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Impact of the COVID-19 Pandemic on the Use of Medical Care in Mainland Portugal

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Abstract

Introduction: COVID-19 is the disease caused by SARS-CoV-2. In March 2020, the WHO announced the beginning of the COVID-19 pandemic and, since then, the world has been facing the challenges imposed by it.

Goals: To study the use of different types of medical care in Mainland Portugal and its regions, across several pandemic periods. We considered the number and variations of COVID-19 new cases, aspects related to the reorganization of healthcare services and public health measures.

Methods: We compared data from emergency room attendances, ambulance services, surgeries, outpatient appointments, and waiting times during the pandemic with similar periods from the previous 5 years, across several regions and several phases within the pandemic. In order to do so, data available in public databases from the Portuguese National Health System was used, and a correlation was established between the different types of medical care and new COVID-19 cases and public health measures.

Results: We observed an overall decrease in appointments, surgeries, emergency room attendances, and activation of ambulance services. As the pandemic worsened, and consequently, COVID-19 new cases raised and the government imposed more restrictive measures, there was a decrease in hospital care, emergency attendances, primary care follow-up and screening, and in the incidence of cancer.

Conclusion: The worsening of the pandemic and the restrictions imposed were associated with changes on the use of medical care, both by possibly leading people to avoid medical care, and by healthcare services not being able to provide an appropriate response to patients.

Keywords: COVID-19, Medical Care, Portugal, Pandemic

Resumo

Introdução: A COVID-19 é a doença causada pelo vírus SARS-CoV-2. Em março de 2020, a OMS declarou o início da pandemia COVID-19 e, desde então, o mundo tem enfrentado os desafios que esta impôs.

Objetivos: Estudar a utilização dos diferentes tipos de cuidados de saúde, em Portugal Continental e nas suas regiões, durante vários períodos da pandemia. Tivemos em consideração o número de novos casos de COVID-19 e as suas variações, aspetos relacionados com a reorganização dos cuidados de saúde e medidas de saúde pública.

Métodos: Comparámos dados relativos a idas ao serviço de urgência, acionamento de meios de emergência, cirurgias, consultas médicas dos cuidados de saúde primários e hospitalares e tempos de espera, durante a pandemia, com períodos homólogos dos 5 anos anteriores, nas várias regiões e durante diversas fases da pandemia. Para isso, utilizámos dados disponíveis em bases de dados públicas do Serviço Nacional de Saúde e correlacionamos os diferentes tipos de cuidados de saúde com o número de novos casos COVID-19 e com as medidas de saúde pública em vigor.

Resultados: Observou-se uma diminuição generalizada das consultas, cirurgias, idas à urgência e acionamento de meios de emergência. O agravamento da pandemia e, consequentemente, o aumento do número de novos casos COVID-19 e implementação de medidas de saúde pública mais restritivas, provocou uma diminuição em cuidados hospitalares, idas à urgência, novos diagnósticos e rastreios oncológicos e no acompanhamento adequado em cuidados de saúde primários.

Conclusão: O agravamento da pandemia e o aumento das restrições impostas associaram-se a um impacto na utilização de cuidados de saúde, tanto por levarem a que a população evitasse os cuidados de saúde, como pela diminuição da capacidade de prestação de cuidados adequados pelos serviços de saúde.

Palavras-chave: COVID-19, Cuidados de Saúde, Portugal, Pandemia

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List of Abbreviations and Acronyms

BI-CSP – Bilhete de Identidade dos Cuidados de Saúde Primários

COVID-19 – Coronavirus Disease 2019

DGS – Direção Geral da Saúde

GAPIC – Gabinete de Apoio à Investigação Científica, Tecnológica e Inovação

LVT – Lisboa e Vale do Tejo

SARS-CoV-2 - Severe Acute Respiratory Syndrome Coronavirus 2

WHO – World Health Organization

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Introduction

COVID-19 is the disease caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). It was first identified in the beginning of January 2020, after several cases of pneumonia of unknown etiology surged in China, during December 2019 (ProMED - International Society for Infectious Diseases, 2019). Not long after the identification of the virus, the first COVID-19-related death was reported, also in China. The virus then spread rapidly across the world, being identified in Europe by January 24th, 2020, in France (World Health Organization, 2020a), and inevitably arriving to Portugal, the first case being reported on March 2nd, 2020 (Direção Geral de Saúde, 2020a).

Due to the fast dissemination of the virus, on March 11th, 2020, COVID-19 was declared a global pandemic by the World Health Organization (WHO) (World Health Organization, 2020b), and, shortly after, the first death due to COVID-19 was reported in Portugal (Direção Geral de Saúde, 2020b).

Since the beginning of the pandemic, countries have been facing the challenge of battling the virus whilst providing adequate medical care for non-COVID-19-related illnesses. Healthcare services went through a reorganization process, with a need to allocate physical and human resources to two different circuits: one for COVID-19 and another for all other patients. This resulted in extra pressure on specialties, especially public health, primary care, emergency, internal medicine and intensive care units, which were forced to increase their capacity in a very short period of time in order to manage COVID-19 patients.

Studies from around the world have shown some of the effects this pandemic has been having on the use of medical care, such as a decline in medical appointments, hospital admissions and elective procedures and in the use of preclinical and clinical emergency care (Mulholland et al., 2020), (Vieira et al., 2020). Studies have also demonstrated an increase in the number of hospitalizations after a visit to the emergency room and in hospital mortality, which suggests a delay in the search for medical care, resulting in more severe disease presentations upon hospital admission (Lyall & Lone, 2020) (Ojetti et al., 2020).

With this study, we aimed to study the impact the pandemic has been having on the use of medical care, through several pandemic periods, in different regions of mainland

Portugal. COVID-19 activity was taken into account, as well as aspects related to measures taken by Portuguese authorities to stop the spread of the virus, aspects related to the reorganization of healthcare services and other factors that may cause variations in health care needs.

Methods

Study design and setting

We carried out an ecological study, based on pre-established hypotheses [Figure 1], with aggregated public data from the different regions of Mainland Portugal.

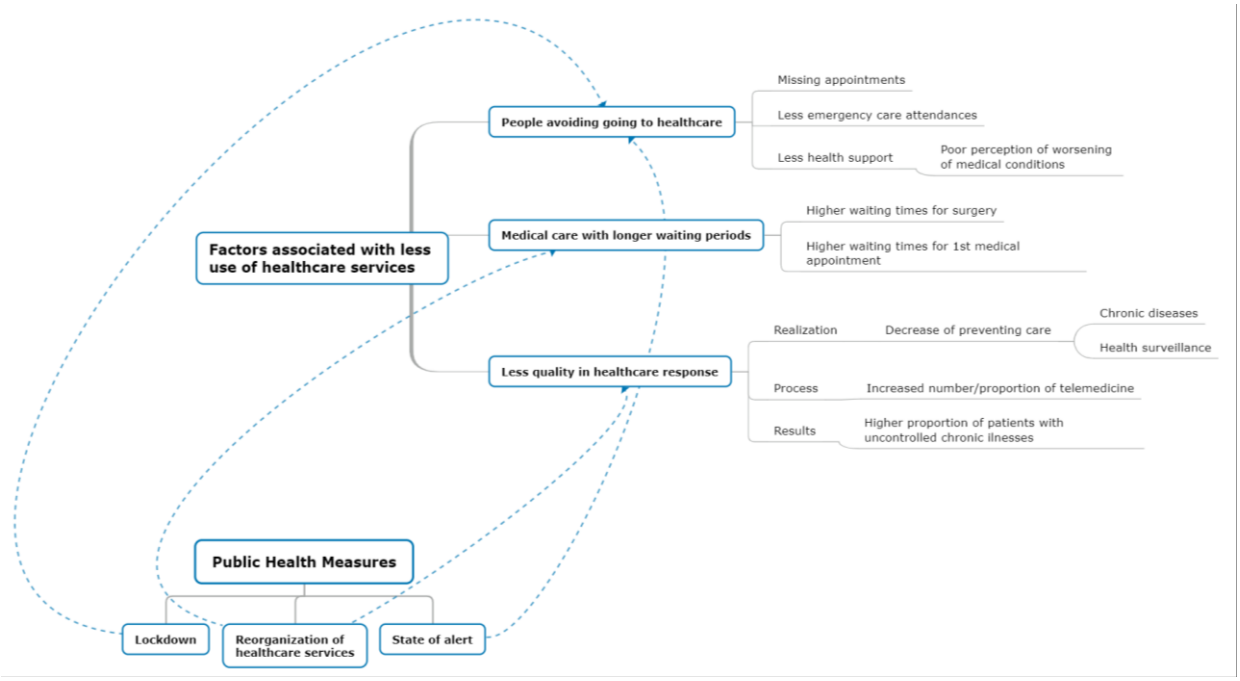


Figure 1. Conceptual model

For the analysis, we established 5 time sub-periods: a pre-pandemic sub-period – from January to February 2020 – and a pandemic sub-period divided into three-month sub-periods – March to May, June to August, September to November, and December 2020 to February 2021. Each time period was compared, when possible, with the homologous period from 2015-2019.

Variables and Data sources

We obtained anonymized aggregated data from official public databases. The data sources used this study were as follows:

Portal da Transparência. «Portal da Transparência» gathers information available across several official sources regarding a) emergency room attendances by level of the Manchester Triage System; b) use of ambulance services; c) primary care and hospital medical appointments by type; d) total number of surgeries and by type; e) waiting times for first hospital medical appointment. This data is provided for Mainland Portugal, by month and region.

BI-CSP. «Bilhete de Identidade dos Cuidados de Saúde Primários» centralizes information from Primary Care Units in Mainland Portugal. From there, we obtained data concerning indicators of chronic and cerebrovascular diseases, children's and women's health and cancer screening/new diagnoses.

DGS. On their COVID-19 portal, «Direção-Geral da Saúde» provides reports on the daily COVID-19 new cases, active cases, recovered people and deaths, at national and regional levels.

In order to study the impact of the pandemic on the use of medical care, we gathered data for Mainland Portugal, by administrative health region (ARS) – Norte, Lisboa e Vale do Tejo, Centro, Algarve, and Alentejo - and type of medical care.

The types of medical care included in this study were: a) primary care – which included data regarding in-person, remote and at-home medical appointments, follow-up of chronic diseases, incidence of stroke/thrombosis, women's and children's health, new cancer diagnoses and cancer screening; b) hospital medical care – which included first, follow-up and total appointments, the percentage of first appointments in adequate time, scheduled and urgent surgeries, and the percentage of people awaiting surgery within the maximum response time; c) ambulance services and emergency – which included the activation of ambulance services and emergency room attendances by the Manchester Triage System.

Restrictiveness Index

To study the impact of public health measures taken to stop the virus transmission, we developed a restrictiveness index [Figure 2], representing the restrictions imposed in Mainland Portugal since the beginning of the pandemic. This index considers local and national measures [Supplementary Table 3] and the percentage of the population under different levels of restriction, based on population estimates for 2019. It was calculated daily for Mainland Portugal and its regions.

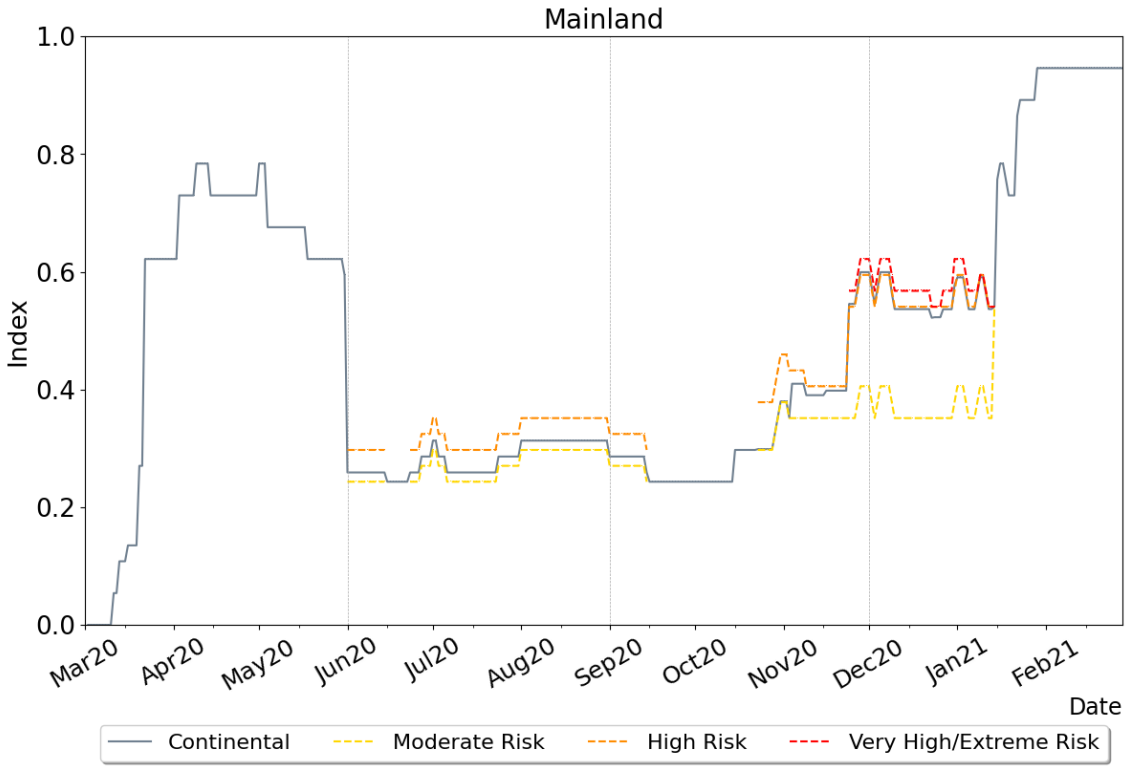


Figure 2. Mainland Restrictiveness Index, from March 2nd to February 28th. The vertical lines represent the division in periods.

Statistical methods

For all variables, we calculated the difference between the value for 2020-2021 and the mean value from the previous 5 years (2015-2019), by homologous periods, corresponding to the 4 pandemic subperiods, and for the entire period in study – from March 2020 to February 2021. To verify if the difference was statistically significant, we used the Student's t-test for data that follows a normal distribution and Wilcoxon-test for data that do not follow a normal distribution, and the difference was considered statistically significant when the p-value was inferior to 0.05.

Primary and hospital care during the pandemic period, and their difference from the previous 5 years, were correlated with the restrictiveness index, and with the number of COVID-19 new cases. When the relationship between two variables was linear, we used the Pearson linear coefficient and its *p-value*. Otherwise, the Spearman coefficient and its respective *p-value* were used. The correlation was considered significant when the *p-value* was inferior to 0.05.

During this study, R, R Studio (R version 4.0.3) and Python (version 3.8.5) were used to carry out the data analysis and to produce figures.

Results

Changes in the use of medical care during the pandemic, compared to 2015-2019

Primary Care

Appointments decreased during the whole pandemic period, which was more accentuated during the first subperiod, immediately after the beginning of the pandemic in Portugal [Figure 3]. Total appointments increased slightly due to a sharp increase in remote appointments (+12,484,439), despite the loss of 9,479,715 in-person (-46.2%) and 82,391 at-home appointments (-42.4%). However, the increase in total appointments was not statistically significant [Supplementary Table 4].

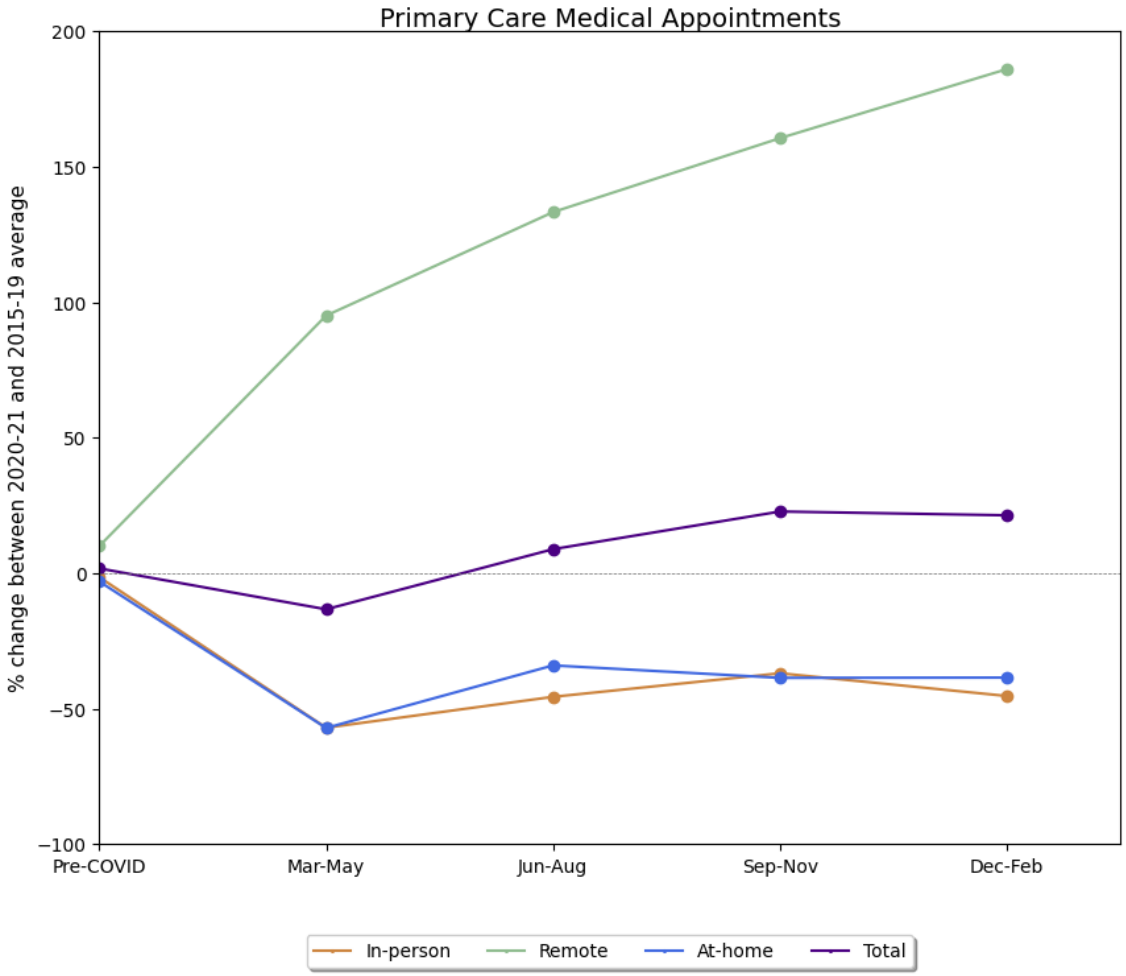


Figure 3. Evolution in the number of primary care appointments according to the type of appointment, compared to homologous periods from 2015-2019.

The follow-up of chronic diseases and the incidence of stroke/thrombosis decreased throughout all subperiods [Figure 4], resulting in a loss of adequate follow-up of 22.3% for patients with diabetes, 9.2% for those with hypertension and 20.7% less diagnoses of stroke/thrombosis.

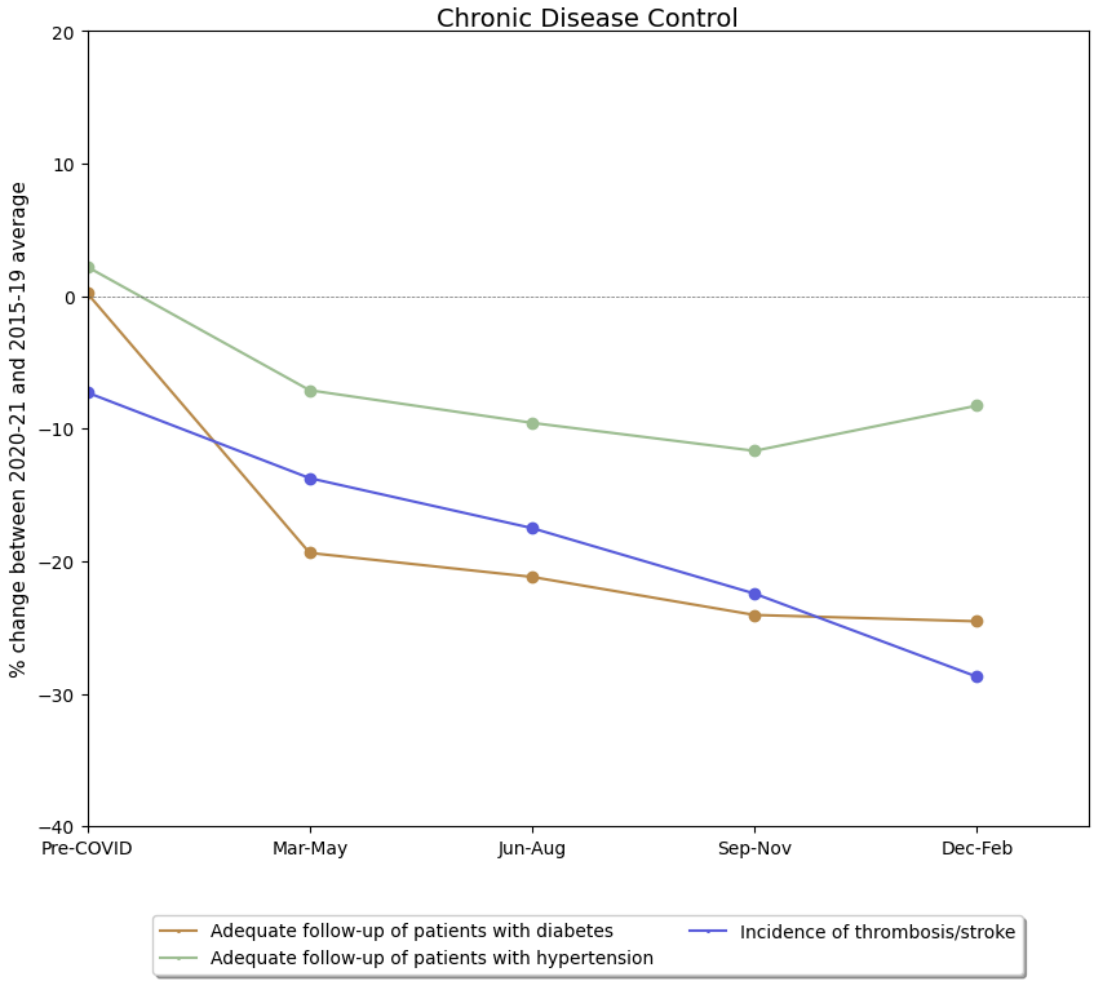


Figure 4. Evolution in adequate follow-up of chronic diseases and in the incidence of thrombosis/stroke, compared to homologous periods from 2018-2019.

Children's health appointments remained similar to previous years, with no statistically significant difference [Supplementary Table 4]. Follow-up in women's health had a slight decrease throughout all the subperiods [Figure 5], which was, however, only statistically significant for adequate follow-up in family planning.

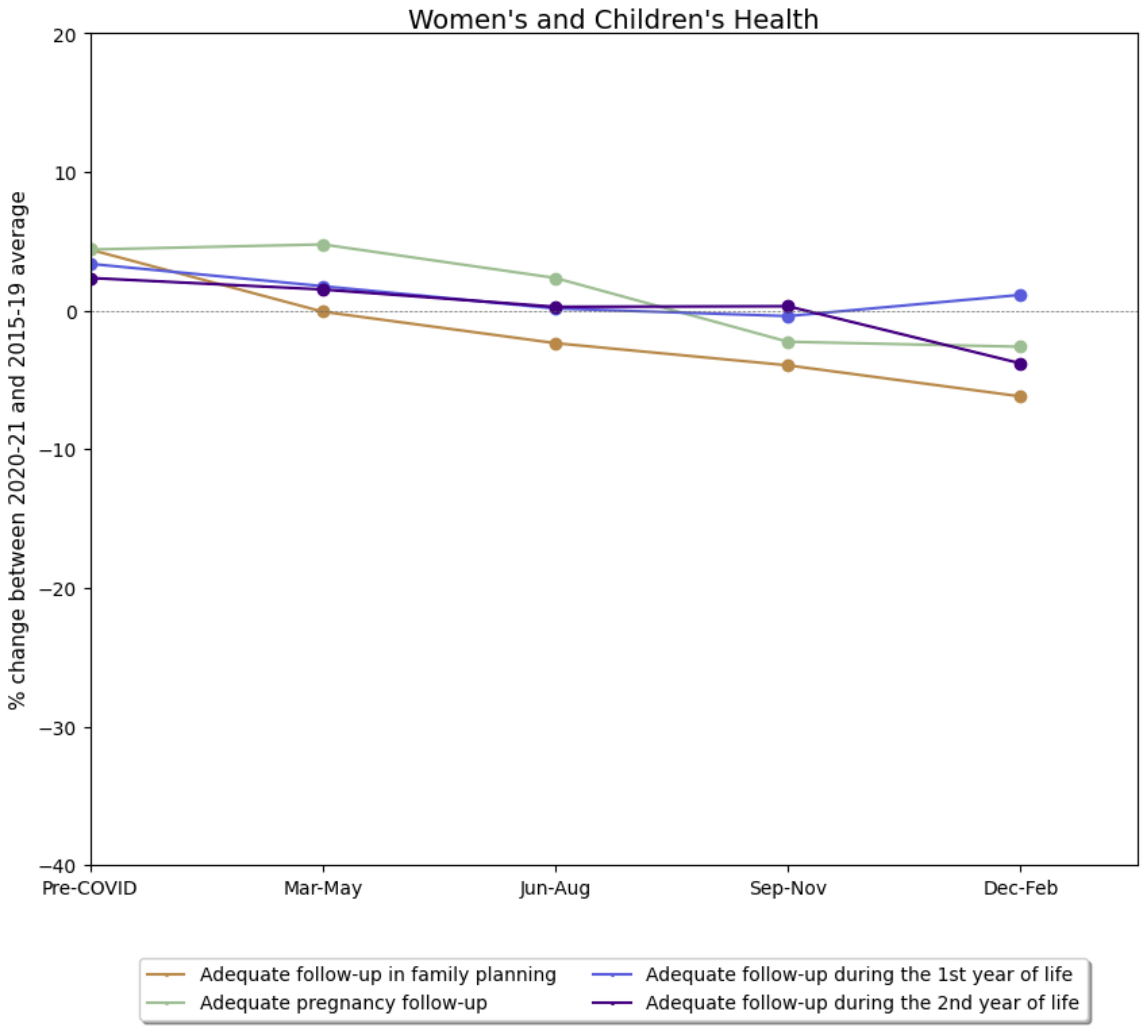


Figure 5. Evolution in follow-up in women's and children's health appointments, compared to homologous periods from 2018-2019.

Cancer screening remained identical to pre-COVID-19 times for cervical and colorectal cancer, with no significant difference [Supplementary Table 4], and decreased steadily throughout all the periods for breast cancer screening [Figure 6]. New cancer diagnoses decreased throughout all the periods resulting in 14.3% less new women's breast cancer diagnoses and 21.7% less diagnoses of colorectal cancer.

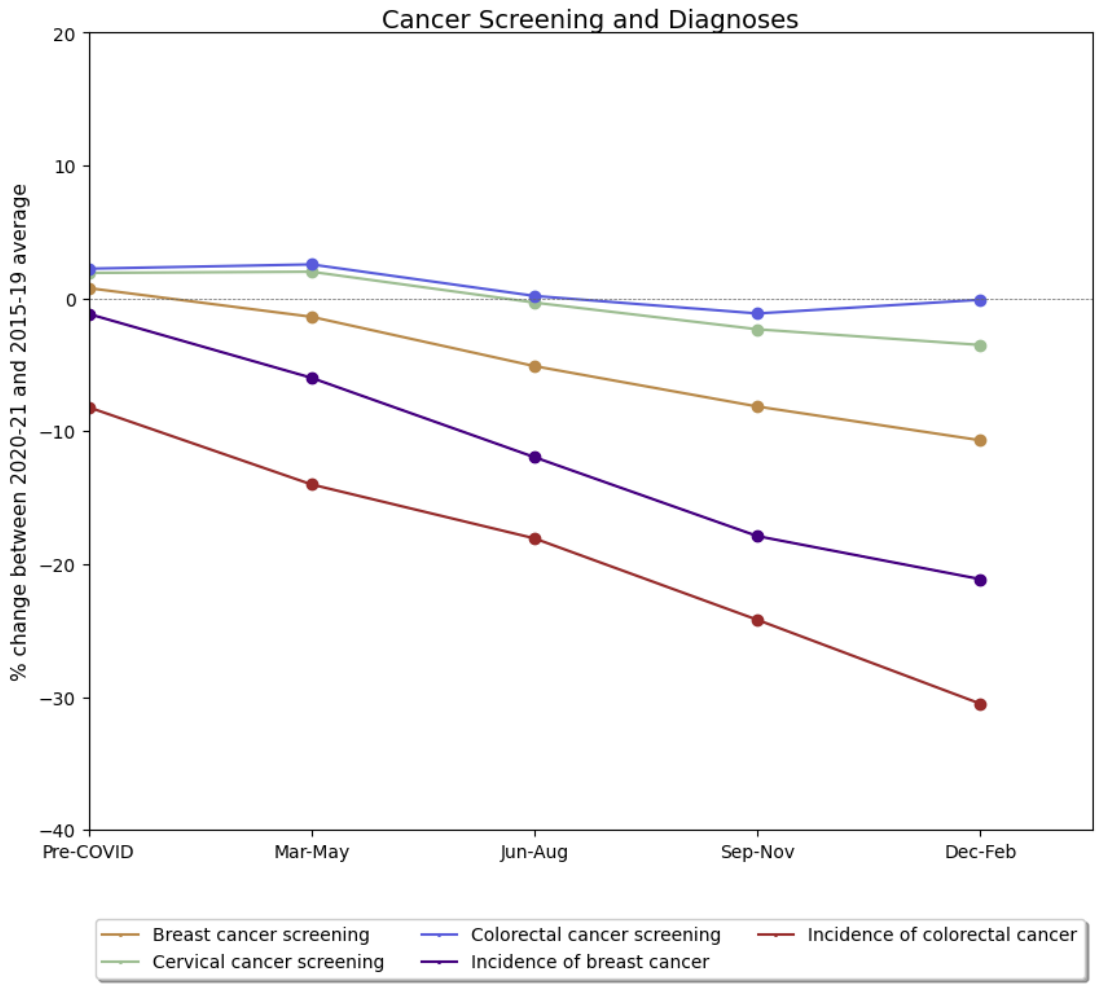


Figure 6. Evolution in cancer screening and new diagnosis, by type of cancer, compared to homologous periods from 2018-2019.

Hospital appointments, surgeries and waiting times

There was a uniform decrease in first and follow-up appointments during the year, resulting on a total loss of 8,397,984 appointments (-10.5%) [Figure 7]. Waiting times for first appointments increased the most during the second and third periods, with, respectively, 8.7% and 11.2% less appointments being done within the recommended waiting time. It should be noted that this pattern was different in the last period, when a recovery attempt in waiting times was registered.

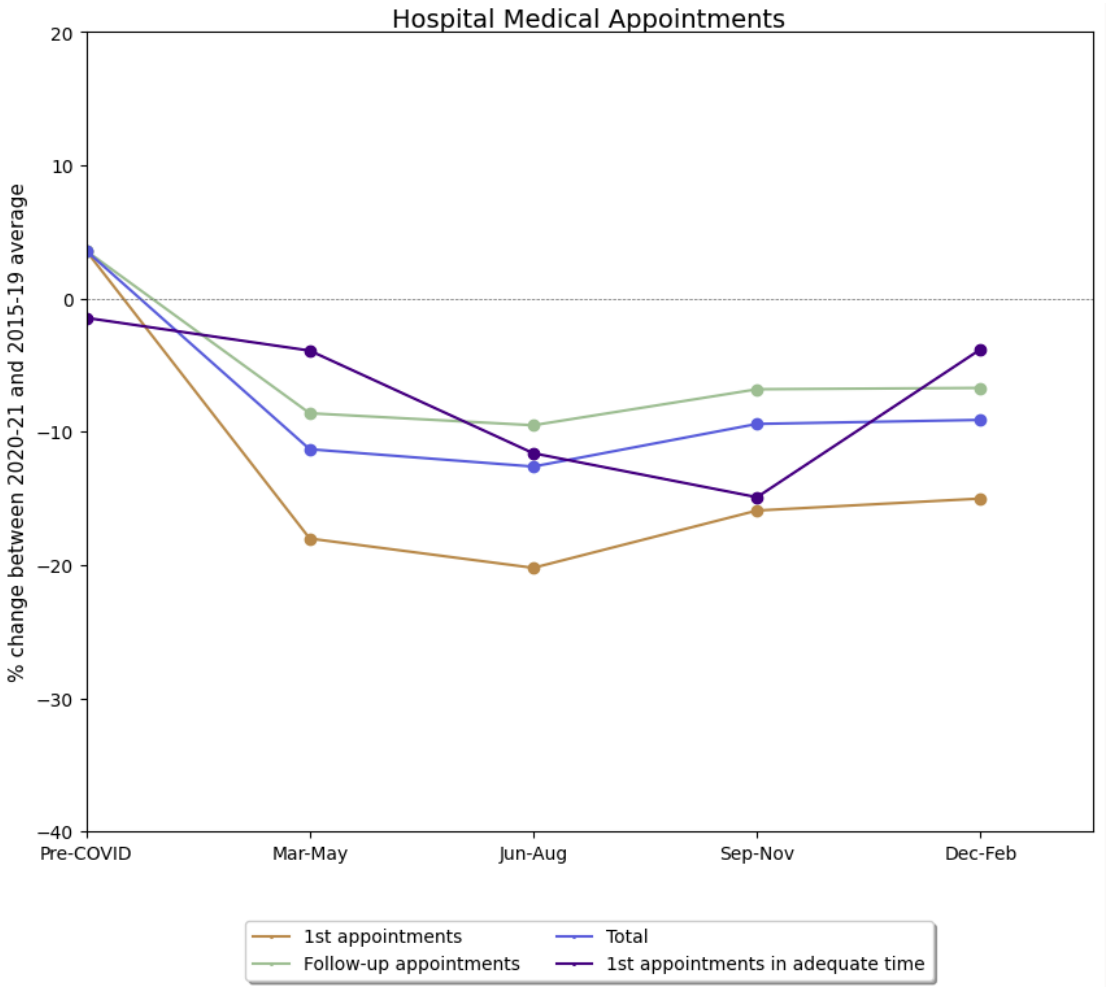


Figure 7. Evolution in the number of hospital appointments according to the type of appointment, and waiting times for appointments, compared to homologous periods from 2015-2019.

In surgeries, an accentuated decrease was verified between March and August 2020, followed by a less intense decrease between September 2020 and February 2021 [Figure 8]. This resulted in a loss of 810,103 surgeries (-18,4%) in 12 months, mainly due to the loss of 752,859 scheduled surgeries (-20.0%).

During the four subperiods, there was a decrease in the percentage of patients waiting for surgery within the maximum guaranteed response time, meaning, an increase in patients waiting for longer than the recommended response time [Figure 8].

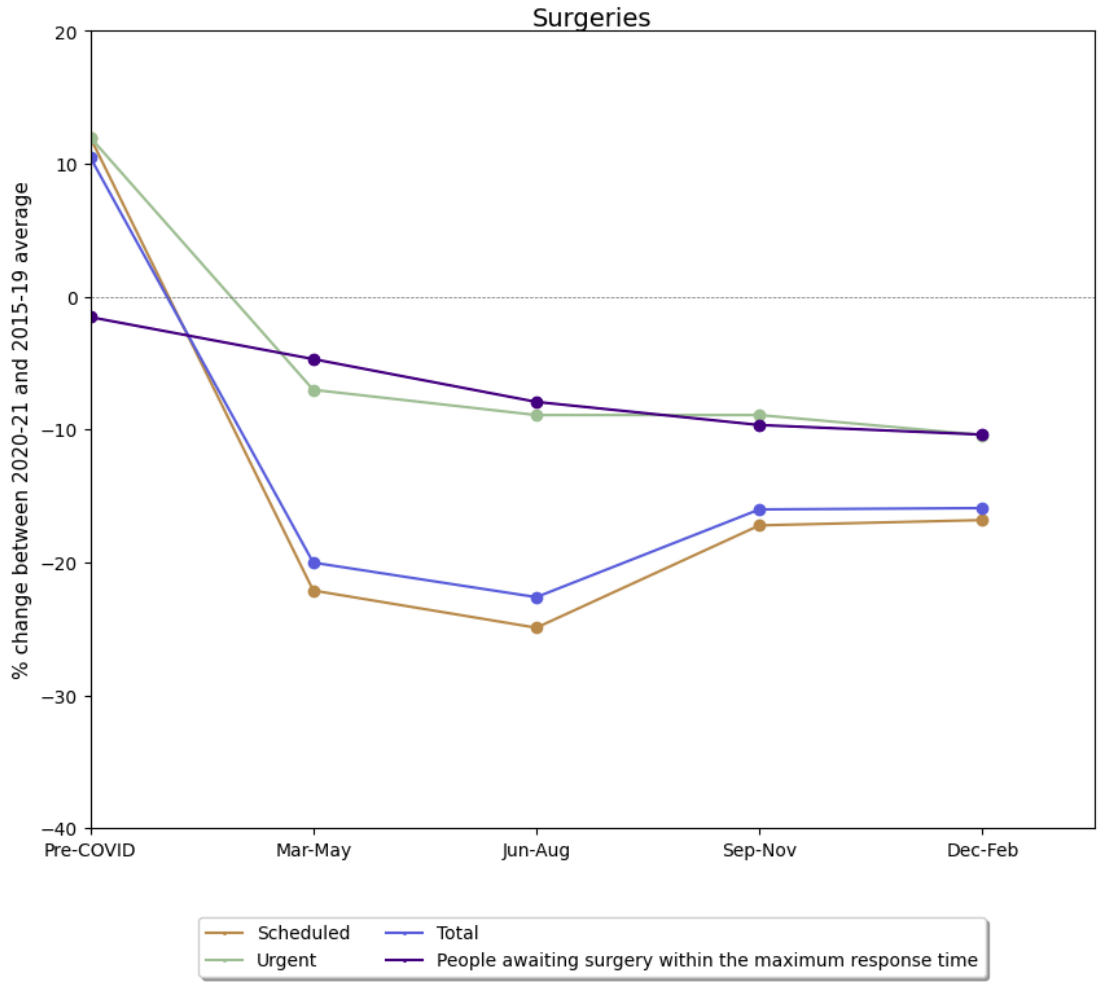


Figure 8. Evolution in the number of surgeries, by type, and waiting times for surgery, compared to homologous periods from 2015-2019.

Ambulance services and Emergency attendances

There was an intense decrease in activation of ambulance services during the first subperiod, followed by a slight recovery in the second and third subperiods, and a new decrease in the fourth subperiod in study. In total, there were 184,774 less ambulance services activated.

During the first 12 months of the Pandemic, there was also a progressively higher decrease in emergency room attendances (-7,658,728), regardless of the level of severity according to the Manchester Triage System [Figure 9].

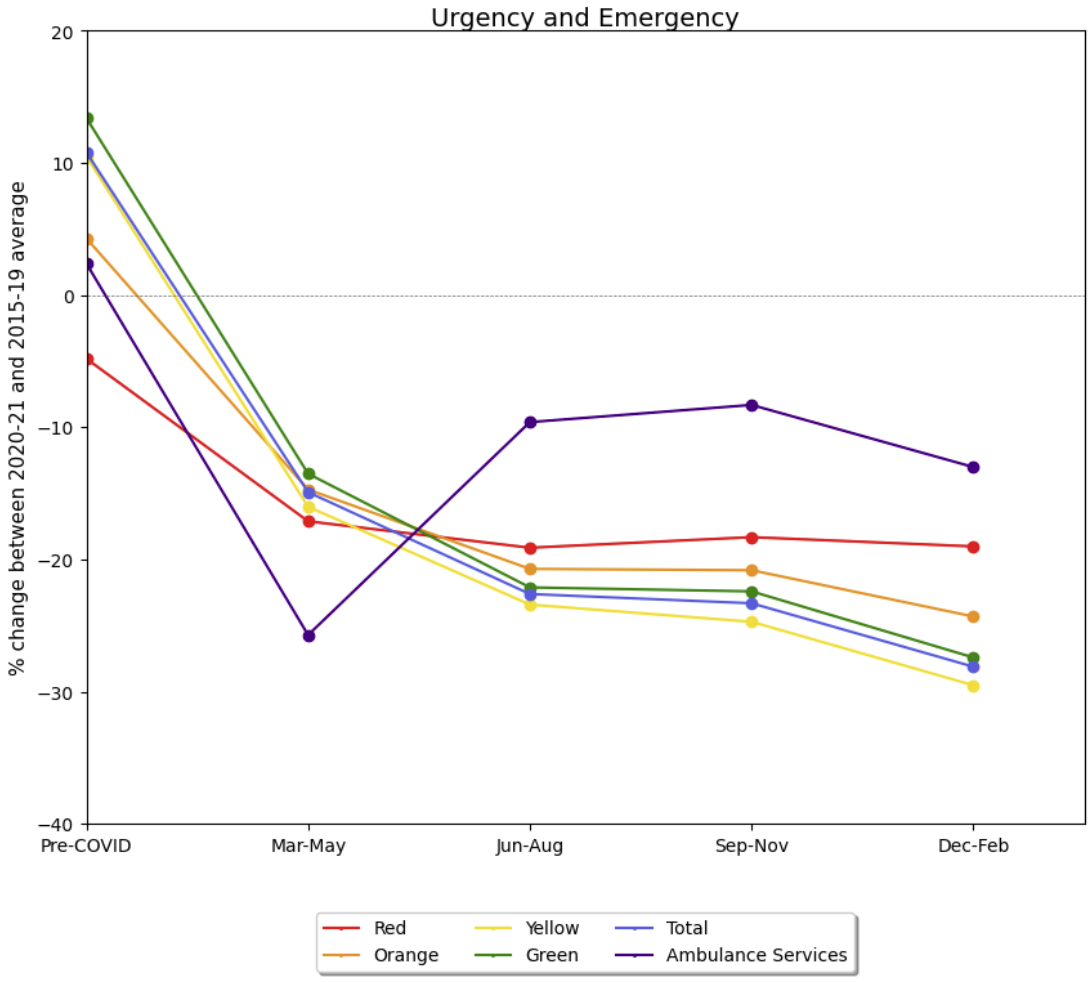


Figure 9. Evolution in emergency room attendances, by the Manchester Triage System, and activation of ambulance services, compared to homologous periods from 2015-2019.

Correlation

Restrictiveness Index

With the increase in the restrictiveness index, there were more first appointments in adequate time during the year, as well as a decrease in hospital appointments and surgeries. For higher index values, these numbers got closer to those of homologous periods from 2015-2019.

With the increase in the restrictiveness index, there was also a decrease in emergency room attendances, children's health follow-up, follow-up in family planning and cancer screening.

However, follow-up of chronic diseases, incidence of stroke/thrombosis, follow-up in pregnancy, incidence of cancer and the percentage of people awaiting surgery within the maximum response time remained unaltered.

*Table 1. Correlation of the restrictiveness index with various indicators of the use of medical care. * represents both the correlation with the values during the pandemic period and with the difference from homologous periods from 2015-2019 being significant. (2015-2019) represents only the difference from homologous periods from 2015-2019 being significant.*

		Restrictiveness index
Positive correlation	Significant	First appointments in adequate time*
	Borderline significant	-
No correlation		Remote and at-home primary care appointments Incidence of stroke Follow-up in pregnancy Follow-up of chronic diseases New cancer diagnoses
Negative correlation	Significant	Hospital medical appointments* Surgeries* Emergency room attendances Children's health Follow-up in family planning Cancer screening
	Borderline significant	In-person primary care appointments (2015-2019)

Number of COVID-19 new cases

With the increase in COVID-19 new cases there were more remote appointments, which represents an increase when compared to the previous 5 years. Thus, the higher the number of cases, the higher the increase.

There was also a decrease in pregnancy follow-up, as well as in stroke and breast and colorectal cancer incidence during the year with the increase in COVID-19 new cases. When compared to homologous periods from the previous 5 years, that decrease was more pronounced with more COVID-19 new cases. The same was registered for follow-up in family planning, children's health and breast and cervical cancer screening, when compared to values from 2015-2019.

In-person and at-home primary care appointments, follow-up of chronic diseases, colorectal cancer screening, hospital appointments, first appointments in adequate time, surgeries, emergency room attendances and ambulance services and the percentage of people awaiting surgery within the maximum response time remained unaltered.

*Table 2. Correlation between COVID-19 new cases and the various indicators of the use of medical care. * represents both the correlation with the values during the pandemic period and with the difference from homologous periods from 2015-2019 being significant. (2015-2019) represents only the difference from homologous periods from 2015-2019 being significant.*

		New COVID-19 cases
Positive correlation	Significant	Remote primary care appointments*
	Borderline significant	-
No correlation		In-person and at-home primary care appointments Hospital appointments Surgeries First appointments in adequate time Emergency room attendances Ambulance services Follow-up of chronic diseases Colorectal cancer screening
Negative correlation	Significant	Follow-up in pregnancy* Follow-up in family planning (2015-2019) Children's health (2015-2019) New cancer diagnoses* Cancer screening (except colorectal) (2015-2019) Incidence of stroke*
	Borderline significant	At-home primary care appointments (2015-2019)

Discussion

In this study we aimed to analyze the impact the pandemic had during its first year on the use of medical care during its first year, through several pandemic periods and in different regions of Mainland Portugal.

As expected, there was an overall decrease in hospital appointments, primary care appointments and follow-up, surgeries, emergency room attendances and ambulance services when compared to homologous periods from 2015 to 2019. There was also an increase in remote appointments in primary care and in waiting times, both for surgery and for first appointments.

The behavior seen in surgeries may be explained by the cancelation of scheduled surgeries in the beginning of the pandemic, in order to redirect healthcare services' resources to respond to COVID-19. This was followed by a less intense decrease months after the pandemic began, possibly due to the later reorganization of healthcare services.

As the pandemic worsened, and, consequently, COVID-19 new cases raised and the government imposed more restrictive measures, there was a decrease in hospital care, emergency room attendances, primary care follow-up and screening and incidence of cancer. This suggests a decrease in the response capacity of healthcare services, and, possibly, more people avoiding healthcare when needed. However, there might have been a reorganization of healthcare providers, represented by the higher numbers of remote appointments with higher COVID-19 new cases.

Contrarily to what we expected, total appointments in primary care increased. However, that was due to the increase in remote appointments.

Children's and women's health follow-up and cancer screening (except for breast cancer) remained similar to pre-COVID-19 times, instead of decreasing. This may have happened because these indicators take into consideration periods of time longer than the 12 months in study.

The incidence of stroke/thrombosis and cancer decreased, which can be related to the overall decrease in in-person appointments, where these diagnoses are made, and due

to these diagnoses requiring encoding in the computer system to be counted as such. Therefore, less diagnoses can be the result of primary care doctors not encoding them, rather than a true decrease in incidence. Another hypothesis would be people not seeking medical care, hence no diagnosis could be made.

Even though a decrease in emergency room attendances was expected, this decrease was uniform for all levels of the Manchester Triage System. This was unexpected since we hypothesized an increase in red and orange levels due to people avoiding medical care and only seeking help as last resource, therefore, presenting more serious health conditions and being attributed a higher level of urgency in triage.

Another unexpected observation was the increase in first appointments in adequate time with the increase in the restrictiveness index. Nevertheless, there were also less first hospital appointments during those times and, consequently, less people awaiting them, making it theoretically easier to comply with deadlines.

Hospital appointments decreased significantly when compared to 2015-2019, but neither that decrease nor the number of appointments during the pandemic period showed any correlation with the increase in COVID-19 new cases. Thus, the pandemic activity does not explain that decrease and other aspects of reorganization, independent of the incidence of COVID-19, may be responsible for that behavior.

Limitations

In our study, time lags were not considered, which is something to be explored in future studies to better understand the impact of the pandemic in some of the indicators.

The data available was, in most cases, provided by month. Weekly or daily data could have led to stronger correlations.

Primary care indicators were only consistently available from 2018 onwards and are dependent of encoding by the healthcare provider.

Conclusion

The worsening of the pandemic and the restrictions imposed by the government were associated with changes on the use of medical care, both by possibly leading people to avoid medical care and by healthcare services not being able to provide an appropriate response to patients. These findings show the importance of reorganizing the healthcare system during a pandemic to assure adequate care. They may also help understanding what needs to be prioritized, both in a near future – to guarantee a recovery of care during what is left of the current pandemic – and in future pandemics.

Disclaimer

This study is included in a project named “Impact of the COVID-19 pandemic on the use of medical care and non-COVID-19 mortality in Portugal”. The project was funded by GAPIC (Gabinete de Apoio à Investigação Científica, Tecnológica e Inovação), and was developed with Joana Monteiro and Margarida Ribeiro. Thus, similarities between our studies do not constitute plagiarism, just common aspects of a joint work.

References

Direção Geral de Saúde. (2020a). *Casos de infeção por novo Coronavírus (COVID-19)*. https://covid19.min-saude.pt/wp-content/uploads/2020/03/Atualização-de-02032020-1728.pdf

Direção Geral de Saúde. (2020b). *Relatório de Situação 16/03/2020*. https://www.dgs.pt/em-destaque/relatorio-de-situacao-n-015-17032020-pdf.aspx

Lyall, M. J., & Lone, N. I. (2020). *Higher clinical acuity and 7-day hospital mortality in non-COVID-19 acute medical admissions: prospective observational study*. https://doi.org/10.1101/2020.06.26.20098434

Mulholland, R. H., Wood, R., Stagg, H. R., Fischbacher, C., Villacampa, J., Simpson, C. R., Vasileiou, E., McCowan, C., Stock, S. J., Docherty, A. B., Ritchie, L. D., Agrawal, U., Robertson, C., Murray, J. L. K., MacKenzie, F., & Sheikh, A. (2020). Impact of COVID-19 on accident and emergency attendances and emergency and planned hospital admissions in Scotland: an interrupted time-series analysis. *Journal of the Royal Society of Medicine*, *0*(0), 1–10. https://doi.org/10.1177/0141076820962447

Ojetti, V., Covino, M., Brigida, M., Petruzziello, C., Saviano, A., Migneco, A., Candelli, M., & Franceschi, F. (2020). Non-covid diseases during the pandemic: Where have all other emergencies gone? *Medicina (Lithuania)*, *56*(10), 1–10. https://doi.org/10.3390/medicina56100512

ProMED - International Society for Infectious Diseases. (2019). *Undiagnosed Pneumonia - China (Hubei): Request for Information*. https://promedmail.org/promed-post/?id=6864153 #COVID19

Vieira, A., Peixoto, R., Aguiar, P., Zampaglione, G., Sousa, P., & Abrantes, A. (2020). *Excesso de mortalidade, mortalidade colateral e resposta dos serviços de saúde em Portugal em tempos de COVID-19*.

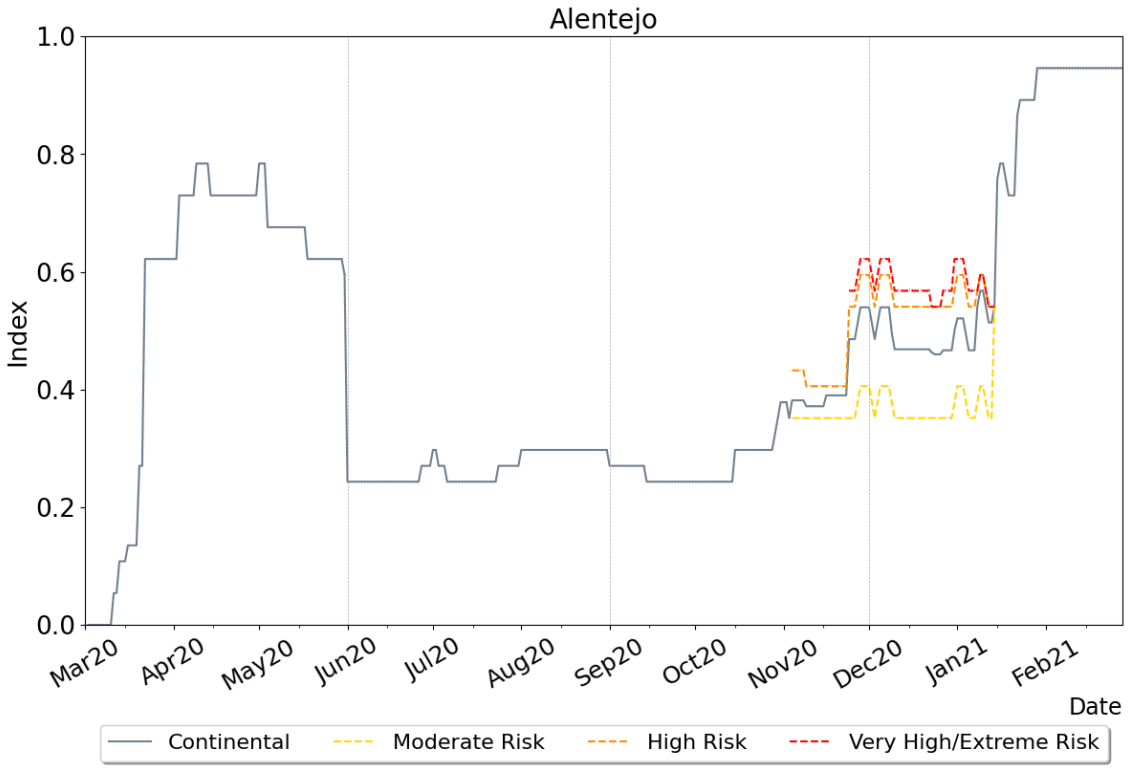
World Health Organization. (2020a). *2019-nCoV outbreak: first cases confirmed in Europe*. https://www.euro.who.int/en/health-topics/health-emergencies/pages/news/news/2020/01/2019-ncov-outbreak-first-cases-

confirmed-in-europe

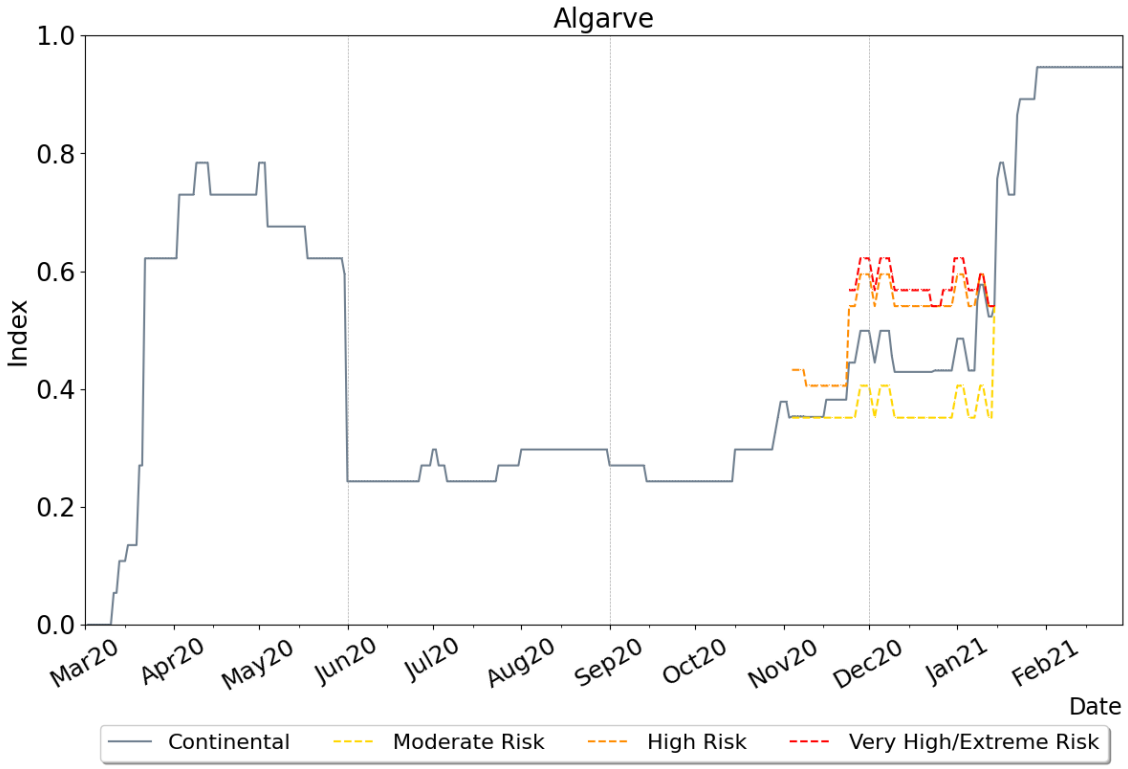
World Health Organization. (2020b). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Appendix

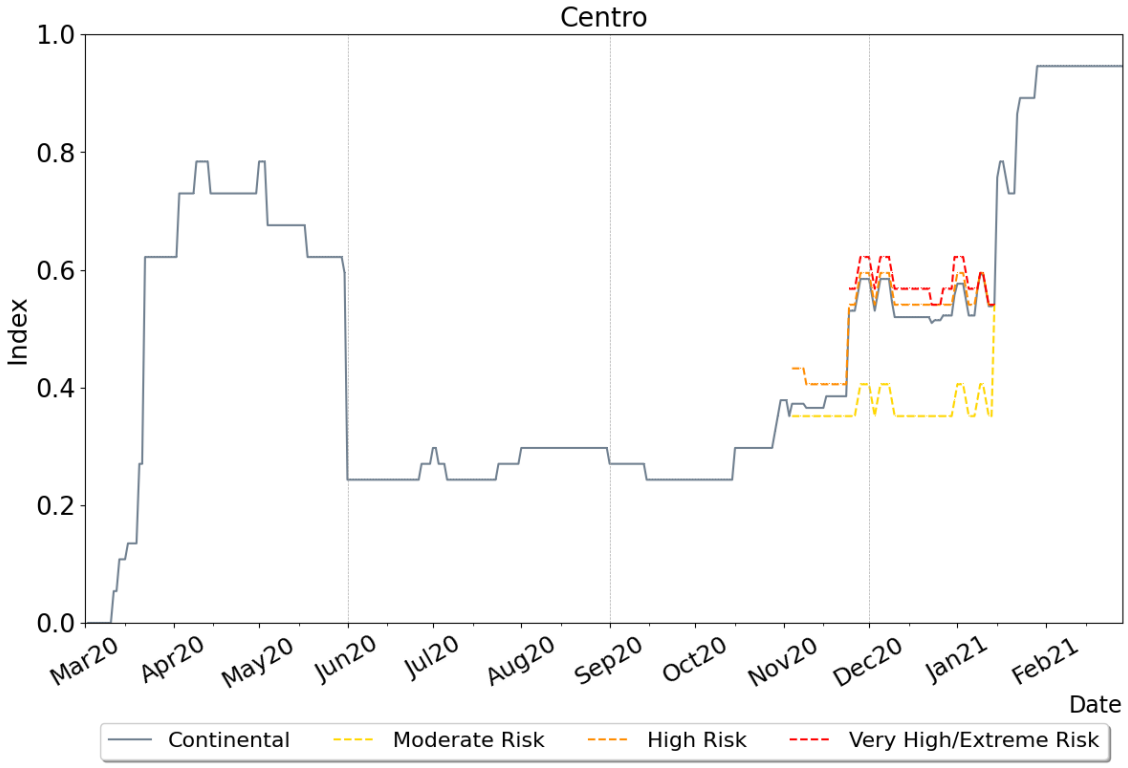
Restrictiveness Index



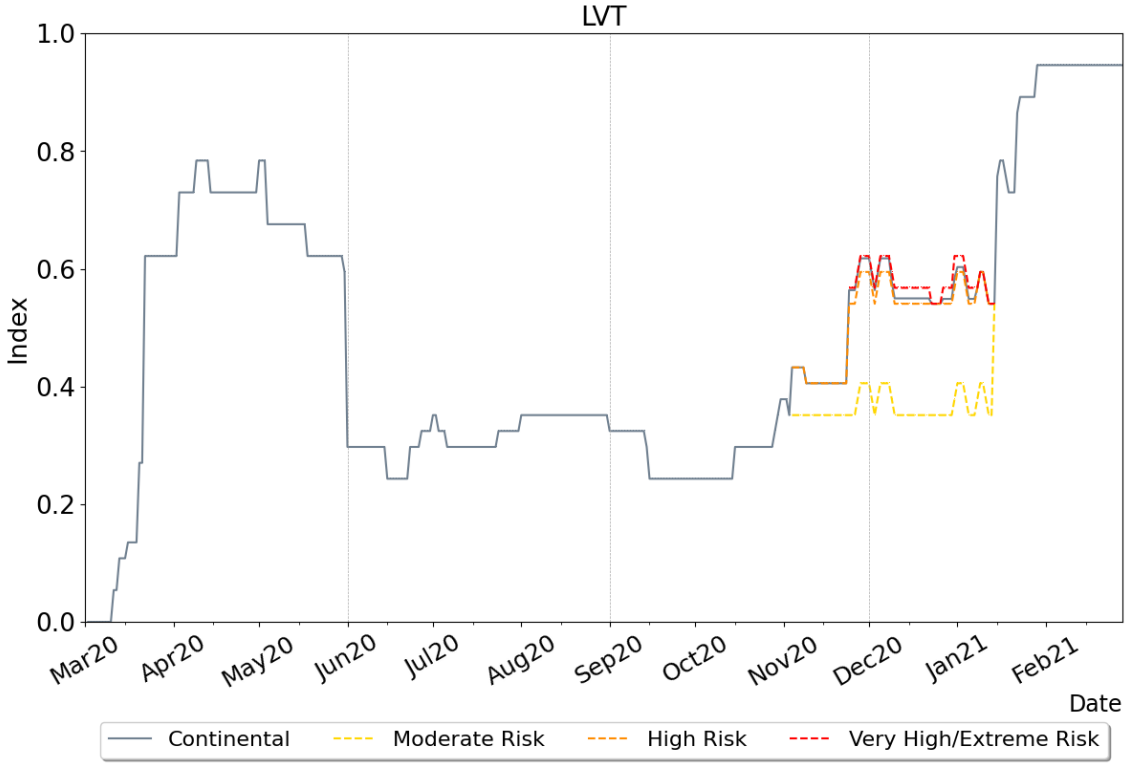
Supplementary Figure 10. Restrictiveness Index in Alentejo, from March 2nd to February 28th. The vertical lines represent the division in pandemic periods.



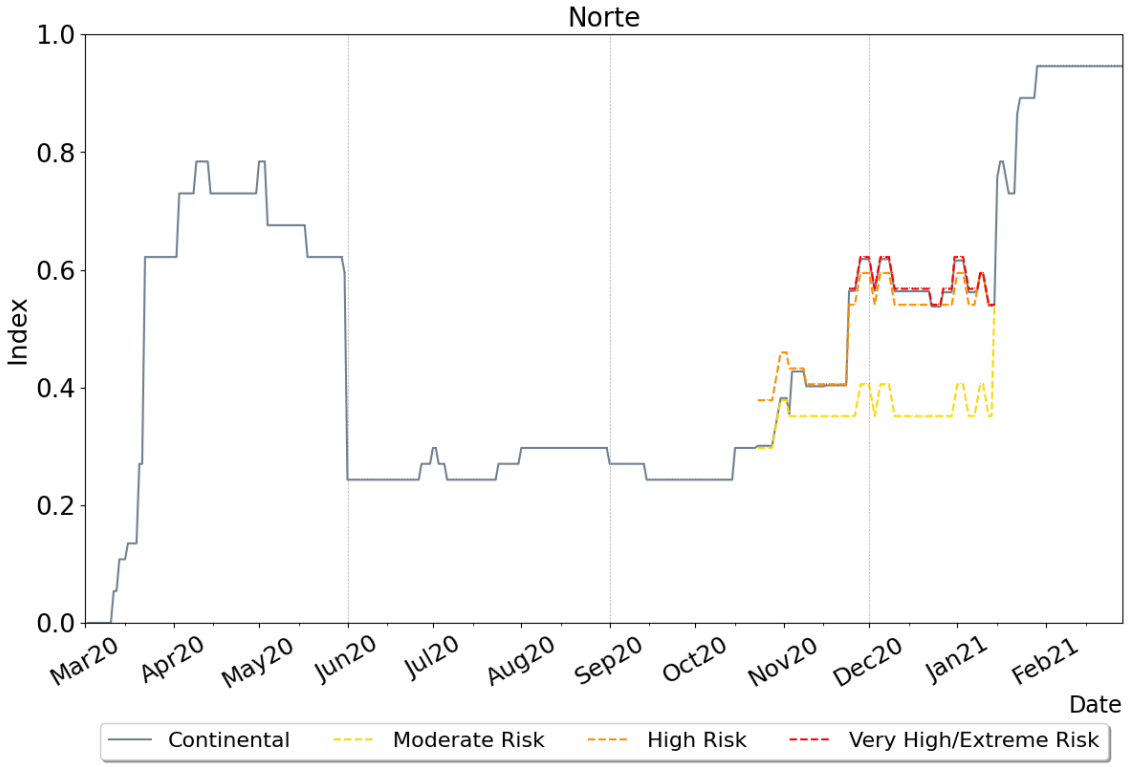
Supplementary Figure 11. Restrictiveness Index in Algarve, from March 2nd to February 28th. The vertical lines represent the division in pandemic periods.



Supplementary Figure 12. Restrictiveness Index in Centro, from March 2nd to February 28th. The vertical lines represent the division in pandemic periods.



Supplementary Figure 13. Restrictiveness Index in Lisboa e Vale do Tejo, from March 2nd to February 28th. The vertical lines represent the division in pandemic periods.



Supplementary Figure 14. Restrictiveness Index in Norte, from March 2nd to February 28th.The vertical lines represent the division in pandemic periods.

Supplementary Table 3. Items used to calculate the daily restrictiveness index. The higher the level within a certain item, the stronger the restrictions. The final score of an item corresponds to the product between the level best suiting the description of the restrictions imposed, and the percentage of the population of Mainland Portugal under said restrictions. The maximum total score (considering 100% of the population is under all maximum levels of restrictions) is 36. Therefore, we divided the sum of all items' levels by 36 in order to obtain an index varying between 0 and 1.

	Items	Level
Circulation	Public roads	
	No restrictions	0
	Curfew: from 11pm to 5am	1
	Curfew: 11pm to 5am (weekdays); 1pm to 5am (weekends and holidays)	2
	General stay-at-home order	3
	Circulation between municipalities	
	Allowed	0
	Forbidden from 11pm or until 5/6am	1
	Forbidden during a whole day or during all weekends	2
	Forbidden for more than 5 consecutive days	3
	Land borders	
	Open	0
	Closed	1
Circulation	Air borders	
	Open	0
	External borders closed (some exceptions)	1
	External borders closed (some exceptions) and/or flight restrictions within the EU or to important Portuguese communities	2
	All borders (external and internal) closed. Only essential justified travels allowed	3
Masks	No recommendation/obligation	0
	Mandatory in closed spaces	1
	Recommended on public roads, whenever social distancing is not possible	2
	Mandatory on public roads, whenever social distancing is not possible	3
Visiting people in institutions	Allowed	0
	Forbidden	1
Businesses	Open shops, restaurants, and other services	
	Stores with more than 400m^2 or in shopping centers; cinemas, theaters, and auditoria; pools, gyms, casinos, tattoo shops	0

	Items	Level
	Stores outside shopping centers and with no more than 400m^2; restaurants, cafés; museums, palaces, art galleries; markets	1
	Stores outside shopping centers and with no more than 200m^2; hairdressers, manicure; bookshops, auto centers; libraries and archives	2
	All closed, apart from those selling essential goods and services	3
	Closing times for businesses	
	Regular schedule	0
	8pm to 11pm	1
	8pm to 1am (weekdays); 1pm to 5pm (weekends or holidays)	2
	Closing times for restaurants	
	Regular schedule	0
	8pm to 1am	1
	8pm to 1am (weekdays); 1pm to 5pm (weekends or holidays)	2
	Consumption of alcoholic beverages on public roads	
	Allowed	0
	Forbidden	1
GATHERINGS	Limit of people in a group	
	None	0
	20 people	1
	10 people	2
	6 people or less	3
	Religious ceremonies	
	Allowed	0
	Forbidden	1
	Limit of people in other events	
	None	0
	50 people	1
	20 people	2
	10 people	3
	5 people	4
	Other events forbidden	5
EDUCATION AND WORK	Schools and universities	
	Open	0
	Partially closed or with exams	1

Items		Level
	Holidays or closed	2
	Work	
	Regular	0
	Partially remote (recommendation)	1
	Partially remote (mandatory)	2
	Entirely remote (mandatory)	3
Index =		$\frac{Sum}{36}$

Changes in the use of medical care during the pandemic, compared to 2015-2019

Primary Care

Supplementary Table 4. Evolution in primary care, during the 12 months in study, when compared to previous years. "2015-2019 average" represents the mean value of the previous 5 years. "2020/2021" represents the value for the 12 months in study – March 2020 to February 2021. "Difference n %" represents said difference in absolute number (n) and percentage of the 2015-2019 value (%). "Significance" represents the p-value obtained after performing a hypothesis test to verify if the difference was statistically significant.

	Region	Total: March 2020 to February 2021				
		2015-2019 average	2020/2021	Difference n	(%)	p-value
Primary Care						
In-person	Mainland	20 509 933.4	11 030 218	-9 479 715.4	-46.2%	< 0.001
	Alentejo	1 191 638.8	712 801	-478 837.8	-40.2%	< 0.001
	Algarve	864 279.4	663 504	-200 775.4	-23.2%	< 0.001
	Centro	3 629 638.6	1 978 667	-1 650 971.6	-45.5%	< 0.001
	LVT	6 652 282.6	3 730 550	-2 921 732.6	-43.9%	< 0.001
	Norte	8 172 094.0	3 944 696	-4 227 398.0	-51.7%	< 0.001
Remote	Mainland	8 681 550.8	21 165 990	12 484 439.2	143.8%	< 0.001
	Alentejo	608 349.2	1 024 739	416 389.8	68.4%	< 0.001
	Algarve	290 996.4	598 959	307 962.6	105.8%	< 0.001
	Centro	1 688 871.0	3 885 360	2 196 489.0	130.1%	< 0.001
	LVT	2 104 045.4	5 828 447	3 724 401.6	177.0%	< 0.001
	Norte	3 989 288.8	9 828 485	5 839 196.2	146.4%	< 0.001
At-home	Mainland	194 448.0	112 057	-82 391.0	-42.4%	< 0.001
	Alentejo	12 946.4	11 043	-1 903.4	-14.7%	0.15
	Algarve	5 980.4	6 072	91.6	1.5%	0.79
	Centro	27 231.2	19 969	-7 262.2	-26.7%	< 0.001
	LVT	48 560.6	20 561	-27 999.6	-57.7%	< 0.001
	Norte	99 729.4	54 412	-45 317.4	-45.4%	< 0.001
Total	Mainland	29 385 932.2	32 308 265	2 922 332.8	9.9%	0.05
	Alentejo	1 812 934.4	1 748 583	-64 351.4	-3.5%	0.37
	Algarve	1 161 256.2	1 268 535	107 278.8	9.2%	0.07
	Centro	5 345 740.8	5 883 996	538 255.2	10.1%	0.03
	LVT	8 804 888.6	9 579 558	774 669.4	8.8%	0.07
	Norte	12 261 112.2	13 827 593	1 566 480.8	12.8%	0.03
Chronic Diseases						
Index of adequate follow-up of patients with diabetes [0-3]	Mainland	1.272	0.989	-0.283	-22.25%	< 0.001
	Alentejo	1.335	1.011	-0.324	-24.27%	< 0.001
	Algarve	1.098	0.913	-0.186	-16.91%	< 0.001
	Centro	1.370	1.113	-0.257	-18.74%	< 0.001
	LVT	1.111	0.848	-0.264	-23.72%	< 0.001
	Norte	1.350	1.031	-0.319	-23.64%	< 0.001
Index of adequate follow-up of patients with	Mainland	1.582	1.437	-0.145	-9.18%	< 0.001
	Alentejo	1.591	1.420	-0.171	-10.76%	< 0.001
	Algarve	1.310	1.302	-0.008	-0.61%	0.49

hypertension [0-3]	Centro	1.596	1.495	-0.102	-6.36%	< 0.001
	LVT	1.485	1.340	-0.145	-9.77%	< 0.001
	Norte	1.682	1.498	-0.184	-10.92%	< 0.001
Incidence of thrombosis/stroke [‰]	Mainland	4.637	3.681	-0.956	-20.62%	< 0.001
	Alentejo	5.450	4.136	-1.314	-24.10%	< 0.001
	Algarve	5.233	4.202	-1.031	-19.70%	< 0.001
	Centro	4.566	3.708	-0.858	-18.78%	< 0.001
	LVT	4.543	3.546	-0.998	-21.96%	< 0.001
	Norte	4.523	3.617	-0.906	-20.02%	< 0.001
Women's and Children's Health						
Index of adequate follow-up in the family planning area [0-3]	Mainland	1.528	1.480	-0.048	-3.14%	< 0.001
	Alentejo	1.525	1.461	-0.064	-4.20%	< 0.001
	Algarve	1.190	1.270	0.080	6.72%	< 0.001
	Centro	1.491	1.494	0.003	0.22%	0.73
	LVT	1.431	1.351	-0.080	-5.57%	< 0.001
	Norte	1.670	1.603	-0.067	-4.01%	< 0.001
Index of adequate follow-up in women's health [0-3]	Mainland	1.983	1.994	0.011	0.57%	0.59
	Alentejo	1.944	1.876	-0.068	-3.50%	0.03
	Algarve	1.781	1.837	0.056	3.14%	0.02
	Centro	2.056	2.135	0.079	3.83%	< 0.001
	LVT	1.816	1.802	-0.014	-0.76%	0.46
	Norte	2.103	2.102	-0.002	-0.07%	0.94
Index of adequate follow-up during the 1st year of life [0-3]	Mainland	2.324	2.338	0.014	0.61%	0.18
	Alentejo	2.316	2.251	-0.065	-2.80%	< 0.001
	Algarve	2.124	2.180	0.055	2.60%	< 0.001
	Centro	2.494	2.508	0.014	0.57%	0.09
	LVT	2.167	2.204	0.037	1.70%	< 0.001
	Norte	2.370	2.377	0.007	0.28%	0.52
Index of adequate follow-up during the 2nd year of life [0-3]	Mainland	2.004	1.997	-0.006	-0.31%	0.3
	Alentejo	1.884	1.863	-0.021	-1.13%	0.27
	Algarve	1.637	1.759	0.122	7.47%	< 0.001
	Centro	2.326	2.320	-0.006	-0.27%	0.23
	LVT	1.746	1.735	-0.011	-0.62%	0.91
	Norte	2.079	2.062	-0.016	-0.78%	0.85
Cancer Screening and New Diagnoses						
Women aged [50; 70[, with record of a mammogram within the previous 2 years (%)	Mainland	40.19%	33.87%	-	-6.32%	< 0.001
	Alentejo	45.89%	33.77%	-	-12.12%	< 0.001
	Algarve	17.13%	15.56%	-	-1.58%	0.02
	Centro	46.55%	40.25%	-	-6.30%	< 0.001
	LVT	37.72%	29.90%	-	-7.82%	< 0.001
	Norte	39.92%	35.35%	-	-4.57%	< 0.001
Women aged [25; 60[screened for cervical cancer (%)	Mainland	36.27%	35.24%	-	-1.03%	0.13
	Alentejo	37.02%	36.17%	-	-0.85%	0.34
	Algarve	24.68%	29.93%	-	5.25%	< 0.001
	Centro	36.48%	37.23%	-	0.75%	0.3
	LVT	32.32%	29.47%	-	-2.85%	< 0.001
	Norte	40.59%	39.09%	-	-1.49%	0.06

People aged [50; 75[, screened for colorectal cancer (%)	Mainland	39.44%	39.82%	-	0.38%	0.73
	Alentejo	24.14%	25.42%	-	1.28%	0.14
	Algarve	28.14%	29.04%	-	0.90%	0.14
	Centro	38.27%	41.58%	-	3.31%	< 0.001
	LVT	38.70%	36.71%	-	-1.99%	0.01
	Norte	45.18%	45.39%	-	0.21%	0.91
Incidence of breast cancer in women [‰]	Mainland	2.591	2.222	-0.369	-14.25%	< 0.001
	Alentejo	2.542	1.995	-0.547	-21.52%	< 0.001
	Algarve	2.428	2.303	-0.125	-5.16%	0.04
	Centro	2.461	2.197	-0.263	-10.70%	< 0.001
	LVT	2.758	2.264	-0.494	-17.92%	< 0.001
	Norte	2.568	2.239	-0.329	-12.81%	< 0.001
Incidence of colorectal cancer [‰]	Mainland	2.231	1.746	-0.484	-21.71%	< 0.001
	Alentejo	2.732	2.212	-0.521	-19.05%	< 0.001
	Algarve	2.132	1.670	-0.462	-21.66%	< 0.001
	Centro	2.387	1.911	-0.476	-19.92%	< 0.001
	LVT	2.131	1.612	-0.520	-24.39%	< 0.001
	Norte	2.127	1.669	-0.458	-21.51%	< 0.001

Hospital Care

Supplementary Table 5. Evolution in hospital care, during the 12 months in study, when compared to previous years. "2015-2019 average" represents the mean value of the previous 5 years. "2020/2021" represents the value for the 12 months in study – March 2020 to February 2021. "Difference n %" represents said difference in absolute number (n) and percentage of the 2015-2019 value (%). "Significance" represents the p-value obtained after performing a hypothesis test to verify if the difference was statistically significant.

	Region	Total: March 2020 to February 2021				
		2015-2019 average	2020/2021	Difference n	(%)	Significance
Hospital Appointments						
1st Appointments	Mainland	23 004 536.2	19 042 967	-3 961 569.2	-17.2%	< 0.001
	Alentejo	931 259.6	681 273	-249 986.6	-26.8%	< 0.001
	Algarve	543 027.0	450 159	-92 868.0	-17.1%	< 0.001
	Centro	4 214 270.2	3 407 836	-806 434.2	-19.1%	< 0.001
	LVT	8 024 393.0	6 656 898	-1 367 495.0	-17.0%	< 0.001
	Norte	9 291 586.4	7 846 801	-1 444 785.4	-15.5%	< 0.001
Follow-up appointments	Mainland	56 928 803.8	52 492 389	-4 436 414.8	-7.8%	< 0.001
	Alentejo	2 041 171.0	1 681 355	-359 816.0	-17.6%	< 0.001
	Algarve	1 369 609.2	1 335 794	-33 815.2	-2.5%	< 0.001
	Centro	10 587 910.0	9 589 501	-998 409.0	-9.4%	< 0.001
	LVT	20 664 579.8	18 788 090	-1 876 489.8	-9.1%	< 0.001
	Norte	22 265 533.8	21 097 649	-1 167 884.8	-5.2%	< 0.001
Total	Mainland	79 933 340.0	71 535 356	-8 397 984.0	-10.5%	< 0.001
	Alentejo	2 972 430.6	2 362 628	-609 802.6	-20.5%	< 0.001
	Algarve	1 912 636.2	1 785 953	-126 683.2	-6.6%	< 0.001
	Centro	14 802 180.2	12 997 337	-1 804 843.2	-12.2%	< 0.001
	LVT	28 688 972.8	25 444 988	-3 243 984.8	-11.3%	< 0.001
	Norte	31 557 120.2	28 944 450	-2 612 670.2	-8.3%	< 0.001
1st Appointments in adequate time (%)	Mainland	75.70%	69.23%	-	-6.47%	< 0.001
	Alentejo	74.74%	69.51%	-	-5.24%	0.02
	Algarve	69.81%	64.43%	-	-5.38%	< 0.001
	Centro	80.06%	71.26%	-	-8.80%	< 0.001
	LVT	72.79%	67.17%	-	-5.62%	< 0.001
	Norte	75.95%	70.00%	-	-5.95%	< 0.001
Surgeries						
Scheduled	Mainland	3 769 666.6	3 016 807	-752 859.6	-20.0%	< 0.001
	Alentejo	178 469.2	137 323	-41 146.2	-23.1%	< 0.001
	Algarve	67 561.8	53 097	-14 464.8	-21.4%	< 0.001
	Centro	724 081.8	525 631	-198 450.8	-27.4%	< 0.001
	LVT	1 213 586.4	950 680	-262 906.4	-21.7%	< 0.001
	Norte	1 585 967.4	1 350 076	-235 891.4	-14.9%	< 0.001
Urgent	Mainland	641 705.6	584 462	-57 243.6	-8.9%	< 0.001
	Alentejo	28 928.2	28 225	-703.2	-2.4%	0.09
	Algarve	25 787.6	23 438	-2 349.6	-9.1%	0.01
	Centro	119 664.2	107 157	-12 507.2	-10.5%	< 0.001
	LVT	237 862.2	215 864	-21 998.2	-9.2%	< 0.001
	Norte	229 463.4	209 778	-19 685.4	-8.6%	< 0.001
Total	Mainland	4 411 372.2	3 601 269	-810 103.2	-18.4%	< 0.001

	Alentejo	207 397.4	165 548	-41 849.4	-20.2%	< 0.001
	Algarve	93 349.4	76 535	-16 814.4	-18.0%	< 0.001
	Centro	843 746.0	632 788	-210 958.0	-25.0%	< 0.001
	LVT	1 451 448.6	1 166 544	-284 904.6	-19.6%	< 0.001
	Norte	1 815 430.8	1 559 854	-255 576.8	-14.1%	< 0.001
People awaiting surgery within the maximum response time (%)	Mainland	84.92%	76.77%	-	-8.15%	0.11
	Alentejo	85.16%	76.01%	-	-9.15%	0.05
	Algarve	83.02%	60.11%	-	-22.91%	< 0.001
	Centro	86.94%	80.23%	-	-6.71%	< 0.001
	LVT	80.91%	68.45%	-	-12.46%	0.03
	Norte	87.52%	83.85%	-	-3.67%	0.2

Ambulance Services and Emergency Attendances

Supplementary Table 6. Evolution in ambulance services and emergency attendances, during the 12 months in study, when compared previous years. "2015-2019 average" represents the mean value of the previous 5 years. "2020/2021" represents the value for the 12 months in study – March 2020 to February 2021. "Difference n %" represents said difference in absolute number (n) and percentage of the 2015-2019 value (%). "Significance" represents the p-value obtained after performing a hypothesis test to verify if the difference was statistically significant.

	Region	Total: March 2020 to February 2021				
		2015-2019 average	2020/2021	Difference n	(%)	Significance
Red	Mainland	136 265	111 081	-25 183.8	-18.5%	< 0.001
	Alentejo	5 810	6 016	205.6	3.5%	0.25
	Algarve	7 311	4 458	-2 852.6	-39.0%	< 0.001
	Centro	26 501	21 957	-4 544.2	-17.1%	< 0.001
	LVT	46 107	37 009	-9 098.2	-19.7%	< 0.001
	Norte	50 535	41 641	-8 894.4	-17.6%	< 0.001
Orange	Mainland	3 869 286	3 075 689	-793 596.8	-20.5%	< 0.001
	Alentejo	208 023	185 252	-22 770.8	-10.9%	0.02
	Algarve	307 003	228 853	-78 150.2	-25.5%	< 0.001
	Centro	679 013	560 962	-118 050.6	-17.4%	< 0.001
	LVT	1 275 062	1 009 239	-265 823.2	-20.8%	< 0.001
	Norte	1 400 185	1 091 383	-308 802.0	-22.1%	< 0.001
Yellow	Mainland	16 719 882	12 713 307	-4 006 575.4	-24.0%	< 0.001
	Alentejo	794 759	704 816	-89 943.0	-11.3%	0.02
	Algarve	955 148	675 522	-279 626.4	-29.3%	< 0.001
	Centro	3 334 393	2 526 945	-807 448.0	-24.2%	< 0.001
	LVT	5 006 969	3 930 936	-1 076 032.6	-21.5%	< 0.001
	Norte	6 628 613	4 875 088	-1 753 525.4	-26.5%	< 0.001
Green	Mainland	12 919 196	10 085 824	-2 833 372.2	-21.9%	< 0.001
	Alentejo	613 373	538 043	-75 330.2	-12.3%	0.02
	Algarve	755 632	637 914	-117 718.2	-15.6%	< 0.001
	Centro	2 054 667	1 513 759	-540 907.6	-26.3%	< 0.001
	LVT	5 367 768	4 116 129	-1 251 639.4	-23.3%	< 0.001
	Norte	4 127 756	3 279 979	-847 776.8	-20.5%	< 0.001
Total	Mainland	33 644 629.2	25 985 901	-7 658 728.2	-22.8%	< 0.001
	Alentejo	1 621 965.4	1 434 127	-187 838.4	-11.6%	0.02
	Algarve	2 025 094.4	1 546 747	-478 347.4	-23.6%	< 0.001
	Centro	6 094 573.4	4 623 623	-1 470 950.4	-24.1%	< 0.001
	LVT	11 695 906.4	9 093 313	-2 602 593.4	-22.3%	< 0.001
	Norte	12 207 089.6	9 288 091	-2 918 998.6	-23.9%	< 0.001
Ambulance services	Mainland	1 309 628.5	1 124 854	-184 774.5	-14.1%	< 0.001

Correlation

Primary Care

Supplementary Table 7. Correlation between primary care and the restrictiveness index and number of new COVID-19 cases. "Pandemic (3/20 to 2/21)" represents the correlation by type of primary care, during the 12 months in study, with the restrictiveness index and with the number of new COVID-19 cases. "Difference to homologous period 2015-2019" represents the correlation of the difference between 2020/2021 and the previous 5 years, by type of primary care, with the restrictiveness index and number of new COVID-19 cases. The numbers in bold indicate statistically significant correlations.

	Region	Correlation with the restrictiveness index				Correlation with number of new COVID-19 cases			
		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019	
		Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Primary Care Appointments									
In person	Mainland	-0.46	0.13	**-0.6**	**0.04**	-0.08	0.79	-0.21	0.47
	Alentejo	**-0.69**	**0.01**	**-0.74**	**0.01**	-0.3	0.3	-0.31	0.28
	Algarve	-0.44	0.16	**-0.49**	**0.1**	0.07	0.81	0	0.99
	Centro	-0.51	0.09	**-0.62**	**0.03**	-0.17	0.56	-0.19	0.51
	LVT	**-0.59**	**0.04**	**-0.73**	**0.01**	-0.15	0.61	-0.31	0.27
	Norte	-0.31	0.33	-0.45	0.14	-0.06	0.83	-0.15	0.62
Remote	Mainland	0.25	0.43	0.31	0.33	**0.7**	**0.01**	**0.69**	**0.01**
	Alentejo	0.46	0.13	0.5	0.1	**0.85**	**< 0.001**	**0.82**	**< 0.001**
	Algarve	0.45	0.14	0.5	0.1	**0.83**	**< 0.001**	**0.81**	**< 0.001**
	Centro	0.38	0.22	0.47	0.12	**0.66**	**0.01**	**0.65**	**0.01**
	LVT	0.37	0.24	0.42	0.17	**0.71**	**< 0.001**	**0.94**	**< 0.001**
	Norte	0.07	0.83	0.11	0.72	**0.69**	**0.01**	**0.68**	**0.01**
At-home	Mainland	-0.18	0.57	-0.47	0.12	-0.09	0.76	-0.26	0.36
	Alentejo	0.33	0.3	0.23	0.46	**0.91**	**< 0.001**	**0.89**	**< 0.001**
	Algarve	0.28	0.38	0.2	0.54	-0.31	0.28	**-0.57**	**0.03**
	Centro	0.16	0.62	-0.08	0.82	0.06	0.85	0.3	0.3
	LVT	**-0.57**	**0.05**	**-0.79**	**< 0.001**	-0.27	0.35	**-0.53**	**0.05**
	Norte	-0.47	0.12	**-0.58**	**0.05**	-0.24	0.41	-0.45	0.1

Chronic Diseases									
Index of adequate follow-up of patients with diabetes [0-3]	Mainland	-0.36	0.25	-0.09	0.78	-0.19	0.51	-0.18	0.55
	Alentejo	-0.42	0.17	-0.22	0.48	-0.39	0.16	-0.13	0.66
	Algarve	-0.39	0.21	0.2	0.54	-0.36	0.21	-0.44	0.12
	Centro	-0.34	0.28	-0.01	0.97	-0.27	0.35	-0.27	0.35
	LVT	-0.4	0.2	0.08	0.82	-0.4	0.16	-0.14	0.64
	Norte	-0.36	0.25	-0.09	0.78	0.06	0.85	-0.32	0.27
Index of adequate follow-up of patients with hypertension [0-3]	Mainland	-0.22	0.5	0.15	0.65	-0.18	0.53	-0.44	0.12
	Alentejo	-0.3	0.34	-0.18	0.57	-0.34	0.24	-0.08	0.78
	Algarve	-0.28	0.38	0.35	0.27	-0.28	0.33	0.05	0.88
	Centro	-0.19	0.54	0.17	0.59	-0.22	0.44	0.11	0.71
	LVT	-0.24	0.44	0.18	0.58	-0.39	0.17	-0.56	0.04
	Norte	-0.21	0.52	0.13	0.69	0.03	0.91	-0.29	0.31
Incidence of thrombosis/stroke [‰]	Mainland	-0.36	0.25	-0.5	0.1	**-0.69**	**0.01**	**-0.71**	**< 0.001**
	Alentejo	-0.29	0.35	-0.53	0.07	**-0.56**	**0.04**	**-0.7**	**< 0.001**
	Algarve	-0.42	0.18	**-0.59**	**0.04**	**-0.74**	**< 0.001**	**-0.73**	**< 0.001**
	Centro	-0.34	0.27	**-0.59**	**0.04**	**-0.56**	**0.04**	**-0.57**	**0.03**
	LVT	-0.34	0.28	-0.39	0.21	**-0.7**	**< 0.001**	**-0.7**	**0.01**
	Norte	-0.37	0.24	-0.48	0.11	**-0.68**	**0.01**	**-0.69**	**0.01**
Women's and Children's Health Follow-up									
Index of adequate follow-up in the family planning area [0-3]	Mainland	**-0.68**	**0.02**	-0.41	0.18	-0.42	0.14	**-0.73**	**< 0.001**
	Alentejo	**-0.71**	**0.01**	-0.51	0.09	**-0.54**	**0.05**	**-0.66**	**0.01**
	Algarve	**-0.62**	**0.03**	-0.04	0.9	0.22	0.44	**-0.67**	**0.02**
	Centro	**-0.65**	**0.02**	-0.24	0.44	-0.4	0.16	**-0.59**	**0.03**
	LVT	**-0.69**	**0.01**	-0.46	0.13	**-0.67**	**0.01**	**-0.7**	**0.01**
	Norte	**-0.68**	**0.02**	-0.42	0.17	-0.19	0.51	**-0.74**	**< 0.001**
Index of adequate follow-up in women's	Mainland	-0.43	0.16	-0.23	0.48	**-0.79**	**< 0.001**	**-0.72**	**< 0.001**
	Alentejo	-0.34	0.27	-0.2	0.52	**-0.72**	**< 0.001**	**-0.8**	**< 0.001**
	Algarve	-0.27	0.4	-0.02	0.95	**-0.67**	**0.01**	-0.33	0.24

health [0-3]	Centro	-0.42	0.18	-0.13	0.69	**-0.73**	**< 0.001**	-0.44	0.11
	LVT	-0.46	0.13	-0.28	0.37	**-0.76**	**< 0.001**	**-0.78**	**< 0.001**
	Norte	-0.43	0.16	-0.25	0.44	**-0.77**	**< 0.001**	**-0.63**	**0.02**
Index of adequate follow-up during the 1st year of life [0-3]	Mainland	**-0.64**	**0.02**	0.35	0.26	0.29	0.32	-0.41	0.14
	Alentejo	**-0.71**	**0.01**	**-0.57**	**0.05**	-0.45	0.1	**-0.65**	**0.01**
	Algarve	**-0.64**	**0.03**	**0.61**	**0.04**	0.38	0.18	0.17	0.56
	Centro	**-0.64**	**0.02**	0.06	0.84	0.25	0.39	**-0.67**	**0.01**
	LVT	**-0.62**	**0.03**	**0.6**	**0.04**	0.25	0.38	**-0.2**	**0.05**
	Norte	**-0.65**	**0.02**	0.49	0.11	-0.01	0.97	-0.3	0.29
Index of adequate follow-up during the 2nd year of life [0-3]	Mainland	**-0.68**	**0.02**	-0.46	0.13	0.25	0.4	**-0.61**	**0.02**
	Alentejo	**-0.72**	**0.01**	**-0.61**	**0.04**	-0.5	0.07	**-0.71**	**< 0.001**
	Algarve	**-0.68**	**0.02**	-0.22	0.49	0.28	0.34	**-0.53**	**0.05**
	Centro	**-0.68**	**0.01**	-0.46	0.13	0.2	0.5	**-0.68**	**0.01**
	LVT	**-0.66**	**0.02**	-0.41	0.19	-0.47	0.09	**-0.75**	**< 0.001**
	Norte	**-0.68**	**0.01**	-0.48	0.12	-0.1	0.74	-0.37	0.19
Cancer Screening and New Diagnoses									
Women aged [50; 70[, with record of a mammogram within the previous 2 years (%)	Mainland	**-0.65**	**0.02**	-0.35	0.26	-0.37	0.19	**-0.72**	**< 0.001**
	Alentejo	**-0.66**	**0.02**	-0.23	0.47	**-0.53**	**0.05**	**-0.63**	**0.02**
	Algarve	**-0.68**	**0.02**	-0.3	0.34	**-0.53**	**0.05**	**-0.74**	**< 0.001**
	Centro	**-0.65**	**0.02**	-0.35	0.27	-0.49	0.07	**-0.64**	**0.01**
	LVT	**-0.65**	**0.02**	-0.33	0.29	**-0.56**	**0.04**	**-0.68**	**0.01**
	Norte	**-0.65**	**0.02**	-0.37	0.23	0.26	0.38	**-0.72**	**< 0.001**
Women aged [25; 60[screened for cervical cancer (%)	Mainland	**-0.68**	**0.02**	-0.28	0.39	-0.43	0.12	**-0.7**	**0.01**
	Alentejo	**-0.71**	**0.01**	-0.39	0.21	**-0.57**	**0.03**	**-0.73**	**< 0.001**
	Algarve	**-0.65**	**0.02**	0.45	0.14	0.22	0.44	-0.2	0.49
	Centro	**-0.66**	**0.02**	-0.16	0.62	-0.44	0.12	**-0.53**	**0.05**
	LVT	**-0.69**	**0.01**	-0.35	0.27	**-0.68**	**0.01**	**-0.71**	**< 0.001**
	Norte	**-0.68**	**0.02**	-0.29	0.36	-0.19	0.51	**-0.68**	**0.01**
	Mainland	**-0.65**	**0.02**	-0.17	0.94	-0.34	0.24	-0.49	0.07

People aged [50; 75[, screened for colorectal cancer (%)	Alentejo	**-0.61**	**0.04**	0.27	0.39	0.28	0.33	0.04	0.88
	Algarve	**-0.68**	**0.02**	-0.16	0.62	0.22	0.44	-0.46	0.1
	Centro	**-0.64**	**0.02**	-0.01	0.99	-0.43	0.12	-0.31	0.29
	LVT	**-0.68**	**0.02**	-0.19	0.55	**-0.58**	**0.03**	**-0.62**	**0.02**
	Norte	**-0.65**	**0.02**	-0.22	0.48	0.26	0.38	-0.5	0.07
Incidence of breast cancer in women [‰]	Mainland	-0.33	0.3	-0.31	0.33	**-0.71**	**< 0.001**	**-0.77**	**< 0.001**
	Alentejo	-0.12	0.7	-0.13	0.69	**-0.59**	**0.03**	**-0.74**	**< 0.001**
	Algarve	-0.18	0.58	-0.27	0.4	**-0.7**	**0.01**	**-0.64**	**0.01**
	Centro	-0.27	0.4	-0.19	0.55	**-0.57**	**0.03**	**-0.74**	**< 0.001**
	LVT	-0.4	0.2	-0.41	0.18	**-0.73**	**< 0.001**	**-0.74**	**< 0.001**
	Norte	-0.33	0.3	-0.29	0.36	**-0.69**	**0.01**	**-0.71**	**< 0.001**
Incidence of colorectal cancer [‰]	Mainland	-0.37	0.23	-0.5	0.1	**-0.71**	**< 0.001**	**-0.7**	**0.01**
	Alentejo	-0.38	0.22	-0.38	0.23	**-0.71**	**< 0.001**	**-0.64**	**0.01**
	Algarve	-0.17	0.6	-0.24	0.44	**-0.61**	**0.02**	**-0.74**	**< 0.001**
	Centro	-0.45	0.14	**-0.62**	**0.03**	**-0.64**	**0.01**	-0.48	0.08
	LVT	-0.31	0.32	-0.42	0.17	**-0.68**	**0.01**	**-0.72**	**< 0.001**
	Norte	-0.38	0.22	-0.51	0.09	**-0.67**	**0.01**	**-0.7**	**0.01**

Hospital Care

Supplementary Table 8. Correlation between hospital care and the restrictiveness index and number of new COVID-19 cases. "Pandemic (3/20 to 2/21)" represents the correlation by type of hospital care, during the 12 months in study, with the restrictiveness index and with the number of new COVID-19 cases. "Difference to homologous period 2015-2019" represents the correlation of the difference between 2020/2021 and the previous 5 years, by type of hospital care, with the restrictiveness index and number of new COVID-19 cases. The numbers in bold indicate in bold indicate statistically significant correlations.

	Region	Correlation with the restrictiveness index				Correlation with number of new COVID-19 cases			
		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019	
		Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Hospital Appointments									
First Appointments	Mainland	-0.54	0.06	**0.61**	**0.03**	0.06	0.84	-0.45	0.1
	Alentejo	**-0.58**	**0.04**	**0.61**	**0.03**	-1	0.71	-0.46	0.09
	Algarve	**-0.61**	**0.03**	**-0.61**	**0.03**	-0.18	0.52	0.22	0.43
	Centro	**-0.55**	**0.05**	**0.64**	**0.02**	-0.08	0.77	-0.38	0.16
	LVT	**-0.55**	**0.05**	0.51	0.08	-0.13	0.64	-0.48	0.07
	Norte	-0.52	0.07	**0.67**	**0.01**	0.31	0.27	-0.11	0.69
Follow-up Appointments	Mainland	**-0.55**	**0.05**	**0.65**	**0.02**	0.28	0.32	-0.41	0.13
	Alentejo	**-0.59**	**0.03**	**0.6**	**0.03**	0.26	0.34	-0.46	0.08
	Algarve	**-0.6**	**0.03**	0.66	0.07	0.24	0.39	0.18	0.65
	Centro	**-0.57**	**0.04**	**0.61**	**0.03**	-0.09	0.74	-0.41	0.13
	LVT	**-0.54**	**0.05**	**0.62**	**0.02**	-0.12	0.66	-0.49	0.07
	Norte	-0.54	0.06	**0.68**	**0.01**	0.29	0.3	-0.1	0.73
1st Appointments in adequate time (%)	Mainland	**0.66**	**0.02**	**0.69**	**0.01**	0.1	0.74	0.16	0.57
	Alentejo	**0.72**	**0.01**	**0.74**	**0.01**	-0.21	0.48	-0.21	0.48
	Algarve	**0.66**	**0.02**	**0.65**	**0.02**	**0.81**	**< 0.001**	**0.87**	**< 0.001**
	Centro	**0.69**	**0.01**	**0.72**	**0.01**	0.3	0.3	0.36	0.21
	LVT	**0.58**	**0.05**	**0.64**	**0.02**	-0.25	0.39	-0.18	0.53
	Norte	**0.65**	**0.02**	**0.68**	**0.01**	-0.15	0.61	-0.1	0.73

Surgeries									
Elective	Mainland	-0.53	0.06	**0.59**	**0.04**	0.06	0.82	-0.32	0.24
	Alentejo	**-0.57**	**0.04**	**0.58**	**0.04**	0.26	0.34	-0.38	0.16
	Algarve	**-0.61**	**0.03**	0.52	0.07	0.14	0.61	-0.27	0.32
	Centro	**-0.57**	**0.04**	0.52	0.07	-0.1	0.74	-0.4	0.14
	LVT	**-0.55**	**0.05**	0.52	0.07	-0.13	0.64	-0.49	0.06
	Norte	-0.51	0.08	**0.63**	**0.02**	0.32	0.25	0.04	0.88
Urgent	Mainland	**-0.57**	**0.04**	0.45	0.12	0.26	0.35	-0.17	0.55
	Alentejo	**-0.61**	**0.03**	0.32	0.28	0.26	0.34	-0.33	0.23
	Algarve	**-0.61**	**0.03**	**0.62**	**0.02**	-0.16	0.56	-0.39	0.15
	Centro	**-0.58**	**0.04**	0.49	0.09	-0.1	0.73	-0.4	0.14
	LVT	**-0.57**	**0.04**	0.3	0.32	-0.13	0.64	-0.55	0.04
	Norte	**-0.56**	**0.05**	**0.56**	**0.05**	0.28	0.3	-0.26	0.35
People awaiting surgery within the maximum response time (%)	Mainland	0	0.99	-0.07	0.84	-0.48	0.08	**-0.56**	**0.04**
	Alentejo	0.6	0.03	0.48	0.11	0.14	0.63	0.12	0.69
	Algarve	-0.23	0.46	-0.2	0.54	**-0.57**	**0.03**	**-0.62**	**0.02**
	Centro	-0.23	0.45	0.39	0.21	-0.18	0.52	-0.27	0.34
	LVT	-0.42	0.15	-0.48	0.11	**-0.62**	**0.01**	**-0.68**	**0.01**
	Norte	0.37	0.21	0.01	0.97	-0.24	0.38	-0.17	0.57

Ambulance Services and Emergency Attendances

Supplementary Table 9. Correlation between ambulance services and emergency attendances and the restrictiveness index and number of new COVID-19 cases. "Pandemic (3/20 to 2/21)" represents the correlation by level of the Manchester Triage System and ambulance services, during the 12 months in study, with the restrictiveness index and with the number of new COVID-19 cases. "Difference to homologous period 2015-2019" represents the correlation of the difference between 2020/2021 and the previous 5 years, by level of the Manchester Triage System and ambulance services, with the restrictiveness index and number of new COVID-19 cases. The numbers in bold indicate in bold indicate statistically significant correlations.

	Region	Correlation with the restrictiveness index				Correlation with number of new COVID-19 cases			
		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019		Pandemic (3/20 to 2/21)		Difference to homologous period 2015-2019	
		Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Red	Mainland	**-0.57**	**0.04**	0.49	0.09	0.26	0.35	-0.04	0.88
	Alentejo	**-0.58**	**0.04**	0.2	0.52	0.36	0.18	-0.04	0.09
	Algarve	**-0.62**	**0.02**	**0.59**	**0.03**	0.27	0.34	-0.28	0.3
	Centro	**-0.59**	**0.03**	0.5	0.08	-0.12	0.67	-0.39	0.15
	LVT	**-0.56**	**0.04**	0.48	0.1	0.29	0.3	-0.36	0.19
	Norte	**-0.56**	**0.04**	0.48	0.1	0.28	0.31	-0.19	0.5
Orange	Mainland	**-0.6**	**0.03**	0.39	0.19	0.23	0.4	-0.15	0.59
	Alentejo	**-0.64**	**0.02**	0.22	0.46	0.26	0.34	-0.2	0.47
	Algarve	**-0.67**	**0.01**	0.46	0.11	0.19	0.5	**-0.53**	**0.04**
	Centro	**-0.59**	**0.03**	0.47	0.1	-0.11	0.7	-0.39	0.15
	LVT	**-0.6**	**0.03**	0.34	0.26	0.22	0.44	**-0.53**	**0.04**
	Norte	**-0.59**	**0.03**	0.42	0.16	0.26	0.36	-0.31	0.26
Yellow	Mainland	**-0.61**	**0.03**	0.37	0.22	0.2	0.48	-0.19	0.51
	Alentejo	**-0.66**	**0.01**	0.1	0.76	0.19	0.49	-0.29	0.3
	Algarve	**-0.68**	**0.01**	0.46	0.12	0.14	0.61	-0.53	0.04
	Centro	**-0.62**	**0.02**	0.41	0.16	-0.13	0.63	-0.42	0.12
	LVT	**-0.61**	**0.03**	0.31	0.3	0.17	0.54	**-0.53**	**0.04**
	Norte	**-0.6**	**0.03**	0.41	0.17	0.25	0.37	-0.35	0.21
Green	Mainland	**-0.61**	**0.03**	0.35	0.25	0.2	0.48	-0.18	0.53

	Alentejo	**-0.65**	**0.02**	0.15	0.64	-0.17	0.54	-0.22	0.44
	Algarve	**-0.66**	**0.01**	0.32	0.29	0.14	0.61	**-0.62**	**0.01**
	Centro	**-0.62**	**0.03**	0.43	0.14	-0.12	0.66	-0.42	0.12
	LVT	**-0.62**	**0.02**	0.29	0.33	0.17	0.54	-0.56	0.03
	Norte	**-0.58**	**0.04**	0.41	0.16	0.28	0.32	-0.28	0.31
Total	Mainland	**-0.61**	**0.03**	0.38	0.2	0.23	0.4	-0.15	0.58
	Alentejo	**-0.65**	**0.02**	0.13	0.66	0.22	0.42	-0.25	0.36
	Algarve	**-0.67**	**0.01**	0.43	0.15	0.14	0.61	**-0.53**	**0.04**
	Centro	**-0.62**	**0.02**	0.42	0.15	-0.13	0.65	-0.42	0.12
	LVT	**-0.62**	**0.03**	0.31	0.31	0.17	0.54	**-0.53**	**0.04**
	Norte	**-0.6**	**0.03**	0.41	0.16	0.26	0.35	-0.32	0.24
Ambulance services	Mainland	-0.4	0.19	**-0.58**	**0.05**	-0.1	0.72	-0.2	0.49