflexiva do *debriefing* com o estilo diretivo de *feedback*, alternando apropriadamente entre facilitação e instrução, é um compromisso aceitável para alcançar uma discussão educacionalmente significativa num tempo limitado.

Palavras-chave: Competência Clínica; Equipas de Cuidados ao Doente; Estudantes de Medicina; Feedback Formativo; Simulação Realística

INTRODUCTION

Reports from the Institute of Medicine,[1,2] the National Health System,[3] and other more recent publications,[4-6] attribute 70% to 80% of the errors in patient care to poor non-technical skills (NTS), namely lack of communication, leadership, task management skills, among others. These reports and publications also have clear recommendations on the use of simulation to promote patient safety.

Simulation based medical education (SBME) can provide a supportive educational environment,[7,8] allowing users to practice and develop skills without any discomfort or risk to real patients.[9] It encourages the acquisition of technical and non-technical skills through experience, ideally in a realistic situation or environment, and can stimulate reflection on performance.[10] If correctly planned, scheduled, implemented and evaluated, it allows knowledge, skills and attitudes/behaviours to be acquired in a safe, educationally

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Recebido/*Received*: 22/07/2021 - **Aceite/*Accepted*:** 19/05/2022 - **Publicado *Online*/*Published Online*:** 27/06/2022 - **Publicado/*Published*:** 02/01/2023

orientated and efficient manner.[11-13]

A typical simulation session includes three stages: briefing, scenario and debriefing/feedback[14]:

1. Briefing. Provides the ground for the simulated experience and promotes the engagement of the trainee(s). Briefing the room, equipment, and the simulation process (including debriefing/feedback) is essential for a valuable learning experience.
2. The scenario. Consists in the actual performance of a trainee or trainees in a specific simulated situation. It can range from basic settings for individual technical skills training to immersive environments for team training.
3. Debriefing or feedback. These remain fundamental and essential elements of simulation-based training or any learning process.[15] It allows the trainees to reflect on their performance, create new frames that will modulate new actions and improve future performance.[16,17]

Traditionally, there are considerable differences between debriefing and feedback, although an effort has been made by the community of medical educators to develop a common framework.[18,19] Yet these terms are still widely used, many times as synonyms, despite their different meanings and aimings.[20]

For the sake of clarity, in this paper we will consider feedback and debriefing defined as follows. Feedback is a type of formative assessment, based on direct observation of the learner in a specific learning environment. Feedback provides specific information on the comparison between a trainee observed performance and a standard, and conveys with the intent to improve/enhance the performance of trainees. Feedback can follow different structures,[21] being one of the most used the Pendleton model.[21-23] In this model, there is a structured dialogue between an instructor and trainee(s), initially pointing out the positive aspects and afterwards emphasizing the aspects to improve/modify. Although trainees contribute to the dialogue, this is viewed as a unidirectional flow of information to the trainee.[20] Typically, formative feedback takes between five to 20 minutes, and can be applied to technical and non-technical skills training.[21-24]

Debriefing is an assembly of participants and facilitator(s) in which a recent event can be recalled, analysed, and reflected upon in order to agree on future practice changes. There are several debriefing models, with most being built-on a three-phase structure: reaction/description, understanding/analysis, and application/summary.[25] This methodology provides the participants with the opportunity to explore and reflect on what happened in a previous event, reinforcing correct behaviours/attitudes, and identifying/exploring aspects that could have been done differently. The self-assessment promotes a deep reflection on the frames behind actions,[16] encouraging changes in future performance, and potentially transferability of new behaviours/attitudes to clinical practice.[17] This process is typically conducted by a facilitator, lasting 20 to 40 minutes,[26-28] and is mostly applied in NTS training.[13,17] Other formats of debriefing[20] (e.g. within-event; self-guided) are out of the scope of this paper and will not be considered.

In the context of team training in simulated emergency scenarios, debriefing is commonly used as a post-scenario discussion method. However, there is a paucity of quantitative studies objectively measuring its impact on the acquisition and retention of NTS, and its comparison with feedback. The main purpose of this study is to provide some insight on this research question, using quantitative data collected from a sample of undergraduate medical students. A secondary objective is to explore students' individual opinion and preference on the post-scenario discussion method.

MATERIAL AND METHODS

Participants

The target population of this study was undergraduate medical students of the Faculty of Medicine of the University of Porto, in Portugal. The recruitment was restricted to fifth year students, with no prior simulation experience. None of the students had prior professional or academic experience in healthcare. Students were invited to voluntarily register in the study, through announcements and posters from the student association. Only registered students comprised the sample of this study. Demographic information of the students was collected at registration.

Study design

This longitudinal double-blinded randomized control study was carried-out at the Biomedical Simulation Center of the Faculty of Medicine, University of Porto. The Ethics Committee of our institution approved the study and written informed consent was obtained from all participants before the study.

One-week prior to the study, the 60 registered participants received relevant support material on technical and non-technical skills required for an adequate resolution of a medical emergency.

Of the 60 registered students, 45 attended day zero. These 45 students received information and clarifications on the study and an informed consent form to read and sign. The objective of the study was blinded to participants, including the assessment of NTS and the comparison between feedback and debriefing. On this day, the 45 participants received a two-hour theoretical session on NTS and on the ABCDE approach to the critical patient, followed by a half-hour briefing of the simulation room, equipment, and

simulation process.

Students were arbitrarily allocated to 15 teams (three elements each) that were randomly assigned to one of the two groups: Group 1 (eight teams) and Group 2 (seven teams). Each team participated in three different emergency scenarios with similar difficulty and opportunities to apply the selected NTS.

To assess acquisition and retention of the skills, the scenarios occurred on day one (baseline), day two (acquisition) and day 20 (retention).

Group 1 received feedback after the first two scenarios and Group 2 received debriefing. After the third scenario the discussion method was swapped, so that all participants could experience both types of post-scenario discussion.

The detailed study protocol is graphically represented in Fig. 1.

NTS selection

Three NTS were selected to be assessed: collaborative leadership, effective communication, and task management. This selection was based on the relevance of these NTS, as pointed out in several publications,[4-6] and on its potential to easily be identified and objectively measured (counted) throughout the scenario. For each NTS, two to four specific behaviors/actions were defined, as specified on Table 1.

Scenario, debriefing, and feedback considerations

Each team participated in three distinct emergency scenarios with similar challenges and opportunities to apply the selected technical skills (ABCDE approach) and NTS (collaborative leadership, effective communication, and task management). The leadership role was experienced by all team members, through rotation of the three elements of each team, in the three scenarios. All scenarios were designed to have a duration of approximately 15 minutes.

Debriefing/feedback followed a standardized structure to avoid bias and to ensure that the approach to all teams was similar. Two teams, with two experienced facilitators each, conducted the scenario and provided debriefing or feedback to each group. The same team provided all debriefings or all feedbacks, avoiding bias due to personality or style of the facilitators. Each team of facilitators was encouraged to follow, during debriefing or feedback, an orientation grid with specific indications and suggestion of questions, to ensure a standard structure among all groups throughout all days [Appendix 1 - Tables S1 and S2 (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/16898/Appendix_01.pdf)]. Both debriefing and feedback focused on the NTS selected for this study, although other skills (technical and non-technical) could be discussed, depending on the teams' educational needs.

Assessment

Teams' objective evaluation

Scenarios were recorded and subsequently evaluated, considering team rather than individual performance. The evaluation was made by an experienced and independent observer, blinded to the study, who used the scenario recordings to assess the number of times each NTS was properly applied. For that, the observer used the previously defined behaviours/actions and counted the times each team exhibited them. The total score is the sum of all adequate behaviours/actions of a team in a scenario. Total scores were obtained for each study group (debriefing and feedback), and for each day of study (days one, two and 20).

It is important to bear in mind that exchanging the discussion method after scenario three has no influence in the assessment measures, as the recordings reflect team performance before post-scenario discussion (debriefing or feedback). As illustrated in Fig. 1, day one was considered the baseline, and days two and 20 represent the team performance after receiving the same discussion type twice (either feedback or debriefing).

Individual evaluation of the post-scenario discussion

On the last day of the study (day 20), after debriefing or feedback, all participants evaluated individually the post-discussion type, considering four specific aspects: 1) Felt involved in the discussion, 2) Clear and objective discussion, 3) Adequate duration, and 4) Good use of time, using a 5-point Likert scale. The preferred method was also questioned.

Statistical analysis

Statistical analysis was conducted using IBM SPSS Statistics® software, version 24.0. Both descriptive and inferential analyses were performed. Considering the reduced sample size, non-parametric tests were used, considering a significance level of 5%.

To evaluate the differences between the three days of the study, intra- and inter-groups comparisons were carried out. Wilcoxon signed rank test (unilateral) was used to compare intra-group mean rank increases between day one and day two (acquisition), and day two and day 20 (retention). Mann-Whitney U test was used to compare the mean rank differences between the two groups, for each day and study variable.

RESULTS

The study sample consisted of 45 medical students (fifth year), 11 male and 34 female, with mean age of 23 ± 5 years.

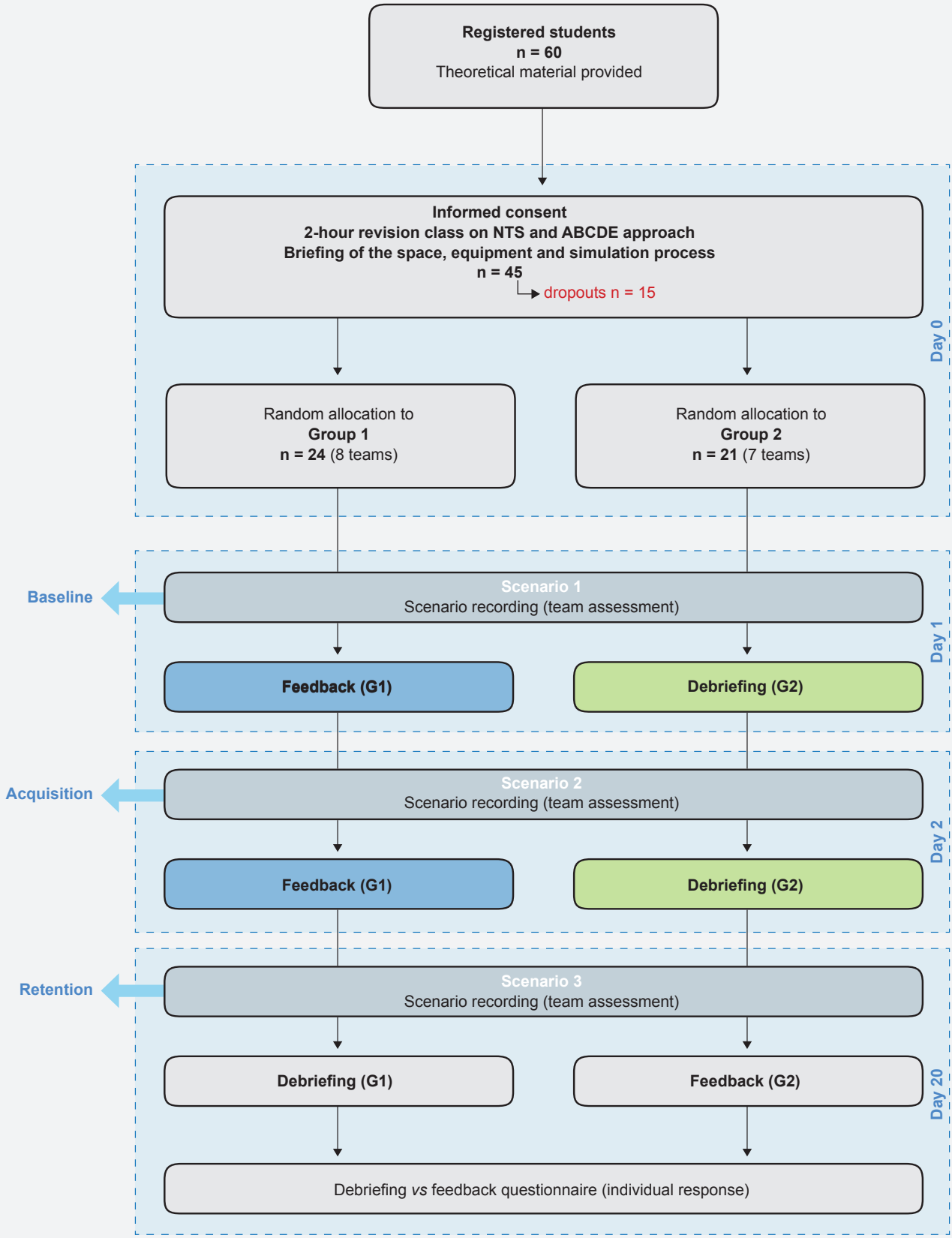

Figure 1 – Flow diagram of the study protocol

Table 1 – Selected non-technical skills (NTS) and specific behaviours/actions

NTS	Behaviour/action
Collaborative leadership	Feedback to team leader
	Offer and/or acknowledge help
Effective communication	Clear verbalization of the task/request
	Direct orders/tasks by using names or tactile/visual contact
	Close-loop communication
	Structured communication (iSBAR[a])
Task management	Use of all available resources[b]
	Adequately distributing tasks among team members (avoiding overload)

iSBAR[a]: identification, situation, background, assessment and recommendation/request;
[b]: For each scenario, specific resources were identified. Most resources were common to all scenarios (e.g. monitor, telephone, etc), although a few were specific (e.g. patient relative).

Teams' objective evaluation scores

The teams' objective evaluation scores increased remarkably between day one and day two, in both groups for all NTS (Table 2). Similarly, between day two and day 20, all scores increased, except for the leadership score, which decreased in both groups. Statistically significant differences were observed between days one and two, for all variables, and between days two and 20 for leadership (both groups), communication (debriefing group), and task management (debriefing group).

Overall objective scores showed a mean increase between days one and 20 of 88.3% and 82.6% for the debriefing and feedback group, respectively. For both groups (feedback and debriefing), a statistically significant overall increase was observed between days one and two (acquisition), with no significant differences between days two and 20 (retention) (Fig. 2).

No significant differences were observed in the intergroup scores (debriefing and feedback), on any variables or days of the study (Mann Whitney U test, $p > 0.05$).

Individual evaluation of the post-scenario discussion

Feedbacks had an average duration of 15 minutes (SD: 3 minutes) and debriefings of 25 minutes (SD: 4 minutes). The participants' assessment on specific aspects of post-scenario discussions was highly positive, for both types of discussion. Most participants agreed or completely agreed that they felt involved in the discussion (Debriefing - 98%, Feedback - 87%), that the discussion was clear and objective (Debriefing - 96%, Feedback - 100%), with adequate time (Debriefing - 87%, Feedback - 87%), and a good use of time (Debriefing - 98%, Feedback - 96%).

Thirty-one students (70%) selected debriefing as their preferential post-scenario discussion method.

DISCUSSION

This study explored the impact of debriefing and feedback, as post-scenario discussion methods, on the acquisition and retention of non-technical skills, using a sample of medical students. A secondary objective explored students' preferred discussion method.

Both debriefing and feedback showed to be equally beneficial in the acquisition and retention of NTS. The teams' objective scores showed, for both methods, a statistically significant increase in the number of adequate behaviours/actions from day one to day two (acquisition), and a

Table 2 – Teams' objective scores (Mean ± SD) for the selected NTS

NTS		Day 1	Day 1 to Day 2 variation	Day 2	Day 2 to Day 20 variation	Day 20
Leadership	G1 (Fe)	6.43 ± 2.31	+ 35.6%*	8.71 ± 1.79	- 27.0%*	6.86 ± 2.01
	G2 (De)	5.57 ± 1.33	+ 67.5%*	9.33 ± 2.70	- 25.6%*	7.43 ± 3.09
Communication	G1 (Fe)	11.42 ± 3.46	+ 81.3%*	20.71 ± 4.41	+ 17.7%	24.38 ± 8.45
	G2 (De)	11.43 ± 4.38	+ 80.8%*	20.67 ± 6.19	+ 15.4%*	23.86 ± 4.46
Task management	G1 (Fe)	3.57 ± 0.93	+ 128.0%*	8.14 ± 2.65	+ 6.0%	8.63 ± 1.24
	G2 (De)	3.71 ± 0.46	+ 97.6%*	7.33 ± 0.77	+ 5.2%*	7.71 ± 1.62
Overall	G1 (Fe)	21.43 ± 4.06	+ 75.3%*	37.57 ± 6.31	+ 4.2%	39.14 ± 10.95
	G2 (De)	20.71 ± 4.34	+ 80.3%*	37.33 ± 4.96	+ 4.5%	39.00 ± 6.84

*: $p < 0.05$, statistically significant for the unilateral Wilcoxon test
The scores represent the number of times correct behaviours/actions were observed. The percentage represents the relative increase/decrease between the study days. G1 (Fe): Group 1 (Feedback); G2 (De): Group 2 (Debriefing).

Figure 2 – Teams' overall objective scores, in the three days of the study. Vertical lines represent the standard deviation. Percentage represents the relative increase between the study days.

*: Significant differences [Wilcoxon test (unilateral), $\alpha = 0.05$]

sustained mild increase from day two to day 20 (retention). On day 20, a mean of 39 adequate behaviours/actions were observed per scenario, in both groups. Worth notice is the higher standard deviation of the feedback group (~11) when compared with the debriefing group (~7). Given that feedback is a more directive type of discussion, it may not engage and reach all participants in the same manner, thus potentiating the observed higher dispersion in the scores.

Leadership was the NTS with a less prominent increase from day one to day two, and the only NTS with a decrease from day two to day 20, in both types of discussion. This can be due to the bias from the rotation of the leadership role associated with the inexperience of our participants in this role. Medical students tend to have very limited opportunities to develop leadership skills[29] and are only given the opportunity to make decisions in a controlled learning environment. How and when these skills should be included and stimulated in medical pre-graduated training deserves future reflection.

Communication was the variable with the highest number of correct behaviours/actions, accounting for more than 60% of the total, for both debriefing and feedback. Since communication is a central skill[30] that encompasses and supports all other NTS, this result is not surprising and confirms its importance in effective teamwork.

Task management was the variable with the lowest mean absolute counting in day one and in day two, but with the highest relative change (double or more) between these days. A marginal increase was observed between day two and day 20. This shows considerable awareness and improvement of participants' task management skills, especially on the identification and correct use of all available resources, and adequate distribution of tasks amongst the team members.

For both debriefing and feedback, most participants felt involved in a clear and objective discussion, with adequate and good use of time, although 70% of the participants selected debriefing as their preferential post-scenario discussion.

There are similarities between debriefing and formative feedback since both methods follow a pre-defined structure that reinforces positive behaviours/actions and addresses performance gaps. Differences rely mostly on its instruction/facilitation style, and dedicated time.

However, do these differences translate into different educational effects and learning outcomes?

Debriefing may provide a safer learning environment, with participants deeply engaged and open to explore and reflect on their (individual and team) actions/behaviours. Learners are more receptive to change when insights emerge from their own discoveries. Feedback, being more directive in nature, may raise tension and discomfort, thus restricting the receptivity of the learner to reflect.[31]

On the other hand, the students' limited experience and clinical contact may be an obstacle for a deeper reflection, impairing the development of individual learning objectives and their implementation into clinical practice. Time wise, feedback offers a rapid turnover, which can be relevant for institutions with a high student-educator ratio.

Our findings concur with recent studies,[18,19] which found that allying debriefing reflexive practice with a feedback directive style, and shifting appropriately between facilitation and instruction, can be a good compromise in order to achieve a timely and educationally meaningful discussion, particularly for undergraduate students. Further investigation is needed to explore the application of these findings to more experienced audiences.

Limitations

An important limitation to this study was the reduced sample. Due to time constraints, student availability, and other logistic restrictions, the sample used was small and only included medical students, which may limit the conclusions of this work. A similar study with a larger sample constituted by interprofessional teams of healthcare staff may lead to different conclusions and a broader insight on the differences and potentials of these two post-scenario discussions to specific target groups.

CONCLUSION

The present study demonstrates that both debriefing and feedback are effective as post-scenario discussion methods, promoting acquisition and retention of non-technical skills, by teams of undergraduate medical students.

ACKNOWLEDGEMENTS

The authors would like to thank the students who participated in this study. A special thanks to Maria Luísa Guedes, MD, for her relevant contribution to the study implementation.

AUTHOR CONTRIBUTIONS

CSC: Conception and design of the work, data acquisition and analysis, drafting of the manuscript.

DR: Design of the work, data acquisition and analysis, critical review of the manuscript.

MG: Data acquisition and critical review of the manuscript.

All authors have approved the manuscript version submitted.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

FUNDING SOURCES

This article was supported by National Funds through FCT - Fundação para a Ciência e a Tecnologia within CINTESIS, R&D Unit (reference UID/IC/4255/2019).

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How Anaesthesiology Helped to Fight the First Wave of the COVID-19 Pandemic in Portugal

Como a Anestesiologia Ajudou a Combater a Primeira Vaga da Pandemia de COVID-19 em Portugal

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Acta Med Port 2023 Jan;36(1):42-48 ▪ https://doi.org/10.20344/amp.18453

ABSTRACT

Introduction: The dissemination of the COVID-19 pandemic in Europe, namely in Portugal, demanded an organizational and clinical reaction from the Portuguese National Health Service. With the unpredictable impact of COVID-19 infected patients redefining hospital logistics, reducing non-priority elective care and extending the hospital capacity for critical care patients made mobilizing a significant part of human resources a priority. We conducted a national survey to monitor the contribution and the role of anaesthesiologists belonging to the 53 Portuguese National Health Service hospitals in the first wave fight against the pandemic.

Material and Methods: This prospective cross-sectional observational study used a weekly survey sent to the Directors of the Anaesthesiology Departments of all Portuguese National Health Service hospitals, between the period of 13th April and 21st June 2020. Directors were asked about human resources, hospital logistics, anaesthetic activity and residency programs in their departments as well as contingency plans facing the impact of the pandemic growth in the PNHS.

Results: Contingency strategy for all Portuguese National Health Service hospitals planned for a total of 1524 level III critical care beds during the initial phases of the pandemic, an increase of 151% from the existing 607 level III critical care beds in Portugal in January 2020. This re-configuration effort of the Portuguese National Health Service was only possible due to the partial or total suspension of non-urgent elective activity that reached over 90% of these institutions in the first pandemic months (March and April) and the deployment of anaesthesiologists from their normal activities to the treatment of critical care patients. During the peak of the first pandemic wave, 209 anaesthesiology specialists and 170 trainees (22.9% of the total anaesthesiologist's staff in the Portuguese National Health Service) were deployed in critical care. There was an almost complete interruption of the residency program rotation in 70.4% of hospitals with anaesthesiology residents, between March and April 2020.

Conclusion: During the first pandemic wave there was an effective and fast reorganisation of the Portuguese National Health Service in order to increase level III critical care beds, which might have contributed to the low mortality rates in Portugal. We believe that this could have also been a result of the contribution given by all public anaesthesiology departments.

Keywords: Anesthesiology; COVID-19; Critical Care; Health Personnel; Health Planning

RESUMO

Introdução: A disseminação da pandemia por COVID-19 na Europa, designadamente em Portugal, exigiu uma resposta clínica e organizativa por parte do Serviço Nacional de Saúde português. Com o imprevisível impacto da COVID-19 nos doentes infectados, foi prioritário redefinir a logística hospitalar, reduzir a prestação de cuidados electivos não prioritários, e estender a capacidade hospitalar ao tratamento do doente crítico, mobilizando uma parte significativa dos recursos humanos. Utilizou-se um inquérito nacional que permitisse monitorizar a contribuição que os anestesiologistas pertencentes aos 53 hospitais do Serviço Nacional de Saúde tiveram no combate à COVID-19 durante a primeira vaga da pandemia.

Material e Métodos: Estudo observacional transversal de tipo prospectivo, baseado num inquérito semanal enviado aos directores dos Serviços de Anestesiologia de todos os hospitais do Serviço Nacional de Saúde, entre 13 de abril e 21 de junho de 2020. Foi solicitada informação relativa aos recursos humanos, logística hospitalar, atividade assistencial, programa de formação pós-graduado, assim como plano de contingência face ao crescimento da pandemia.

Resultados: O plano de contingência hospitalar nos hospitais do Serviço Nacional de Saúde previu um total de 1524 camas de cuidados intensivos de nível III, o que corresponde a um crescimento de 151% das 607 camas existentes em janeiro de 2020. Esta reconfiguração dos hospitais do Serviço Nacional de Saúde só foi possível devido à suspensão parcial ou total da atividade eletiva não prioritária que afectou mais de 90% das instituições hospitalares nos primeiros meses da pandemia (março e abril), e à mobilização dos anestesiologistas das suas atividades eletivas para o tratamento do doente crítico. Nos piores momentos, esta mobilização envolveu 209 especialistas e 170 internos de especialidade (22,9% do total destes profissionais nos hospitais do Serviço Nacional de Saúde). Por outro lado, registou-se uma interrupção quase total do programa de formação pós-graduada em mais de 70,4% dos hospitais com esta idoneidade formativa, de março a abril de 2020.

Conclusão: Durante a primeira vaga da pandemia houve uma rápida reorganização do Serviço Nacional de Saúde que poderá ter contribuído para a baixa taxa de mortalidade em Portugal. Os autores acreditam que para esse resultado poderá ainda ter contribuido a ajuda dada pelos serviços de Anestesiologia do Serviço Nacional de Saúde.

Palavras-chave: Administração de Recursos Humanos; Anestesiologia; COVID-19; Cuidados Intensivos; Planeamento em Saúde

INTRODUCTION

In December 2019, 27 patients who had been at the Huanan seafood market, in the Chinese Province of Wuhan were reported to have a severe viral pneumonia.[1] This disease caused by the severe acute respiratory syndrome coronavírus type 2 (SARS-CoV-2) was defined by the World Health Organisation (WHO) as

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Recebido/*Received*: 20/04/2022 - **Aceite/*Accepted*:** 22/06/2022 - **Publicado *Online*/*Published Online*:** 29/07/2022 - **Publicado/*Published*:** 02/01/2023

coronavirus disease 2019 (COVID-19), according to the International Committee on Taxonomy of Viruses.[2] On the 30th January 2020, the WHO declared the COVID-19 epidemic as a public health emergency of international concern – PHEIC, and on the 11th March declared it as a pandemic disease.

The first cases in Portugal were reported on the 2nd March 2020, and the first death on the 17th March. The Portuguese Government implemented a State of Emergency on the following day.[3] The Portuguese Directorate General of Health (DGS) announced the beginning of the mitigation phase on the 26th March 2020 in order to control disease dissemination due to the existence of community transmission.[4] On the 30th March 2020, the Portuguese Government decided to raise the containment measures, replacing the State of Emergency with the State of Calamity with a bi-weekly periodic evaluation, beginning on the 4th May.[5]

Due to the high transmissibility rate[6] COVID-19 quickly spread in Portugal, forcing hospitals of the Portuguese National Health Service (PNHS) to undergo a logistic reconfiguration and to establish separate circuits and specific areas for the diagnosis and treatment of these patients. By ministerial order on the 16th March, it was decided that CEO's of all public hospitals should suspend, as much as possible, all non-urgent elective care activity that, by its nature or clinical priority, was not life limiting, or limiting for an individual prognosis.[7]

The hospital re-configuration of areas providing separate circuits (for patients awaiting COVID-19 testing results; for COVID-19 positive patients; for COVID-19 negative patients), and suspension of non-urgent elective care, led to a re-organisation of anaesthesiology departments. Due to the functional competence and versatility recognised in anaesthesiologists it was not surprising that these professionals were rapidly mobilised to reinforce Intensive Care Unit (ICU) medical teams, to lead and organise new ICUs, and to see them involved in the Emergency department or areas that are usually under the responsibility of intensive care medicine doctors.

The Board of the Portuguese College of Anaesthesiology developed a national survey to monitor the contribution of this speciality in the fight against the first wave of the pandemic in Portugal.

MATERIAL AND METHODS

Ethics committee approval for this study was not required because no animals or patients were involved. In addition, and for the same reasons, it was not necessary to obtain any patient consent.

This prospective cross-sectional observational study was based on a weekly survey sent to the Directors of the Anaesthesiology departments of all 53 PNHS public hospitals (including the hospitals of the Autonomous Regions of Azores and Madeira and the Armed Forces Hospitals in Lisbon and Porto), asking for a characterisation of the department and the hospital with data relative to January 2020, and to add weekly information between the week beginning on Monday 13th April, until the week beginning on Monday, 21st June 2020. These would allow the continuous monitoring of all changes ocurring in those institutions for 10 weeks.

Regarding hospital characterisation, the data requested included human resources (number of staff, anaesthesiologists and residents), logistics (number of level III & II critical care beds; number of operating rooms; number of remote locations where anaesthesiologists performed anaesthesia outside operating room; number of post-anaesthetic care unit beds; and number of ventilators), anaesthetic activity (non-urgent elective care in operating rooms or outside it, anaesthesia and pain consultations), teaching activity, and the impact of COVID-19 on absenteeism among anaesthesiologists due to SARS-CoV-2 infection or to quarantine, were all analysed. There was a focus on collecting data related to contingency planning, based on the capacity to increase the number of level III critical care beds. Finally, the implementation of good practices, such as the creation of separate patient circuits, testing admitted patients to hospital, testing patients undergoing surgery, creation of dedicated operating or delivery rooms, use of high efficiency particulate air (HEPA) filters, and use of adequate masks and proper personal protective equipment (PPE), were also included in the weekly survey.

RESULTS

Fifty-three PNHS surgical public hospitals were included, representing all the public hospital network, including the three hospitals from the Autonomous Regions of the Azores and only one from Madeira Island, and the two Hospitals of the Armed Forces in Lisbon and Porto.

The 47 public hospitals in mainland Portugal are regionally distributed according to five main health administrative regions with: 15 hospitals in the North; 10 hospitals in the Centre; 16 in the Lisbon and Tagus Valley region; four in Alentejo; and two in Algarve.

Hospital characterisation in January 2020, regarding human resources, logistics, and anaesthesia and teaching activity is presented in Table 1.

In order to prepare for the impact of the first pandemic wave (March and April 2020), PNHS hospitals underwent reorganization to give priority to the treatment of COVID-19 infected patients, especially those needing critical care. For this purpose, PNHS hospitals, foreseeing the likely possibility to more than twice the number of level III critical care beds

existing in Portugal, developed contingency plans to avoid chaotic situations like those occurring in Italy, France and Spain[8,9] (Table 2).

Following the ministerial order on the 16th March 2020, that all public hospitals should as far as possible suspend all non-urgent elective care,[6] there was a reduction in the elective anaesthesia and teaching activity in the majority of anaesthesiology departments. Monitoring 10 weeks between the 13th April and the 21st June enabled the authors to analyze the behaviour of the clinical and teaching activity

Table 1 – Hospital characteristics in January 2020, regarding human resources in anaesthesiology, logistics and anaesthetic and teaching activity (n = 53)

Hospital characterisation in January 2020		n	%
Human Resources	Total	1719	
	Anaesthesiologists from departments of Anaesthesiology	1192	69.3%
	Anaesthesiologists from other departments (ICU, Pain Clinic, ...)	67	3.9%
	Residents of Anaesthesiology	460	26.8%
Logistics	Hospitals with ICU	42	79.2%
	Number of Level III ICU beds	607	
	Number of Level II ICU beds	490	
	Number of Level II ICU beds equipped with ventilator	124	25.3%
	Total number of operating rooms	622	
	Number of operating rooms exclusively dedicated to emergency	91	14.6%
	Number of remote locations or room for procedures	223	
	Number of remote locations or room for procedures equipped with ventilator	149	66.8%
	Number of beds in post-anaesthesia care units	881	
	Number of beds in post-anaesthesia care units equipped with ventilator	92	10.4%
Types of Anaesthetic Services	Non-emergent surgery	53	100%
	Labour analgesia clinic	42	79.2%
	Remote location anaesthesia	49	92.5%
	Anaesthesia clinic	53	100%
	Acute pain clinic	49	92.5%
	Chronic pain clinic	47	88.7%
	Teaching activity	27	50.9%

ICU: intensive care unit

Table 2 – Impact of contingency plans developed in Portuguese National Health Service (PNHS) public hospitals to fight COVID-19, involving anaesthesiology (n = 53)

Contingency planning to fight COVID-19 involving anaesthesiology		n	%
Contingency planning	Director of Anaesthesiology knows that there is a contingency planning	52	98.1%
	Director of Anaesthesiology was involved in the contingency planning	38	71.7%
	Hospitals that planned an increase in level III ICU beds	47	88.7%
	Total number of level III ICU beds in the final phase of contingency planning	1524	151.1%
Anaesthetic involvement	Anaesthesiology department is part of the contingency planning	44	83.0%
	Assuming tasks in ICU	35	66.0%
	Assuming tasks in Emergency Room	26	49.1%
	Assuming Internal Medical Emergence	27	50.9%
	Assuming coordination in endotracheal intubation teams	37	69.8%
	Assuming leadership in new ICU	26	49.1%
	Not involved in COVID-19 fighting	4	7.5%

ICU: intensive care unit

Table 3 – Reduction in elective anaesthetic and teaching activity

Reduction in the elective anaesthetic and teaching activity	Week of April 13th to 19th		Week of May 11th to 17th		Week of June 15th to 21st	
	n	%	n	%	n	%
Elective surgery (n = 53)	51	96.2%	32	60.4%	6	11.3%
Remote location anaesthesia (n = 49)	39	79.6%	26	53.1%	7	14.3%
Anaesthesia clinic (n = 53)	50	94.3%	30	56.6%	12	22.6%
Acute pain clinic (n = 49)	24	49.0%	19	38.8%	5	10.2%
Chronic pain clinic (n = 47)	44	93.6%	22	46.8%	6	12.8%
Teaching activity (n = 27)	19	70.4%	8	29.6%	2	7.4%

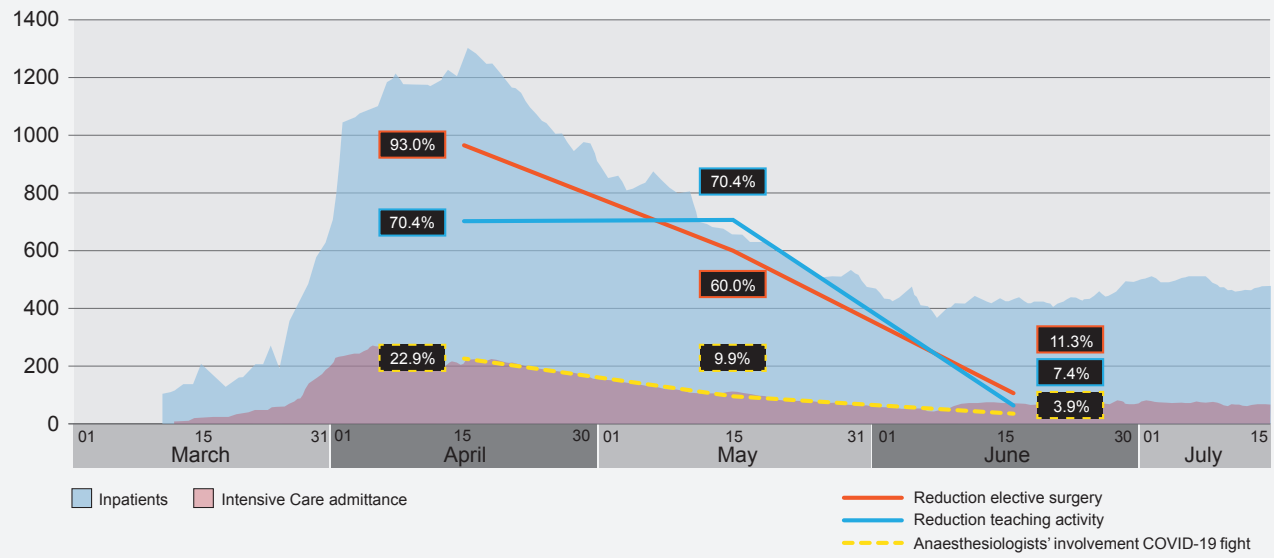

Figure 1 – Relationship between patient admissions with surgical and teaching activity or anaesthesiologists' involvement

Table 4 – Involvement of anaesthesiologists in the fight against COVID-19, during first wave

Involvement of anaesthesiology staff in COVID-19 fighting	Week of April 13th to 19th		Week of May 11th to 17th		Week of June 15th to 21st	
	n	%	n	%	n	%
Anaesthesiology departments with staff dedicated to COVID-19 fight (n = 53)	31	58.5%	25	47.2%	12	22.6%
Anesthesiologists dedicated to COVID-19 fight (n = 1192)	209	17.5%	89	7.5%	34	2.9%
Anaesthesiology residents dedicated to COVID-19 fight (n = 460)	170	37.0%	74	16.1%	32	7.0%

responses as the pandemic evolved, in different time periods (Table 3). The first situation point coincides with the first lockdown (April 13th to 19th), the second situation point coincides with resumption of surgical activity (May 11th to 17th) and the third situation point with the return of full surgical activity (June 15th to 21st), after the end of the first wave.

Figure 1 shows a direct relationship between the increase of the number of admitted patients with SARS-CoV-2 in hospitals and an increase in the suspension of elective anaesthetic activity, interruption of teaching activity, and involvement of anaesthesiologists in several tasks related directly or indirectly with COVID-19 patients, as shown in Tables 2 and 3.

The impact of the involvement of anaesthesiologists in the pandemic first wave is described in Table 4, especially during the month of April.

Table 5 points out the number of affected anaesthesiology staff, with COVID-19 disease or quarantine, during the studied period, again with more impact in the month of April.

With the passage of time and our increasing knowledge

Table 5 – Affected anaesthesiologists during first wave COVID-19

Affected anaesthesiology staff during first wave COVID-19	Week of April 13th to 19th		Week of May 11th to 17th		Week of June 15th to 21st	
	n	%	n	%	n	%
Anaesthesiologists infected with COVID-19 (n = 1192)	23	1.9%	3	0.3%	2	0.2%
Anaesthesiology residents infected with COVID-19 (n = 460)	4	0.9%	1	0.2%	0	0.0%
Anaesthesiologists in quarentine (n = 1192)	18	1.5%	9	0.8%	2	0.2%
Anaesthesiology residents in quarentine (n = 460)	2	0.4%	2	0.4%	1	0.2%

of the disease, it was possible to identify and implement a set of good practices that enabled the prevention of further spread of the disease and the increase of both patient and healthcare professional safety (Fig. 2).

In the first pandemic wave, between the 3rd March and the 15th July 2020, Portugal had 47 426 patients infected with SARS-CoV-2 virus, and 1677 deaths with COVID-19, with a mortality rate of 3.5%.[10] Until June 2022, it is estimated that Portugal has had over four million infected with SARS-CoV-2 virus and 22 583 deaths with COVID-19, with a mortality rate of 0.56%. This corresponds to the 41st highest in the World.[11]

DISCUSSION

The need to tackle the COVID-19 Pandemic led to an urgent hospital re-configuration, with the creation of separate circuits (for patients awaiting COVID-19 testing results; for COVID-19 positive patients; for COVID-19 negative patients), nurseries and ICUs dedicated to COVID-19 infected and COVID-19 free patients, and the re-organisation of hospital human resources needed to face these new constraints.

Confronted with this new devastating pandemic, the first issue was the expansion of the number of level III critical care beds, considering the fact that it was already known that the number in Portugal was clearly insufficient for the

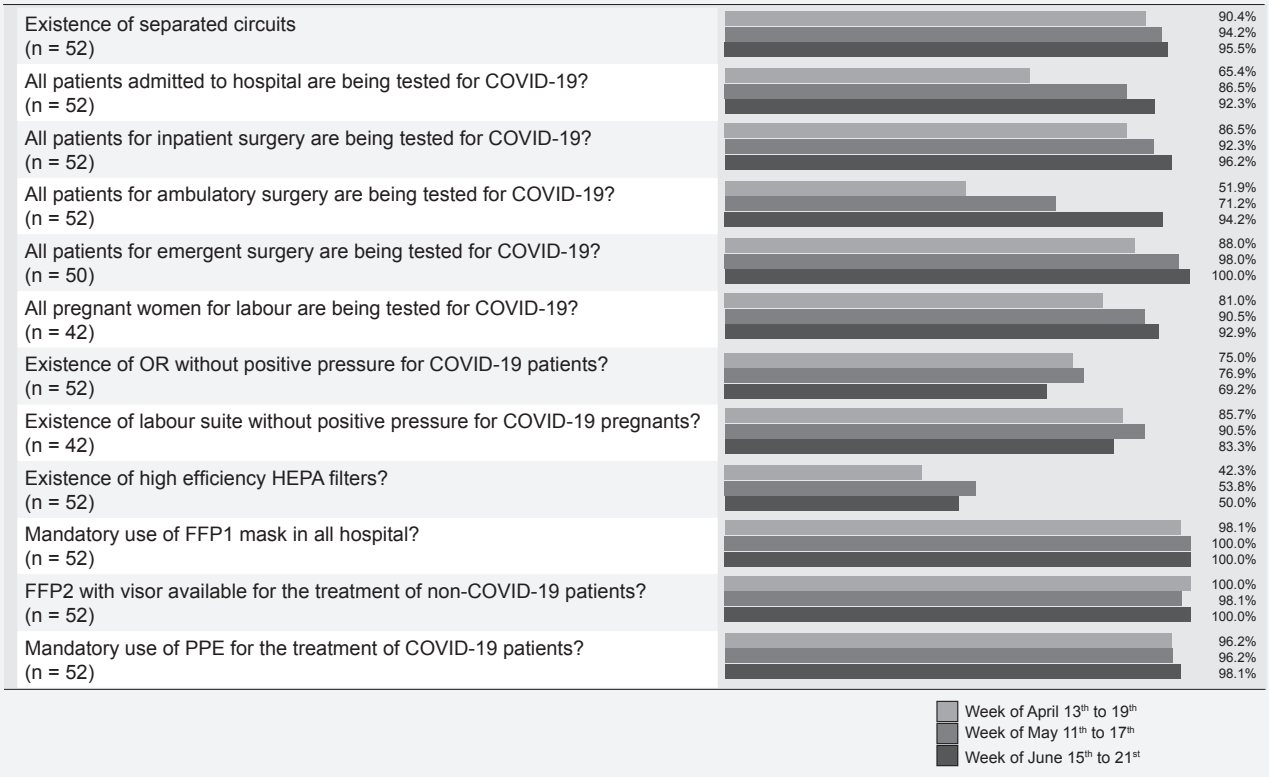

Figure 2 – Hospital implementation of good practices to fight COVID-19

OR: operating room; FFP: filtering face piece; PPE: personal protective equipment; HEPA: high effciency particulate air

treatment of the critical care patients on a regular basis. The authors found that, in January 2020, Portugal had 607 level III critical care beds, which meant a rate of six beds per 100 000 population, which was much lower compared with other European countries like Germany (35.3), Croatia (33.5) or Austria (26.4) and similar to countries like Sweden (5) or Denmark (6.4).[12] According to the contingency plans, it was possible to predict, for the final stages, a total of 1524 level III critical care beds, which meant a 151.1% increase (corresponding to a ratio of 15.24 beds per 100 000 patients), and which was more aligned with rates in the majority of Central European countries.[12]

The extra level III critical care beds were provided in several areas within hospitals. The use of areas already equipped with ventilators and monitors such as post-anaesthesia care units (PACU) or operating rooms was common even though the contingency plans of some hospitals supported the use of other ward areas. With this sudden expansion came the need to re-allocate human resources for these areas.

These healthcare professionals came from those areas where non-urgent elective activities were suspended (some surgical wards, operating rooms and PACU). In relation to the deployment of Anaesthesiology staff, this targeted, at the worst times of the first pandemic wave, 209 specialists and 170 trainees (22.9% of the total anaesthesiology staff based on the 1192 anaesthesiologists and 460 trainnees available in PNHS Hospitals), in the week of the 13th to the 19th April. These results were similar to those reported in other countries like the United Kingdom.[13] Kursumovic *et al*[13] found the overall impact on national anaesthesia staff to be a 29% loss in January 2021 (due to redeployment to critical care, non-patient facing roles, shielding, self-isolation, quarantine and sickness as a result of COVID-19).

These anaesthesiology specialists were involved in different scenarios, not only in ICU areas (old and new units), but also in internal and external emergency departments, or assuming coordination in endotracheal intubation teams, as happened in other countries.[14] Trainees had their residency programs suspended and in most cases were redeployed to triage zones of accident and emergency departments, or even in wards for the treatment of COVID-19 patients. For this reason, their internships at national level were postponed for two months to compensate for the suspension of their residency program. Anaesthesiology was one of the medical specialties most exposed to the front-line fight against this pandemic and it turned out to be one of the most affected medical specialties (by infection or confinement) by the SARS-CoV-2 virus, at least in Portugal.

As in other countries, we found difficulties in equipping new ICUs due to the global shortage of ventilators and monitoring equipment. For that reason, operating rooms and PACU areas were transformed and adapted into new ICU facilities to increase the critical care capacity nationwide.

The need to increase the response to COVID-19 patients led to a substancial reduction in non-urgent elective activity, affecting, especially in April, all, except four, PNHS hospitals. This was also observed in several countries around the world.[15-17] This was particularly noticed in elective surgery, remote locations, and anaesthesia and chronic pain clinics, where almost all planned activities ceased.

The reduction in all non-emergent procedures during the first pandemic wave was also due to the fear of acquired SARS-CoV-2 infection in hospitals and the risk of increasing the perioperative risk of morbidity and mortality. One large study estimated the 30-day mortality for those patients with peri-operative SARS-CoV-2 infection to be 23.8%, with worse outcomes in those undergoing emergency surgery (25.6% *vs* 18.9%).[18]

The above reasons led to the cancellation of millions of surgical procedures worldwide. The COVIDSurg Collaborative estimated that over 28 million surgical procedures in 190 countries would be cancelled in the pandemic peak period.[19]

To mitigate the spread of the viral infection and increase the safety of patients and heath professionals, hospitals felt the need to implement a set of good pratices: separate patient circuits, patient testing at hospital admission or before surgery, creation of dedicated operating and delivery rooms, use of HEPA filters, and use of adequate masks and proper PPE. This was not all readily available in the beginning, due to the overwhelming demand worldwide. However, there was a positive evolution towards its implementation as the impact of the pandemic grew.

Finally, our data illustrates very clearly that anaesthesiologists (and of course other healthcare providers working in operating theatres) were crucial in the critical care response to the pandemic.

This study has some limitations since it only gives a limited picture about the impact of the pandemic in the first wave. Although in hindsight this first wave was not the most dramatic in terms of number of patients infected or deaths, it nevertheless demanded a quick and effective response from the PNHS. In the face of the unpredictable fight that was to come against the pandemic it allowed the PNHS to be prepared for future pandemic waves.

CONCLUSION

The COVID-19 pandemic has placed a substantial strain on PNHS around the country. However, the effective reorganisation of the PNHS with restriction of elective surgeries that enabled the expansion of critical care resources to accommodate the increased COVID-related demands, resulted in Portugal having a low mortality rate during the first wave and allowed the heathcare system to be prepared for

the following pandemic waves. We believe that this could have also been a consequence of the contribution provided by all public anaesthesiology departments.

ACKNOWLEDGEMENTS

Authors want to thank all Directors of the Anaesthesiology Departments that helped to collect data for the present study and Ian Jackson for his helpful suggestions in the preparation of the present manuscript.

AUTHOR CONTRIBUTIONS

PL: This author helped design and conduct the study, helped with data collection and analysis, and drafted the manuscript.

AG, APM, CB, CL, JM, JSP, NS, RA, SC, VA: These authors helped design and conduct the study, helped with data analysis, and revised the manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

PL: President of the Anesthesiology Board at Ordem dos Médicos. President of the General Assembly of the Associação Portuguesa de Cirurgia Ambulatória. Treasurer of the Portuguese Association for Development and Education in Anaesthesia.

AG, APM, CB, CL, JM, NS, RA, SC: Member of the Anesthesiology Board at Ordem dos Médicos.

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FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ACTA MÉDICA PORTUGUESA
A Revista Científica da Ordem dos Médicos

Expert Perspectives on the Management of Alpha 1-Antitrypsin Deficiency

Perspetivas dos Especialistas na Gestão da Deficiência de Alfa 1-Antitripsina

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Acta Med Port 2023 Jan;36(1):49-54 ▪ https://doi.org/10.20344/amp.18497

ABSTRACT

Alpha 1-antitrypsin deficiency is an inherited autosomal codominant disorder, which predisposes patients to lung and/or liver disease. Even though it is considered rare, it is one of the most frequent genetic disorders worldwide, albeit remaining underdiagnosed. Several organizations and societies, including the Portuguese Society of Pulmonology have been elaborating guidelines and recommendations for the diagnosis and management of alpha 1-antitrypsin deficiency. Nevertheless, some important matters are yet to be included in those, mainly due to lack of robust scientific evidence, and continue to represent a point of discussion. This article reviews some important scientific publications and expresses the perspectives of a group of Portuguese experts regarding the management of alpha 1-antitrypsin deficiency, namely in terms of the pre and neonatal diagnosis, the impact of the COVID-19 pandemic, the validity of replacement therapy in lung transplant-receiving, and finally, alternative strategies of alpha 1-antitrypsin deficiency treatment to improve the patients' quality of life.
Keywords: alpha 1-Antitrypsin; alpha 1-Antitrypsin Deficiency

RESUMO

A deficiência de alfa 1-antitripsina é uma doença hereditária autossómica codominante que aumenta a predisposição para o desenvolvimento de doença pulmonar e/ou hepática. Esta doença, embora seja considerada rara, é um dos distúrbios genéticos mais comuns em todo o mundo. Contudo, atualmente ainda constitui uma doença subdiagnosticada. Várias organizações e sociedades, incluindo a Sociedade Portuguesa de Pneumologia, elaboraram recomendações e diretrizes para o diagnóstico e gestão da deficiência de alfa 1-antitripsina. Porém, estes documentos ainda não abordam alguns temas relevantes associados à gestão da deficiência de alfa 1-antitripsina, principalmente devido à falta de robustez na evidência científica, que continuam a representar um ponto de discussão entre a comunidade médica. Neste artigo é feita a revisão de publicações científicas relevantes acerca da deficiência de alfa 1-antitripsina, e são descritas as perspetivas de especialistas portugueses sobre a gestão da deficiência de alfa 1-antitripsina, nomeadamente ao nível do diagnóstico pré e neonatal, do impacto da pandemia COVID-19, da validação da terapêutica de aumento em doentes que receberam um transplante pulmonar e, por fim, estratégias alternativas para a melhoria do tratamento da deficiência de alfa 1-antitripsina de modo a promover a qualidade de vida dos doentes.
Palavras-chave: alfa 1-Antitripsina; Deficiência de alfa 1-Antitripsina

INTRODUCTION

Alpha 1-antitrypsin (AAT), otherwise known as alpha-1-proteinase inhibitor, is the most prevalent protease inhibitor in the human serum, which belongs to the supergene family of serpins (serine protease inhibitors), encoded by the *SERPINA1* gene, located on chromosome 14.[1-3] This 52 kDa glycoprotein is primarily synthesised by the liver (around 80%) and to a lower extent by mononuclear cells, neutrophils, broncho-alveolar and corneal epithelium, colonocytes and endocrine pancreatic cells.[1,2] As an acute phase protein, AAT responds to inflammation by neutralizing neutrophilic elastase, and therefore supressing pulmonary associated damage. This glycoprotein develops an additional important role, considering that it also behaves as a tissue repair inducer.[1,2,4]

AAT deficiency (AATD) is an inherited autosomal codominant disorder, which remains underdiagnosed.[2,5] This condition may result from various point mutations that can cause either a deficit of AAT or a loss of anti-proteolytic and anti-inflammatory function, which are associated with the development of pulmonary emphysema, hepatic disease, severe asthma, bronchiectasis, granulomatosis with polyangiitis, and less frequently, skin disorders such as panniculitis.[2-4,6-10] From a clinical perspective, AATD is a very heterogeneous condition, considering that its symptoms may appear earlier or later in life, or even never develop at all. This diversity may result not only from the individual genotype, but also from damage in the liver or lungs caused by infections or toxic agents.[2,3]

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Recebido/*Received*: 27/04/2022 - **Aceite/*Accepted*:** 20/06/2022 - **Publicado *Online*/*Published Online*:** 18/07/2022 - **Publicado/*Published*:** 02/01/2023

As for the prevalence of AATD, this condition is estimated to represent up to 5% of COPD cases.[11] Importantly, although epidemiological data are scarce in both Europe and the United States, the prevalence of AATD can be compared with that of cystic fibrosis, impacting 1:2000 to 1:5000 people.[3-5,12] Nevertheless, and in order to contribute to a better awareness of AATD and to accurately record the real impact of this genetic disorder, efforts are being made and the Portuguese medical community is currently registering their patients on the pan-European Alpha-1 Research Collaboration platform (EARCO),[13] which is supported by the European Respiratory Society and the Portuguese Society of Pulmonology.

Guidelines concerning the management of AATD have been proposed by different societies and organizations.[14-17] In Portugal, a consensus document was published in 2018 and included an extensive literature review and recommendations for the diagnosis and management of AATD.[4] However, in light of the new scientific evidence and of the current pandemic situation, the AATD patient association, as well as the medical community, felt the need to debate a few important topics. To this end, an advisory board meeting was arranged, during which a group of experts discussed the appropriateness of implementing pre and neonatal diagnosis, the impact of the coronavirus disease 2019 (COVID-19) pandemic, the importance of maintaining the augmentation therapy in patients receiving a lung transplant, and finally, strategies to improve the patient quality of life as far as AAT administration is concerned.

This article provides an overview of some important scientific publications about AATD and summarizes the perspectives of a group of Portuguese experts (all the authors) in AATD diagnosis and management, specifically their opinion about scientific publications taking into consideration their clinical expertise about AATD. Briefly, data on the new scientific evidence about ATTD and strategies that can improve AAT administration was presented at this meeting (17th September 2021) and, afterwards, the experts debated about AATD diagnosis and management according to the scientific evidence and their clinical expertise.

EXPERT PERSPECTIVES

Pre or neonatal diagnosis of AATD

Even though AATD is the most frequent genetic lung disease in the Caucasian population, it remains underdiagnosed and only a modest proportion of patients are detected with this condition.[18]

The relevance of early diagnosis, pre or neonatally, has been a matter of discussion. Even though it is acknowledged that early identification of AATD enables those individuals to implement preventive therapeutic or lifestyle measures which may protect lung and/or liver damage, thus delaying the onset of disease, some ethical concerns may be raised.[4,11,19]

Prenatal diagnosis may be performed by means of an amniocentesis or chorion villi biopsy, which subsequently undergo a DNA analysis (genotyping).[19] Importantly, the collection of either of these samples is invasive and may put the viability of approximately 1% of pregnancies at risk.[20] Neonatal diagnosis, on the other hand, does not imply a mortality risk, as it can be done by drawing blood from the newborn, after which the serum levels and genotype can be assessed.[4,6] Nonetheless, the common diagnostic method of DNA analysis either by Sanger or next generation sequencing (NGS) only allows the identification of the most frequent AAT pathogenic variants, and consequently does not guarantee the detection of all pathogenic variants.[4] Even though DNA sequencing analysis of exon-intron and promoter regions is a method which allows the identification of all mutations, it cannot be used as a universal screening tool due to its costs and technological requirements.[4] Therefore, this analysis is only performed when the phenotype/genotype diverge from the biochemical analysis or from clinical manifestations.[4]

In view of the limitations and risks that the aforementioned methods imply, as well as its costs, the Portuguese experts foresee some ethical concerns regarding the implementation of a universal prenatal or neonatal screening. Firstly, the detection of AATD implies the identification of a predisposition for the development of a disease rather than the diagnosis of a disease.[3] As such, it does not mean that the individual will ever develop clinical symptoms. As previously reported by other authors, a diagnosis without the presence of symptoms may increase the psychosocial stress of those families and raise financial, social, insurance and employability uncertainties.[21] Additionally, a negative result through the currently used DNA sequencing approaches, that only identify the most common pathogenic variants, may lull the parents into a false sense of security.

Nevertheless, the group of experts recommends referring couples with a family history of severe AATD to genetic counselling, so that they can be informed about the risks and benefits of screening. For patients who have experienced a neonatal death due to AATD associated liver disease, prenatal diagnosis may be considered.

Additionally, the early detection of AATD allows the implementation of preventive measures, namely avoidance of smoking and of environmental risks, compliance with vaccination, physical exercise, adequate follow-up and eventual treatment in the early stages of the disease, which are widely recognized as being of particular importance to prevent and/or avoid the progression of pulmonary disease.[3,4,11,21] Therefore, and because non-invasive methods are available, the experts also recommend neonatal diagnosis for

those individuals who descend from couples where both parents carry an AAT pathogenic variant.

Impact of COVID-19 on AATD patients

AATD has been proposed as a risk factor for COVID-19, not only because it may facilitate the entry of the virus into host cells, but also due to an increased likelihood of lung injury and to a possible risk of developing a coagulation disorder.[22,23] In fact, 67 countries have reported a positive correlation between AATD (specifically, the genotype SZ) and COVID-19 associated mortality.[22]

In Portugal, however, the group of experts did not observe that same trend. On the contrary, most of their patients did not develop COVID-19 and, interestingly, the majority of those that became infected did not show severe disease.[24] Similarly, a survey conducted in Germany by BREATH – Member of the German Center for Lung Research (DZL) has shown that among 208 participants with AATD only six were infected with COVID-19 virus, of which none had to undergo mechanical ventilation.[25]

Several reasons may be presented to justify these observations. The lockdown, social distancing and the use of personal protective equipment are likely to have contributed to a lower exposure to the virus, hence reducing the incidence of cases in this population. In fact, during 2020, these experts observed a reduction in the frequency of COPD and asthma exacerbations, and therefore a decrease in the number of hospitalizations, indicating that all patients with respiratory diseases benefited from these preventive measures.[26]

Additionally, doctors have stressed to their patients since the beginning of the COVID-19 pandemic, the importance of adhering to their treatment regimens. As such, most AATD patients retained their treatment adherence and continued receiving augmentation therapy, even if altered to a biweekly scheme, in order to prevent lung function deterioration, which may have contributed to some kind of protection against COVID-19-associated severe disease.

Replacement treatment in transplant receiving patients

Replacement therapy with AAT has an important role in reducing lung density decline[27,28] and postponing lung transplantation, as a result of its clinical benefits in preserving lung tissue integrity.[29] Whether transplant recipients should receive exogenous AAT has been a matter of debate, due to insufficient evidence.[3,4]

A few studies have reported that patients who were not under replacement treatment prior to lung transplant showed a longer survival after lung transplant, when compared with those that had received AAT intravenously.[30,31] However, it has also been speculated that the discontinuation of AAT treatment may be associated with a rebound phenomenon, characterized by a pro-inflammatory state in the post-transplant period, which may negatively impact the outcome of those transplanted patients.[29-31] In fact, AATD patients who suffer from infections during the post-transplant period or transplant rejection present excessive inflammation and neutrophil activity.[29]

Similar post-transplant survival rates have been described between patients who received and didn't receive replacement therapy immediately after transplantation.[32] Of note, a small study showed that the reintroduction of AAT therapy immediately after lung transplantation seems safe and may have a stabilizing effect on the forced expiratory volume in one second.[33]

The validity of implementing augmentation therapy post-lung transplantation, can be further supported by AAT's immunomodulatory properties. AAT has been shown to lead to a reduction in the levels of pro-inflammatory mediators, namely tumour necrosis factor (TNF)-α and interleukin (IL)-1β, while increasing those of anti-inflammatory cytokines, thus promoting immunological tolerance.[34-36] Additionally, it also decreases neutrophil chemotaxis and adhesion, prevents cell death, and also participates in the regulation of fibrinolysis.[34-36]

Recurrence of emphysema after lung transplantation is rare and has only been described in patients who have resumed smoking.[37] In light of the current knowledge, it is appealing to think that there is benefit in continuing augmentation treatment after lung transplantation, at least in some subgroups of patients, during the peri-transplant period or during periods of clinical worsening,[38,39] in order to reduce the risk of inflammatory complications after the procedure and to prevent a decline in the pulmonary function in the healthy lungs. Presently, the role of replacement therapy in the post-transplant period is under discussion.

Improvements on the administration of AAT

The current treatment for AATD consists in the intravenous infusion of human purified AAT, administered on a weekly basis.[4] The augmentation therapy has been reported as a therapeutic strategy that is effective in slowing the progression of emphysema and safe, with a low adverse event rate.[15,27,28] Although this treatment is of major importance for the patient's well-being, it is a burden for both patients and healthcare institutions. For the hospitals and healthcare professionals, AAT administration requires a considerable amount of time for preparation and perfusion, and the outpatient clinics are often overbooked as they usually cover a wide geographical area.[40-42] Concerning the burden for patients, the frequent visits to the hospital may represent several problems, namely a threat to their health (due to exposure to viral and bacterial infections), costs due to travelling and workdays lost and impossibility to spend more than

a few days away from hospital, thus affecting holidays and travel plans.[40-42] Considering the current disadvantages to AAT administration, the group of experts discussed the existence and implementation of patient-centred alternatives with the objective of improving the patient's quality of life and adherence to treatment:

- A bi-weekly dosing strategy (120 mg/kg) has been shown to be an interesting and convenient therapeutic option, as it appears to be safe, presenting a tolerability profile similar to that of a weekly administration of 60 mg/kg,[43] and seems to be sufficient to obtain protective serum levels of AAT (> 57 mg/dL) in ZZ patients.[44] In fact, many clinicians have been considering and implementing this therapeutic regimen, and although it seems to have biochemical efficacy, there is lack of evidence concerning the long-term impact on the progression of the disease.[41,42] Indeed, since the start of the pandemic until now, some of the experts included in this group implemented a bi-weekly dosing strategy, in order to reduce contact with the hospital environment, hence protecting their patients from exposure of hospital infections. Additionally, this therapeutic scheme entails several advantages, which include higher convenience for full-time employees, reduced travel costs and the possibility of enjoying longer vacations.[41,42] Care should be taken when using this regimen in null patients (i.e. with absence of AAT levels) as though protective concentrations may not be achieved.
- Self-administration is a safe alternative commonly used in other diseases, namely haemophilia, primary immunodeficiency and hereditary angioedema,[45-47] where it has demonstrated to be well tolerated, cost-effective and to improve patients' quality of life, independence and well-being. In AATD, it has been shown that patients who self-administer AAT therapy are very satisfied, have improved independence and require limited training to self-administer independently.[48] Although the experts consider that this strategy would not suit all of their patients, it may represent a valuable option for those who are younger and still working.[49]
- Home therapy is a strategy already available in a few countries.[41,42] Alpha-1 Global initiative, a collaborative global network of Alpha 1 patient leaders, physicians, and researchers, has appealed to all European Union (EU) Member States to make this option available, with the objective of reducing the risk of AATD patients developing COVID-19.[50] The results obtained where this option was implemented revealed a positive impact, as patients felt less stressed, not only because it increased their independence relatively to a caregiver, but also because it reduced the impact of treatment on their personal and professional lives.[42] Although this strategy is currently not implemented in Portugal, the experts foresee the advantages and agree that this option would be valuable to many patients.
- Treatment provided by community health centres close to the patients' home may also be an interesting option, as it would reduce the inflow of patients into hospitals and the burden to hospital healthcare professionals. Therefore, the experts consider that this strategy could represent a feasible alternative, whilst also having a positive impact on patients, who would not have to travel long distances to their treatment centre, hence reducing costs and saving time.
- The upcoming new presentations of 4 g and 5 g vials of AAT concentrate may also improve the convenience of treatment either at the hospital setting, at home or during a self-administration approach. Considering that it will allow, in most cases, the preparation and infusion of a single vial, this alternative will certainly reduce the time and costs of preparation, as well as facilitate the administration handling.

CONCLUSION

The advisory board meeting organized for this group of experts to discuss recent scientific evidence and concerns raised by the Portuguese association of AATD patients resulted in a compilation of important suggestions for the improvement of diagnosis and management of AATD. The group of experts considers that their clinical experience and their perspectives explained in this article may help other colleagues and, more importantly, may have a significant impact on preventing a decline in the pulmonary function of AATD patients and improve their quality of life.

ACKNOWLEDGEMENTS

Medical writing assistance was provided by EP Health Marketing, S.L., Portugal, funded by CSL Behring.

AUTHOR CONTRIBUTIONS

CG: Project coordination. Conception, design and drafting of the manuscript.

BC, FC, JG, APL, MAM, OR, CS, LS, MS: Design and drafting of the manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

COMPETING INTERESTS

BC, FC, JG, CG, APL, MAM, OR, CR, LS and MS report financial support by CSL Behring through EP Health Marketing, S.L., Portugal for medical writing assistance.

BC, FC, JG, CS, MS and CG participate on a Data Safety Monitoring Board/Advisory Board of CSL Behring.

BC, MS, JG and FC received consulting fees from CSL Behring.

MS, APL, OR, JG, FC, MAM and CG received payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing or educational events from CSL Behring.

MS, FC and CR: received support for attending meetings and/or travel from CSL Behring.

MS received support from Grifols.

The authors stated that there are no other conflicts of interest.

FUNDING SOURCES

This manuscript is the consensus resulting from an Advisory Board Meeting. CSL Behring funded medical writing support.

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ACTA MÉDICA PORTUGUESA
A Revista Científica da Ordem dos Médicos

An Uncommon Presentation of Pheochromocytoma in Neurofibromatosis Type 1 and the Importance of Long-Term Follow-Up

Uma Apresentação Rara de Feocromocitoma na Neurofibromatose Tipo 1 e Importância do Seguimento a Longo Prazo

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Acta Med Port 2023 Jan;36(1):55-58 ▪ https://doi.org/10.20344/amp.16604

ABSTRACT

Neurofibromatosis type 1 (NFT1) is a disease caused by mutations in the tumor suppressor gene *NF1*. It is associated with a higher incidence of chromaffin cell tumors which are usually adrenal, unilateral and benign. The presence of these tumors during pregnancy is extremely rare and frequently associated with fatal outcomes. We report the case of a female patient with NFT1, who presented with paroxysmal spells of headache, palpitations, dizziness and pre-cordial discomfort, starting immediately after the delivery of her third child. Diagnostic work-up came to reveal a bilateral pheochromocytoma and the patient underwent bilateral adrenalectomy. Over 12 years after the initial surgery, metastatic disease was diagnosed, and a reintervention was performed. This is a rare presentation of bilateral malignant pheochromocytoma in a patient with NFT1, with postpartum occurrence of the first symptoms. This text focuses the important details and challenges found at each stage of diagnosis and follow-up.
Keywords: Neurofibromatosis 1; Pheochromocytoma

RESUMO

A neurofibromatose tipo 1 (NFT1) é uma doença causada por mutações no gene supressor de tumor *NF1*. Está associada a uma maior incidência de tumores de células cromafins que geralmente são adrenais, unilaterais e benignos. A presença destes tumores durante a gravidez é extremamente rara e com frequência associada a resultados fatais. Relatamos o caso de uma doente com NFT1, que apresentou crises paroxísticas de cefaleias, palpitações, tonturas e desconforto pré-cordial, com início imediatamente após o parto de seu terceiro filho. A investigação diagnóstica revelou feocromocitoma bilateral e a doente foi submetida a adrenalectomia bilateral. Mais de 12 anos após a cirurgia inicial, foi diagnosticada doença metastática e efetuada reintervenção. Esta é uma apresentação rara de feocromocitoma maligno bilateral numa doente com NFT1, com ocorrência pós-parto dos primeiros sintomas. Este texto foca detalhes e desafios importantes encontrados em cada fase do diagnóstico e acompanhamento.
Palavras-chave: Feocromocitoma; Neurofibromatose 1

INTRODUCTION

Neurofibromatosis type 1 (NFT1) is an autosomal dominant disease that results from germline mutations in the tumor suppressor gene *NF1*.[1]

Pheochromocytoma is a rare tumor that originates in the chromaffin cells of the adrenal glands.[2] Several syndromes have been associated with an increased frequency of pheochromocytoma/paragangliomas.[3,4] Approximately 0.1% - 5.7% of NFT1 patients develop chromaffin cells tumors,[5] which are mostly adrenal and unilateral (93%) with metastatic disease occurring only in 7.3%.[6] The presence of pheochromocytomas during pregnancy is an extremely rare occurrence and, in most cases, the diagnosis is made in the context of hypertensive crisis with serious/fatal consequences.[7]

CASE REPORT

A 31-year-old, female patient with a clinical diagnosis of NFT1 presented with holocranial headaches, dizziness, palpitations and precordial discomfort, immediately after the delivery of her third child. The episode lasted for a few minutes and had spontaneous resolution.

Analogous episodes occurred during the following years as paroxysmal events, with no relation with exertion and reached a weekly periodicity. She started follow-up in an Internal Medicine clinic and a cardiac study was ordered with a 24-hours Holter registering elevated mean heart rate due to the presence of sudden periods of tachycardia. An abdominal computed tomography was requested, and nodular masses were seen in both adrenal glands with 5.4 x 8.9 cm on the right and 5.2 x 4.9 cm on the left, solid and with heterogenous postcontrast enhancement. Due to suspicion of pheochromocytoma, urine metanephrines and vanillylmandelic acid (VMA) measurements were requested.

At age 33, during another paroxysmal crisis, the patient presented in the Emergency Department and was admitted in order to complete the study. The requested urine tests were already available, revealing urine metanephrines > 1500 µg/24 hours (reference range-RR < 1000) and VMA 38.5 mg/24 hours (RR 1-8). An ^{123}I-metaiodobenzylguanidine (^{123}I-MIBG) scintigram was requested, which showed masses in the topography of both adrenal glands, intensely fixating the radiopharmaceutical substance. The presence of

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Recebido/*Received*: 24/05/2021 - **Aceite/*Accepted*:** 03/03/2022 - **Publicado *Online*/*Published Online*:** 08/04/2022 - **Publicado/*Published*:** 02/01/2023

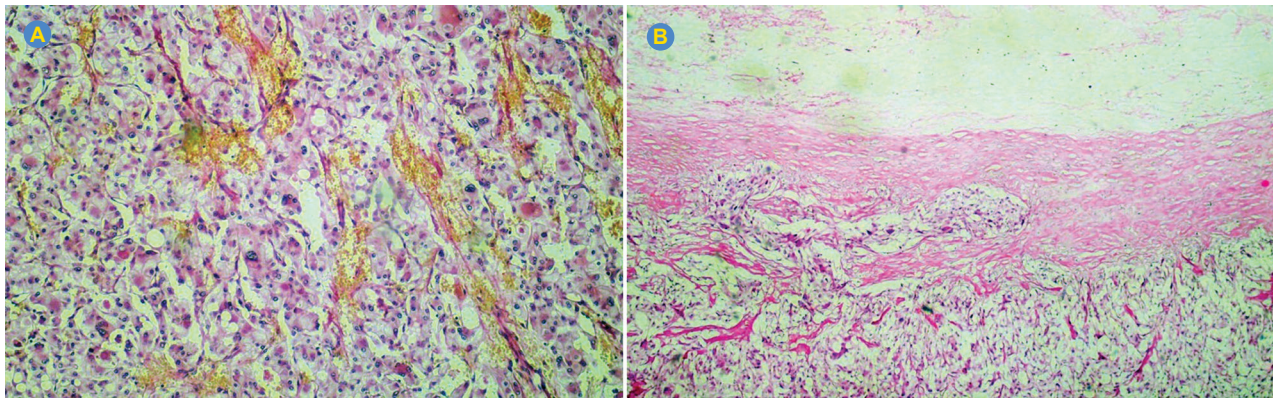

Figure 1 – (A) Left pheochromocytoma with prominent nuclear pleomorphism and high cellularity areas (100x); (B) Capsular invasion was documented on both sides (100x).

bilateral pheochromocytoma was assumed.

The patient was initiated on phenoxybenzamine and subsequently atenolol and bilateral adrenalectomy was performed a month later. During surgery, she had several hypertensive peaks that were controllable with nitroprusside, esmolol and fentolamin. In the immediate postoperative period, she was treated with stress doses of hydrocortisone and there were no significant complications. The histologic examination confirmed a bilateral pheochromocytoma with a pheochromocytoma of the adrenal gland scaled score (PASS) of four on the right and six on the left. Capsular compression, cortical gland distortion and vascular invasion were present on both sides; on the left there were areas of necrosis and cavitation, focal capsular invasion and venous tumoral embolism (Figs. 1A and 1B).

In the initial postoperative evaluation, there was normalization of the biochemical markers. She was kept under follow-up in an Internal Medicine, and later also in an Endocrinology clinic. Urinary and later fractioned plasmatic metanephrines and normetanephrine were performed yearly and

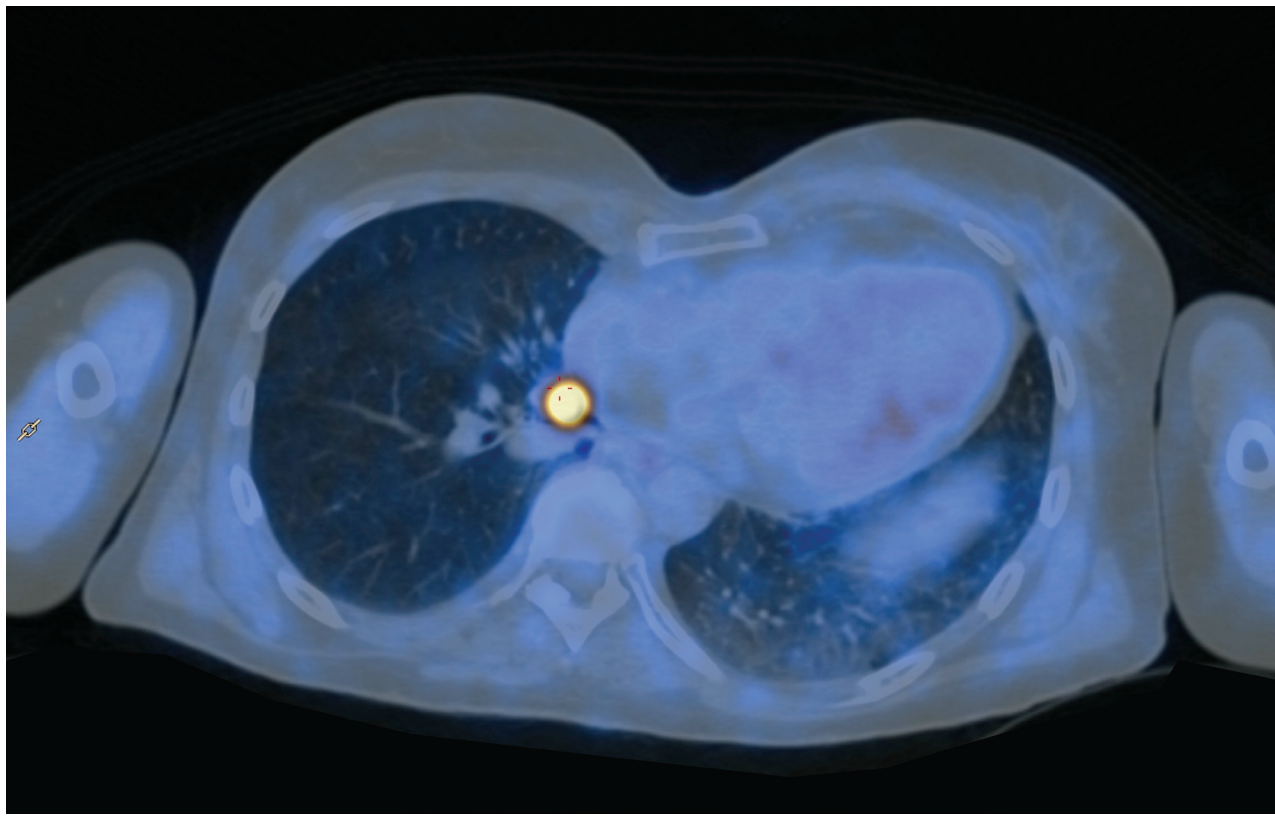

Figure 2 – FDOPA-F18 PET scan revealing a right broncho-hilar nodular formation with intense F-DOPA uptake suggestive of either a neuroendocrine tumor or a pheochromocytoma lymph node metastasis

were within the reference range during the first 13 years postsurgery. Cervico-toraco-abdominal computed tomography alternating with magnetic resonances were performed every 1-2 years and the results were unremarkable, except for the detection, seven years after surgery of residual left adrenal tissue. The possible coexistence of other endocrinopathies was also screened and no other significative abnormalities were found.

At 47 years of age, a thoracic magnetic resonance imaging revealed a right side 16x19 mm nodular lesion. Recent biochemical markers were unremarkable, a few months later, however, a *de novo* elevation of plasma metanephrine (185.7 ng/mL, RR < 60) and normetanephrine (247.9 ng/mL, RR < 120) was detected and confirmed in another sample. A fluoroDOPA-F18 positron emission tomography (FDOPA-F18 PET) scan documented a right broncho-hilar nodular lesion with intense F-DOPA uptake, suggesting a neuroendocrine tumor/pheochromocytoma lymph node metastasis (Fig. 2).

After a 15-day period of presurgical preparation, the broncho-hilar lesion was excised. The procedure was uneventful. The histologic examination revealed a well-defined lesion, partially covered by a thickened fibrous capsule, consisting of nests of cells with marked pleomorphism and evident nuclei, with occasional figures of mitosis. Neoplastic cells showed strong and diffuse expression of chromogranin, synaptophysin and succinate dehydrogenase subunit B (SDHB). Ki67 was < 1%. Thus, a metastasis of pheochromocytoma was confirmed (Fig. 3).

In the first biochemical control post-surgery the patient displayed normal plasmatic metanephrines (20.5 pg/mL; RR < 60) and normetanephrines (116.3 pg/mL, RR < 120). The FDOPA-F18 PET performed seven months later did not suggest local or metastatic disease.

Currently, 24 months after surgical excision of the bronchial metastasis, the patient is clinically well, without biochemical abnormalities or imaging signs suggestive of neoplastic recurrence.

DISCUSSION

The diagnosis of pheochromocytoma/paragangliomas is challenging due to the frequently non-specific clinical presentation.[8,9] These tumors entail a high risk of complications and limiting screening to symptomatic NFT1 patients may leave some cases undiagnosed,[10–12] with some authors currently suggesting systematic screening.[6,10]

The hypertensive crisis that our patient experienced immediately after parturition was most likely the first overt manifestation of the tumor. This postpartum presentation occurred without overt prior symptoms and, more importantly, it did not have major consequences, which contrasts with most cases of undiagnosed chromaffin cell tumors during pregnancy described in the literature.[7]

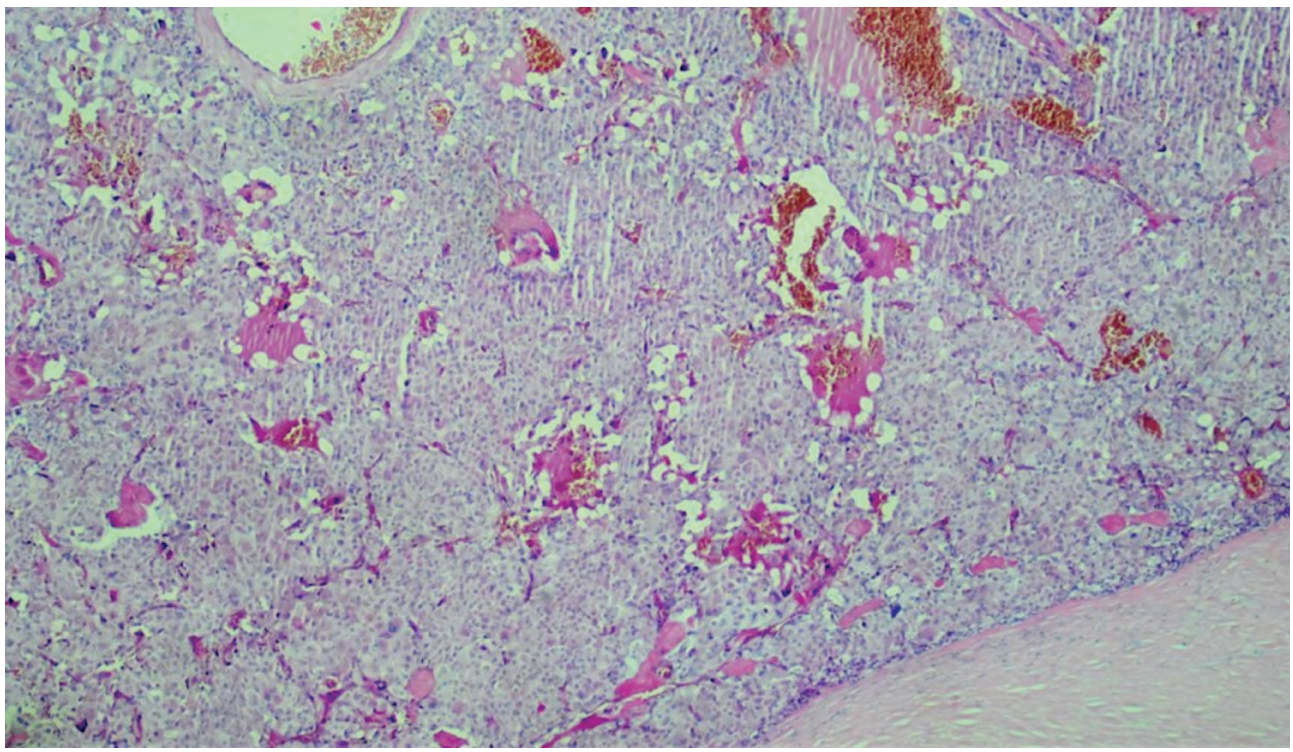

Figure 3 – Pheochromocytoma metastasis on the right broncho-hilar region partly surrounded by a fibrous capsule (inferior right corner, 40x)

Our patient had an adrenal epinephrine and normetanephrine secreting tumor, as is common in NFT1[5,13]; however, she presented bilateral malignant disease which is unusually seen in these patients.[6]

Surgical resection is the cornerstone of therapy and presurgical preparation with α-blockage is standard treatment to avoid intraoperative hypertensive crisis.[8] Despite presurgical blockage, our patient experienced some periods of hemodynamic instability during the first surgical procedure. In fact, possibly due to its secretory profile, pheochromocytomas in patients with NFT1 have been associated with a more unstable hemodynamic course.[14]

In the presented case, the first histological report of necrosis and vascular invasion depicted worrisome prognostic signs. The fact that a remainder of the left adrenal was identified might also have contributed to metastatic disease, however no signs of local recurrence were documented. Our patient developed metastatic disease over 12 years after the initial tumor resection and interestingly the asymptomatic presentation of the metastatic disease sharply contrasted with the florid clinical picture associated with the primary tumor. These aspects support current recommendations for lifelong clinical, biochemical and imagiological follow-up of pheochromocytomas/paragangliomas in the presence of genetic disease.[13]

On an important note, the presence of syndromic disease is demanding for the patient, and exhaustion in maintaining follow-up may occur. Therefore, patient education and support is essential.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Dírcea Rodrigues for her assistance in reviewing the manuscript.

AUTHOR CONTRIBUTIONS

IV: Produced the initial report and performed the literature review.

VA: Reviewed the histologic samples and provided the histological images.

CM, VA, IP: Reviewed the initial reported, contributed to its scientific accuracy and assisted in creating the final version. All the authors approved the final version to be published.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

PATIENT CONSENT

Written informed consent has been obtained from the patient for publication of the submitted article and accompanying images.

COMPETING INTERESTS

All authors report no competing interests.

FUNDING STATEMENT

This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

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ACTA MÉDICA PORTUGUESA
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Venetoclax: Uma Nova Esperança para o Doente Idoso com Leucemia Mielóide Aguda

Venetoclax: A New Hope for Elderly Patients with Acute Myeloid Leukemia

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Acta Med Port 2023 Jan;36(1):59-62 ▪ https://doi.org/10.20344/amp.17770

RESUMO

A leucemia mielóide aguda (LMA) é uma neoplasia hematológica caracterizada pela proliferação clonal, com incidência crescente com a idade. A LMA com alterações relacionadas com mielodisplasia (LMA-ARM) representa um subtipo de LMA com prognóstico adverso, cujo tratamento é desafiante, sobretudo nos doentes mais idosos. Descrevemos o caso de uma doente de 77 anos com o diagnóstico de LMA-ARM, de alto risco inelegível para quimioterapia intensiva, com necessidades transfusionais frequentes. Tanto quanto é do seu conhecimento, os autores apresentam o primeiro caso clínico de LMA-ARM, em Portugal, tratado com a associação do agente hipometilante, azaciditina, e o inibidor BCL2 (venetoclax), o que foi crucial para o tratamento e sobrevivência global do doente, muito além da sobrevivência esperada.
Palavras-chave: Compostos Bicíclicos Heterocíclicos com Pontes; Idoso; Leucemia Mielóide Aguda/tratamento formacológico

ABSTRACT

Acute myeloid leukemia (AML) is a hematopoietic malignancy characterized by clonal proliferation, with increased incidence with advancing age. AML with myelodysplasia-related changes (AML-MRC) represents an AML subtype with a poor prognosis and challenging treatment, particularly in elderly patients. We report the case of a 77-year-old patient diagnosed with high-risk AML-MRC, ineligible for intensive chemotherapy, with frequent need of transfusion of red cell concentrates. The authors present, to the best of their knowledge, the first patient in Portugal with AML-MRC treated with an hypomethylating agent, azacytidine, and a BCL2 inhibitor (venetoclax), and that association was essential in the treatment and overall survival, which was much higher than expected.
Keywords: Aged; Bridged Bicyclo Compounds, Heterocyclic; Leukemia, Myeloid, Acute/drug therapy

INTRODUÇÃO

A leucemia mielóide aguda (LMA) é uma neoplasia de células hematopoiéticas[1] caracterizada por proliferação clonal, com acumulação de blastos, na medula óssea (> 20%), sangue periférico ou outros tecidos. Este processo condiciona inibição da hematopoiese normal, caracterizando-se, clinicamente, por síndrome de falência medular, com neutropenia, anemia e trombocitopenia. A idade mediana de diagnóstico é 70 anos,[2] verificando-se uma incidência crescente com a idade. A LMA com alterações relacionadas com mielodisplasia (LMA-ARM) constitui cerca de 19% de todos os casos de LMA[3] e é mais comum nos doentes idosos. Inclui tanto doentes com síndrome mielodisplásica ou mielodisplásica/mieloproliferativa prévia que evoluíram para LMA, como LMA com displasia multilinhagem, superior a 50%, ou com alterações citogenéticas relacionadas com mielodisplasia, de acordo com a Classificação da Organização Mundial de Saúde.[4]

O tratamento *standard*[5] da LMA consiste em quimioterapia (QT) intensiva de indução, seguido de QT de consolidação e/ou transplante alogénico de progenitores hematopoiéticos (alo-TPH). Contudo, os doentes com LMA-ARM apresentam frequentemente características de mau prognóstico com menores taxas de resposta à QT intensiva, devido às características clínicas do doente, como idade avançada e comorbilidades, e à biologia da doença, como a presença de alterações citogenéticas/genéticas adversas.[6] Podem, porém, ser candidatos a regimes menos intensivos, incluindo agentes hipometilantes (HMA), como azacitidina (AZA) ou decitabina, ou citarabina em baixa dose.[7]

Apesar dos recentes avanços, o prognóstico da LMA-ARM contínua desfavorável, apresentando baixas taxas de remissão completa (RC) e de sobrevivência global (SG) inferiores a 9 - 12 meses[9] na LMA-ARM. O desenvolvimento de novas terapêuticas é uma necessidade premente que tem vindo a ser colmatada nos últimos quatro - cinco anos. Os autores apresentam um caso clínico de LMA-ARM de alto risco inelegível para QT intensiva, em que a associação AZA (D1-7) + venetoclax (VEN) (D1-28), administrada em ciclos de 28 dias, foi crucial para o aumento da SG.

CASO CLÍNICO

Mulher, 77 anos, *ECOG Performance Status Scale*- 1 (*restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature*), com antecedentes de basalioma, hipertensão arterial, prótese total da anca, diverticulose cólica, referenciada à consulta de Hematologia em setembro de 2018 por neutropenia ligeira, sem outras citopenias. Referia anorexia, sem clínica infeciosa ou hemorrágica. Dois meses depois, apresentou

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Recebido/*Received*: 24/12/2021 - **Aceite/*Accepted*:** 18/03/2022 - **Publicado *Online*/*Published Online*:** 29/03/2022 - **Publicado/*Published*:** 02/01/2023

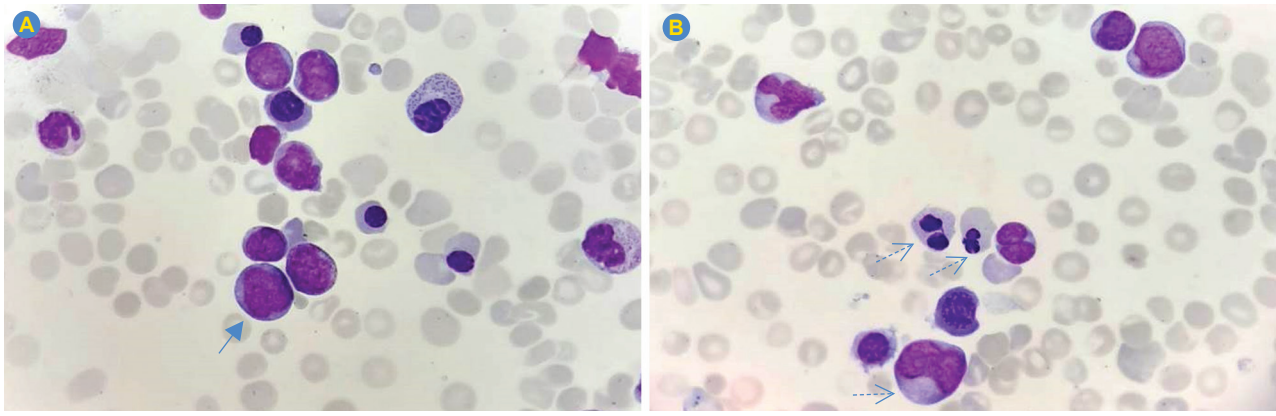

Figura 1 – Caso clínico. Estudo medular com evidência de displasia eritróide, com presença de cariorrexis, pontes internucleares (setas a tracejado) e blastos mielóides (seta).

pancitopenia: Leuc 2,3 x 10^9/L (N = 4,0 - 10,0 x 10^9/L), Neut 0,97 x 10^9/L (N = 2 - 7 x 10^9/L), Hb 9,3 g/dL (N = 12,0 - 16,0 g/dL), Plaq 121 x 10^9/L (N = 150 – 400 x 10^9/L); e blastémia de 6% (N < 0%). O estudo medular revelou displasia multilinhagem ≥ 50%, com presença de displasia eritróide, com presença de cariorrexis (fragmentação do núcleo), pontes internucleares, e displasia mielóide com segmentação anómala e assincronias maturativas; e 33% de blastos (Fig. 1); cariótipo 46,XX,i(7)(p10). A pesquisa mutacional *NPM1* e *FLT3-ITD* foi negativa. Foi estabelecido o diagnóstico de LMA-ARM, com prognóstico intermédio (ELN 2017[9]).

A doente iniciou azacitidina (AZA) inicialmente em monoterapia (quatro ciclos, na dose de 75 mg/m^2, por via subcutânea (sc), de D1-D7, em ciclos de 28 dias) com necessidades transfusionais regulares. A partir do quinto ciclo, foi associado venetoclax (VEN), sem necessidade de internamento eletivo (na dose de 100 mg em D1, 200 mg em D2 e 400 mg do D3 ao D28, no ciclo 1, e posteriormente contínuo, em ciclos de 28 dias). Apresentou dois episódios de infeção do trato urinário (ITU) por *Klebsiella pneumoniae*, com interrupção transitória da terapêutica. A associação AZA+VEN diminuiu a necessidade transfusional e, após 7 ciclos de AZA, os últimos três com VEN, é evidenciada remissão completa (2% de blastos no medulograma, cariótipo normal), de acordo com as recomendações da European Leukemia Net, 2017.[9] Depois da associação do VEN à AZA, houve redução da necessidade transfusional, com resposta hematológica. Nos meses seguintes, surgiram complicações infeciosas graves (diverticulite e abcesso abdominal), que implicaram interrupções prolongadas da terapêutica, com consequente recidiva em maio de 2020. Neste contexto, foi alterado o esquema terapêutico para citarabina (20 mg/m^2, sc, 10 dias), em associação com VEN (D1-14), que se encontra atualmente a cumprir, sem intercorrências infeciosas relevantes e com dependência transfusional ocasional. A doente completou 36 meses desde o diagnóstico de leucemia mielóide aguda (Fig. 2).

DISCUSSÃO

Nos doentes com LMA inelegíveis para quimioterapia (QT) intensiva (pela idade ou comorbilidades ao diagnóstico), os esquemas de baixa intensidade com hipometilantes têm sido associados a uma taxa de resposta reduzida (10% - 50%), com sobrevivência global mediana inferior a um ano.[7,9] Dada a dificuldade do tratamento destes doentes, novos fármacos têm sido estudados. O VEN é um potente inibidor oral da proteína anti-apoptótica BCL2, importante na sobrevivência e persistência dos blastos. Apesar dos estudos pré-clínicos terem evidenciado que o VEN induz apoptose dos blastos, o efeito em monoterapia na LMA é limitado. A combinação AZA+VEN tem mostrado efeito sinérgico em modelos pré-clínicos,[10] dado que a AZA reduz os níveis da proteína anti-apoptótica, MCL-1, e induz a expressão de proteínas pro-apoptóticas, tornando os blastos dependentes da proteína BCL2, posteriormente inibida pelo VEN. Estudos mais recentes[11] mostraram que AZA+VEN em doentes idosos com LMA de novo, sem tratamento prévio e inelegíveis para QT intensiva apresentam taxas de resposta de 76%, maioritariamente após o primeiro mês de tratamento, apresentando SG mediana aos dois anos de 51%. No que respeita ao perfil de toxicidade, este esquema apresentou um perfil de tolerância razoável, embora com maior número de episódios de neutropenia febril.[12]

A LMA-ARM corresponde a uma grande proporção dos doentes com LMA, sobretudo no idoso. O prognóstico da LMA-ARM melhora substancialmente se os doentes forem submetidos a Alo-TPH, embora apenas uma minoria dos doentes sejam candidatos, quer pela idade ou por atingirem baixa carga tumoral suficiente para seguir para Alo-TPH. O tratamento da LMA-ARM continua desafiante dada a escassez de estudos prospetivos, nomeadamente nos doentes mais idosos. Contudo, a combinação AZA+VEN ainda não foi especificamente investigada nas LMA-ARM, nem em doentes previamente tratados com HMA. É necessário um tratamento personalizado baseado nos fatores clínicos

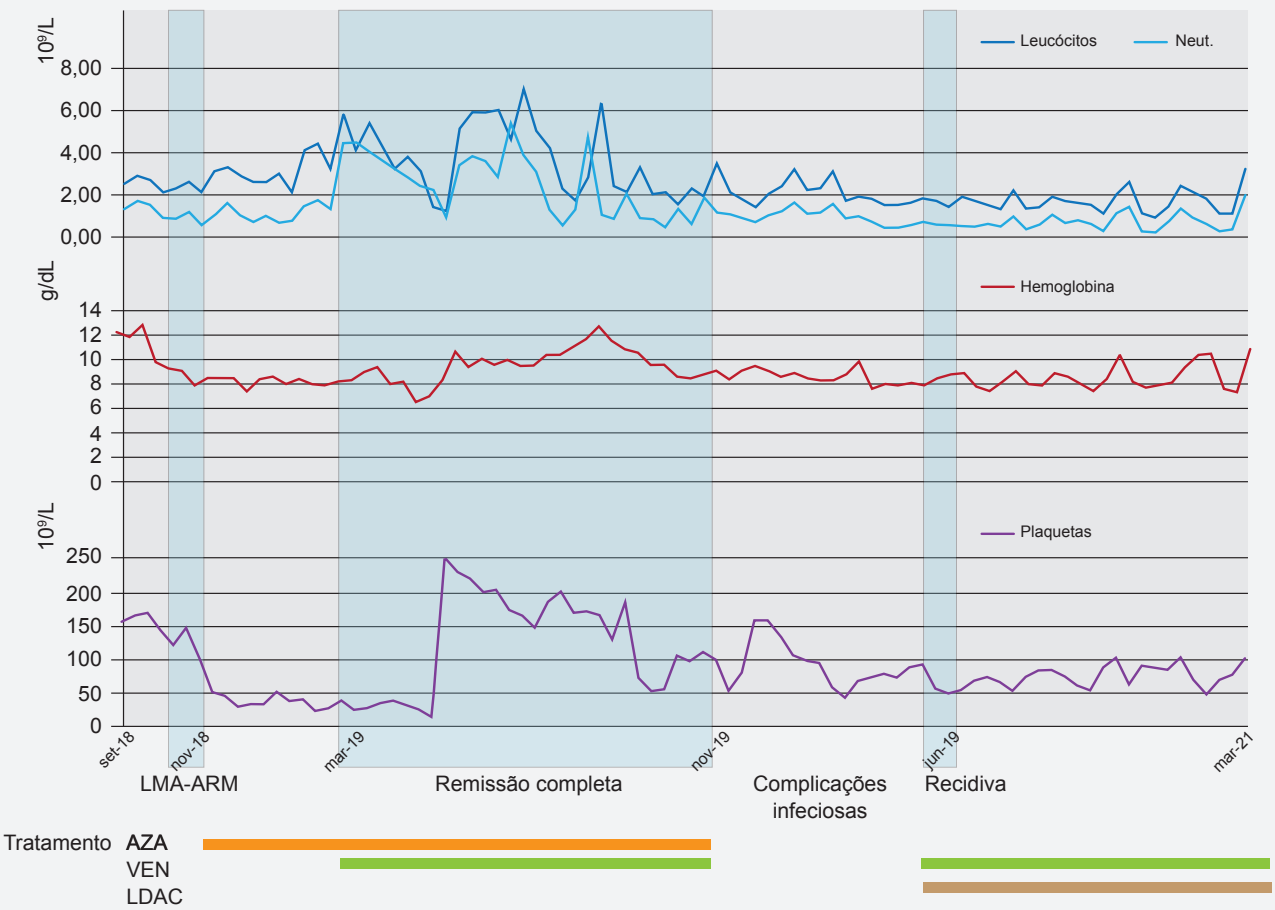

Figura 2 – Evolução clínica e analítica, em relação com o tratamento instituído.
AZA: azacitidina; LDAC: citarabina em baixa dose; LMA-ARM: LMA com alterações relacionadas com mielodisplasia; Neut: contagem absoluta de neutrófilos; VEN: venetoclax

do doente, da doença e da terapêutica prévia. O caso clínico apresentado destaca-se sobretudo pela SG mediana de 36 meses, que é significativamente superior à descrita na literatura, sendo, tanto quanto é do conhecimento dos autores, o primeiro doente tratado com AZA+VEN em Portugal. Concluindo, a associação de agentes hipometilantes ou citarabina em baixa dose com venetoclax em primeira linha em LMA, em doentes não candidatos a QT de indução, poderá vir a ser um esquema promissor.

AGRADECIMENTOS

Os autores gostariam de agradecer especialmente a todos os profissionais que também contribuíram para este trabalho, António Almeida, Sandra Marini, Ana Isabel Espadana, Teresa Rodrigues.

CONTRIBUTO DOS AUTORES

BM: Aquisição, análise e interpretação dos dados, redação do manuscrito.

CA: Aquisição, análise e interpretação dos dados.

EC: Aquisição, análise e interpretação dos dados, revisão do manuscrito.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial actualizada em 2013.

CONFIDENCIALIDADE DOS DADOS

Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação de dados.

CONSENTIMENTO DO DOENTE

Obtido.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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Pustulose Palmo-Plantar

Palmoplantar Pustulosis

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Acta Med Port 2023 Jan;36(1):63-64 ▪ https://doi.org/10.20344/amp.17018

Palavras-chave: Dermatoses da Mão; Psoríase
Keywords: Hand Dermatoses; Psoriasis

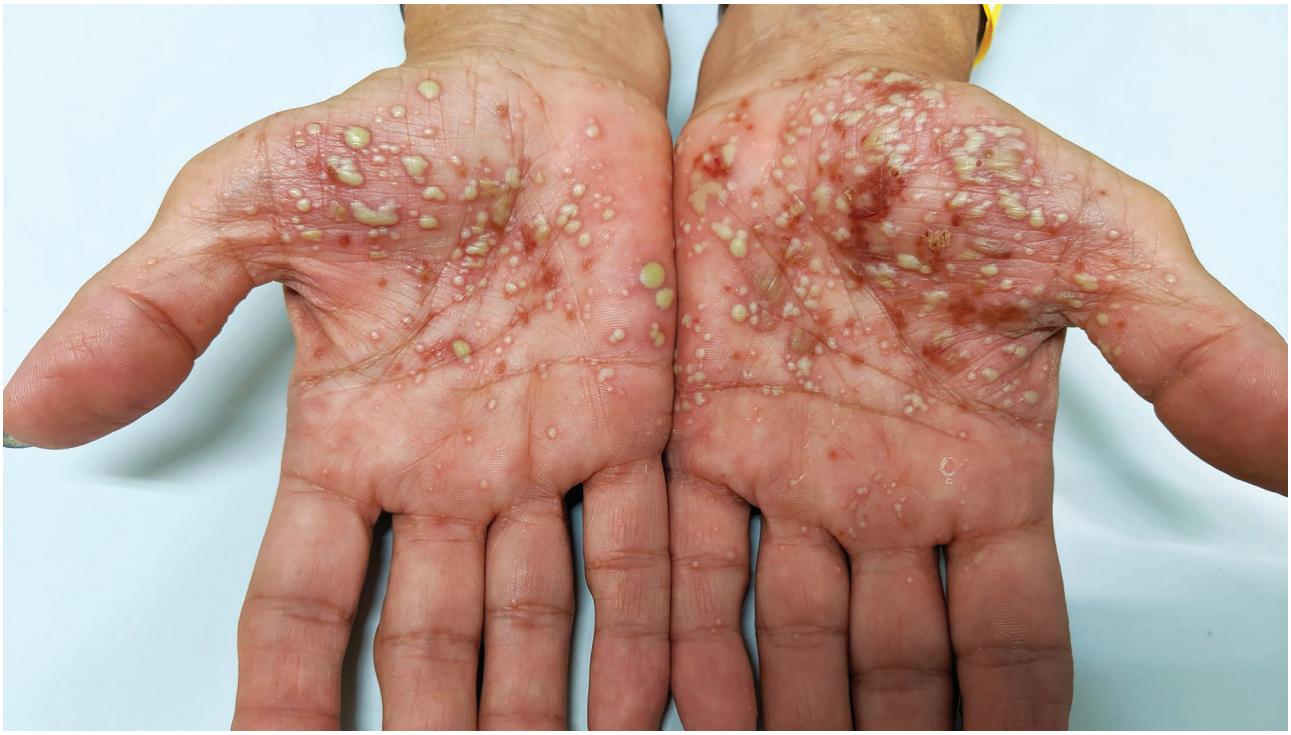

Figura 1 – Múltiplas pústulas aglomeradas e por vezes confluentes, numa base eritematosa, com algumas áreas hemorrágicas na região palmar.

Mulher de 48 anos, fumadora, que apresentava nas palmas das mãos, desde há duas semanas, múltiplas pústulas aglomeradas e por vezes confluentes, numa base eritematosa, com algumas áreas hemorrágicas associadas a prurido (Fig. 1). Não havia atingimento plantar nem outras lesões cutâneas relevantes. Negava episódios semelhantes no passado ou história familiar de psoríase.

A pustulose palmo-plantar é uma doença inflamatória rara, crónica e recorrente que afeta as palmas e/ou plantas caracterizada por múltiplas pústulas estéreis. A dermatose é debilitante e normalmente resistente ao tratamento.[1] O principal diagnóstico diferencial é a psoríase pustulosa palmo-plantar (na qual, para além das pústulas estéreis palmoplantares, surgem lesões de psoríase noutras localizações).[2] O tabagismo e infecções respiratórias superiores são os principais factores desencadeantes da pustulose-palmoplantar.[2] Não existe, ainda, um tratamento *gold standard*, que geralmente envolve agentes tópicos, fototerapia ou terapêutica sistémica (convencional ou biológica).[1]

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Recebido/*Received*: 18/08/2021 - **Aceite/*Accepted*:** 27/10/2021 - **Publicado *Online*/*Published Online*:** 03/06/2022 - **Publicado/*Published*:** 02/01/2023

do trabalho; aprovação da versão final; concorda em ser responsável por todos os aspetos do trabalho.

TT: Contribuição substancial para a concepção do trabalho; revisão crítica do manuscrito; aprovação da versão final; concorda em ser responsável por todos os aspetos do trabalho.

PROTECÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial actualizada em 2013.

CONFIDENCIALIDADE DOS DADOS

Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação de dados.

CONSENTIMENTO INFORMADO

Obtido.

CONFLITOS DE INTERESSE

Os autores declaram não ter qualquer conflito de interesse relativamente ao presente artigo.

FONTES DE FINANCIAMENTO

Não foi utilizada nenhuma bolsa ou subsídio para a realização do trabalho.

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Management of Chronic Pain: The Importance of Improving Patient Quality of Life

Abordar a Dor Crónica: A Importância de Melhorar a Qualidade de Vida dos Utentes

Keywords: Chronic Pain; Quality of Life
Palavras-chave: Dor Crónica; Qualidade de Vida

Dear Editor,

We recently read a study performed in Portugal between September 2017 and November 2018 concerning chronic pain in Primary Health Care centers. The prevalence of chronic pain was estimated to be 33.6%, with severe impact on patient quality of life. This was mainly due to musculoskeletal causes affecting the lumbar spine and lower limbs.[1]

Pain has been considered the fifth vital sign since Dr. James Campbell addressed the American Pain Society in 1995. Pain is an unpleasant sensory and emotional experience associated with current or potential tissue damage or described in terms of such damage. Chronic pain is pain that persists or recurs for longer than three months.[2] It can significantly decrease patient quality of life with physical, psychological, social, family and work consequences.

Being one of the most common causes for patients to seek healthcare services, it is considered a public health concern. In 2010, costs associated with chronic pain amounted to €4611.69 million per year, with 42.7% direct and 57.3% indirect costs, representing 2.71% of the Portuguese gross domestic product.[3] Chronic pain often leads to early retirement due to disability, high levels of absenteeism and unemployment.

Due to its consequences, pain should be recognized as a disease itself. It triggers a continuous stress response in a vulnerable body that causes suffering, physical, functional, and psychological disability, fatigue, decreased appetite, concentration difficulties, and sleep disorders, which may then lead to social isolation, hopelessness, and thoughts of death.[1]

Patients report a significant impact on quality of life ranging from difficulties in mobility and daily life activities to personal hygiene, leading to discomfort.

Chronic pain is frequently associated with other chronic comorbidities such as endocrine, nutritional, and metabolic diseases, circulatory and musculoskeletal system problems.

Pain must be identified early on and properly treated, and its management should be multidisciplinary, with chemical, physical and psychological approaches. The best strategy to prevent pain chronification requires administering adequate treatment as soon as possible.

We consider that medical education and patient literacy concerning pain prevention and its management is imperative. There should be an increasing effort regarding the implementation of pain clinics and specific chronic pain programs, both at the level of primary and secondary health care.

AUTHOR CONTRIBUTIONS

CMN, NSM: Data collection and analysis. Drafting, critical review and approval of the manuscript.

CFA: Critical review and approval of the manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Recebido/*Received*: 13/10/2022 - **Aceite/*Accepted*:** 24/10/2022 - **Publicado *Online*/*Published Online*:** 18/11/2022 - **Publicado/*Published*:** 02/01/2023

https://doi.org/10.20344/amp.19198

Perspetivas sobre o Presente e Futuro dos Registos Eletrónicos de Saúde em Portugal

Perspectives on the Present and Future of Electronic Health Records in Portugal

Palavras-chave: Informática em Saúde Pública; Portugal; Registos Eletrónicos de Saúde; Sistemas de Apoio a Decisões Clínicas
Keywords: Decision Support Systems, Clinical; Electronic Health Records; Portugal; Public Health Informatics

Caro Editor,

O artigo "Perspetivas sobre o Presente e Futuro dos Registos Eletrónicos de Saúde em Portugal" demonstra a necessidade da transposição da comunicação em saúde para a vertente tecnológica.[1] Existe uma relação entre os registos eletrónicos e a melhoria da prática clínica, com redução do número de eventos adversos inerentes a falhas de acesso à informação.[2]

Em Portugal, o investimento na área da eSaúde traduziu-se recentemente no programa Estratégia Nacional para o Ecossistema de Informação de Saúde 2020 - 2022 (ENESIS 20-22) estabelecido pelos Serviços Partilhados do Ministério da Saúde. Este programa tem como objetivo promover, dinamizar e garantir a operacionalização da evolução tecnológica da informação da saúde no âmbito do Serviço Nacional de Saúde.[2,3] O contexto pandémico recente veio reavivar a importância dos registos clínicos e da resposta tecnológica na saúde, permitindo o acesso remoto a informação para uma prestação de cuidados à distância através de teleconsulta.

A metodologia aplicada neste artigo é particularmente interessante. A divisão em três fases de desenvolvimento e o foco em seis dimensões de estudo identificadas por profissionais de saúde com prática clínica ativa (inserção de dados, armazenamento, visualização, comunicação/interoperabilidade, suporte à decisão, outro), permite aferir as principais valorizações e dificuldades dos registos eletrónicos de saúde.[1]

A utilização de acrónimos e siglas poderá traduzir um viés de informação com diferentes interpretações de resultados e de estratégias terapêuticas, pelo que é crucial a uniformização do processo de codificação.[2,3] No artigo, este tópico destaca-se como uma das principais dificuldades identificadas pelos profissionais.[1]

A amostra populacional que integrou este estudo aparentava poucos anos de experiência no campo da informática médica (6,33). A divulgação do *workshop* via *e-mail* e através de redes sociais poderá ter limitado a adesão dos profissionais com dificuldade em aceder a tecnologia informática.[1]

Numa visão futurística, considera-se importante a melhoria da integração de dados entre os elementos das equipas multiprofissionais, bem como da acessibilidade à informação clínica entre os profissionais de saúde das diferentes instituições médicas (públicas ou privadas).

Para terminar, concorda-se com a perspetiva dos autores relativamente ao escasso aproveitamento dos atuais sistemas de informação tecnológica na saúde. É imperativo o investimento formativo no setor das ferramentas digitais, com vista à potenciação dos sistemas existentes e ao empoderamento dos seus profissionais.

Congratulamos os autores pela originalidade deste estudo em Portugal, cuja temática se torna cada vez mais premente e que está diretamente relacionada com uma prática clínica segura e de qualidade.

CONTRIBUTO DOS AUTORES

ISC: Pesquisa bibliográfica, organização documental, redação inicial, aprovação da versão final.

PM: Revisão e edição final do manuscrito, aprovação da versão final.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial atualizada em 2013.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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Recebido/*Received*: 29/10/2022 - **Aceite/*Accepted*:** 08/11/2022 - **Publicado *Online*/*Published Online*:** 16/11/2022 - **Publicado/*Published*:** 02/01/2023

https://doi.org/10.20344/amp.19250

A Importância da Valorização da Saúde Mental Perinatal em Portugal

The Importance of Valuing Perinatal Mental Health in Portugal

Palavras-chave: Mães/psicologia; Perturbações Mentais; Relações Mãe-Criança; Saúde Materna; Saúde Mental
Keywords: Maternal Health; Mental Disorders; Mental Health; Mother-Child Relations; Mothers/psychology

O período perinatal, definido como o intervalo que engloba a gravidez até um ano pós-parto, representa uma fase de alto risco para o surgimento de perturbações psiquiátricas ou exacerbação de condições pré-existentes.[1,2] Estima-se que, neste período, uma em cada cinco mulheres venha a desenvolver problemas de saúde mental.[2] Contudo, e apesar do crescente protagonismo da depressão pós-parto e sensibilização para as suas consequências, a relevância de muitas outras perturbações psiquiátricas perinatais permanece ainda amplamente desconsiderada. A doença mental perinatal não tratada associa-se a elevadas taxas de morbimortalidade materna e infantil, com repercussões inevitáveis nas despesas em saúde e com grave prejuízo na qualidade de vida das mulheres e das suas famílias.[2]

Paralelamente ao impacto isolado da doença mental nas mulheres, destaca-se também o potencial efeito deletério sobre o desenvolvimento emocional, comportamental e cognitivo do bebé. Alguns dos mecanismos implicados exploram determinantes neurofisiológicos particularmente relevantes no período pré-natal, assim como aspetos relacionados com o estatuto socioeconómico e hábitos de vida das mulheres com doença mental, dos quais são exemplo a deficitária procura de cuidados de saúde pré-natais e o elevado risco de abuso de substâncias psicoativas durante a gravidez. No período pós-natal, as preocupações voltam-se para as dificuldades na vinculação entre a díade mãe-bebé e a capacidade materna de cuidado, sob risco de expor o bebé a negligência emocional ou física.[3]

Pesando as múltiplas repercussões, e considerando os avanços do conhecimento científico nesta área, torna-se premente a criação de oportunidades para discussão sobre a saúde mental materna. A abordagem destas situações pressupõe um modelo de intervenção multidisciplinar, em que a natureza e intensidade do suporte oferecido se relacionam com a complexidade e severidade da patologia em causa.[3,4] Este modelo de atuação contempla a possibilidade de orientação para serviços de Saúde Mental Perinatal diferenciados, estruturas ainda por definir em Portugal.

A atual inexistência de serviços clínicos e infraestruturas dedicados à Psiquiatria Perinatal constitui um importante entrave à adequada capacitação dos profissionais de saúde mental. Embora o programa de formação em Psiquiatria assegure a aquisição de conhecimento básico necessário ao acompanhamento da mulher no decorrer do seu ciclo de vida, a formação nesta área específica tende a ser escassa e variável.

Concluindo, salienta-se a urgente necessidade de priorizar a saúde mental materna em Portugal, através de uma mudança sistémica que facilite a esta população o acesso a cuidados especializados e a oportunidade de mitigar os devastadores efeitos da doença mental no seio familiar.

CONTRIBUTO DOS AUTORES

FP, JRPC: Redação e revisão do manuscrito.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial atualizada em 2013.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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Recebido/*Received*: 15/08/2022 - **Aceite/*Accepted*:** 07/11/2022 - **Publicado *Online*/*Published Online*:** 05/12/2022 - **Publicado/*Published*:** 02/01/2023

https://doi.org/10.20344/amp.18967

Food Allergy to Sheep's Milk Proteins with Cow's Milk Tolerance in an Adult Patient

Alergia Alimentar a Leite de Ovelha com Tolerância ao Leite de Vaca na Idade Adulta

Keywords: Adult; Anaphylaxis; Milk/immunology; Milk Hypersensitivity; Sheep
Palavras-chave: Adulto; Anafilaxia; Hipersensibilidade a Leite; Leite/imunologia; Ovinos

Allergy to cow's milk is the most common cause of milk allergy in children and in adults.[1] Most patients allergic to cow's milk also do not tolerate sheep's or goat's milk due to the considerable cross-reactivity between these milks.[1,2]

Despite being a rare disorder, especially in adults, allergy to sheep's milk should not be forgotten, especially in a country where sheep's dairy products are frequently consumed.[3]

We thereby report a case of a female adult patient with sheep's milk allergy and tolerance to cow's milk.

A 20-year-old woman described two anaphylactic reactions, one month apart, at the age of 19 (oropharynx pruritus, facial flush and angioedema, generalized urticaria and dizziness), thirty minutes after eating sheep's milk cheese. She reported tolerance to cow's milk.

The diagnostic workup included prick tests with commercial extracts (LETI Pharma, Madrid, Spain), which were negative to whole cow's milk and its fractions and positive to goat's milk (mean wheal diameter 4.5 mm). Prick to prick tests (performed with fresh food, first pricking the food and then the skin) were positive to sheep's milk (mean wheal diameter 6 mm) and sheep's milk cheese (7 mm).

Although specific IgE was negative to cow's milk and its fractions, to sheep's milk and to goat's milk, these results did not enable us to make the diagnosis because skin tests are more sensitive than specific IgE.[4]

The SDS-PAGE immunoblotting assay detected three main IgE reactive regions in the three milk extracts that were more intense in sheep's milk: an 18 kDa band, surely beta-lactoglobulin; a 29 - 34 kDa region, surely casein; and a high molecular weight region, that could be serum albumin.

The SDS-PAGE immunoblotting-inhibition results showed a total IgE binding inhibition when sheep's and goat's milk extracts were used as inhibitors, whereas cow's milk extract only inhibited the IgE binding to the 18 kDa band (Fig. 1). The lack of IgE binding inhibition detected on the 23-kDa sheep milk protein (surely casein) when cow's milk extract was used as inhibitor led us to admit the presence of serum specific IgE, which recognized epitopes from sheep casein not shared with cow casein. That could explain this patient's clinical tolerance to cow´s milk.

Our patient was diagnosed with sheep's milk allergy. We recommended avoidance of sheep's and goat's milk dairy products due to the cross-reactivity pattern detected, wrote an emergency action plan and prescribed emergency treatment with adrenaline 0.3 mg autoinjector, 40 mg oral prednisolone and 20 mg sublingual bilastine.

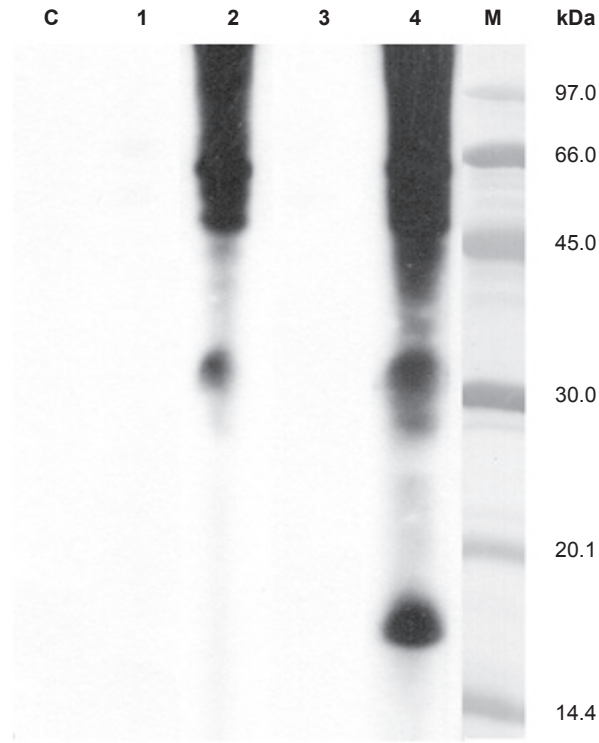

Figure 1 – SDS-PAGE Immunoblotting-inhibition results. Solid phase: sheep's milk extract. Lane C: control serum (pool of sera from non-atopic subjects). Lane 1 – 4: patient serum previously incubated with sheep's milk extract (lane 1), with cow's milk extract (lane 2), with goat's milk extract (lane 3), with sunflower pollen extract (lane 4) Lane M: molecular mass standard.

Unlike children, adult patients can tolerate cow's milk and do not acquire natural tolerance to milk of other mammals.

Long term follow-up of patients is recommended due to the high degree of homology and cross reactivity described between the proteins in the milk from different mammals so new sensitizations and new allergy symptoms could occur.

AUTHOR CONTRIBUTIONS

IMC, ARP, HF: Study design, manuscript writing and revision.

BB: Manuscript writing and revision.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

PATIENT CONSENT

Obtained.

COMPETING INTERESTS

BB: Receives monthly remuneration from Roxall España, as employee.

The remaining authors have declared that no competing interests exist.

FUNDING SOURCES

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Recebido/*Received*: 04/10/2022 - **Aceite/*Accepted*:** 21/11/2022 - **Publicado/*Published*:** 02/01/2023

https://doi.org/10.20344/amp.19153

A Idade Materna Avançada: Uma Perspetiva da Realidade Portuguesa

Advanced Maternal Age: A Perspective of the Portuguese Reality

Palavras-chave: Idade Materna; Portugal; Resultado da Gravidez
Keywords: Maternal Age; Portugal; Pregnancy Outcome

Caro Editor,

O artigo "A Idade Materna Avançada como Fator de Risco Obstétrico: Experiência Atual num Hospital do Nordeste de Espanha", apresenta a elevada prevalência de grávidas com idade materna avançada (IMA) em Espanha e salienta o surgimento de mais complicações obstétricas e neonatais associadas.[1,2] Os dados comprovam a tendência para o adiamento da maternidade nas últimas décadas, justificada por mudanças socioeconómicas e a promoção do planeamento familiar.[1]

Em Portugal escasseiam dados epidemiológicos semelhantes aos do estudo, à exceção da idade média da mãe no nascimento do primeiro filho e no nascimento de um filho que, em 2021, é de 30,9 e 32,3 anos, respetivamente, à semelhança dos dados no artigo.[1,3]

Alguns estudos demonstram que a população recorre a fontes de informação não fidedignas, apresenta escasso conhecimento dos fatores que afetam a fertilidade e sobrevaloriza o sucesso das técnicas de procriação médica assistida.[2,4] Neste cenário, é lícito questionar se o adiamento da maternidade resulta de uma escolha informada. Deste modo, reconhece-se a posição privilegiada dos Cuidados de Saúde Primários (CSP) na promoção da literacia em saúde relativa ao percurso reprodutivo e a potenciais riscos associados à IMA.

O artigo conclui que a IMA é um fator de risco para o desenvolvimento de diabetes e hipotiroidismo gestacionais.[1] Assim, deverão considerar-se estratégias que permitam a prevenção da diabetes e a deteção precoce do hipotiroidismo ao nível dos CSP. Tome-se como exemplos a sensibilização da mulher fértil para a temática da diabetes gestacional e a possível integração da hormona tiroestimulante (TSH) nos exames de rotina da grávida.[4,5] Este último baseia-se na prevalência de hipotiroidismo na Europa rondar os 5% e no seu subdiagnóstico.[6] Atendendo às implicações do hipotiroidismo no risco materno-fetal, são necessários estudos custo-eficácia para aferir a validade da avaliação da função tiroideia como parte integrante do rastreio trimestral, com vista à sua eventual implementação nas Normas de Orientação Clínica da Vigilância da Gravidez de Baixo Risco.[5]

Adicionalmente, dado o panorama atual da resposta hospitalar em Portugal e o aumento de grávidas com IMA, poderá questionar-se se o atual protocolo de seguimento destas gestantes não culminará na sobrelotação dos serviços hospitalares de Ginecologia-Obstetrícia. Assim, considera-se essencial a formação dos profissionais de saúde dos CSP de forma a permitir o seguimento personalizado desta população de mulheres, bem como o desenvolvimento de protocolos de atuação clínica atualizados e dirigidos.

Pela sua atualidade, pertinência e originalidade, o artigo revelou-se uma ferramenta útil que salienta dados relevantes em saúde. Estes incentivam à caracterização da realidade portuguesa mediante investigação dirigida, de forma a percecionar as necessidades da população e aumentar a literacia em saúde acerca deste assunto.

CONTRIBUTO DOS AUTORES

Todos os autores contribuíram igualmente para este manuscrito.

PROTEÇÃO DE PESSOAS E ANIMAIS

Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial atualizada em 2013.

CONFLITOS DE INTERESSE

Os autores declaram não ter conflitos de interesse relacionados com o presente trabalho.

FONTES DE FINANCIAMENTO

Este trabalho não recebeu qualquer tipo de suporte financeiro de nenhuma entidade no domínio público ou privado.

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Recebido/*Received*: 21/09/2022 - **Aceite/*Accepted*:** 28/11/2022 - **Publicado/*Published*:** 02/01/2023

https://doi.org/10.20344/amp.19115

PubMed

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