Original

Protective equipment and detection of infection in Primary Care paediatricians during the COVID-19 pandemic

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Abstract

Introduction: during the COVID-19 pandemic, the use of personal protective equipment and devices by health care workers is essential to prevent transmission of the infection in the health care community.

Methods: the Occupational-Professional Group of the Asociación Española de Pediatría de Atención Primaria (Spanish Association of Primary Care Paediatrics, AEPap) carried out a survey of the regional chapters of the AEPap to establish the availability of personal protective equipment to primary care paediatricians (PCPs), and the diagnostic tests used to detect infection in PCPs.

Results: in the month of March, adequate protection was available to PCPs in 32% of the autonomous communities (ACs), a percentage that rose to 70% in April. Cases of COVID-19 in PCPs have been recorded in every AC., although it is difficult to quantify the number of affected providers. Based on our data, adding the number of providers with positive tests, the providers that were quarantined and the providers admitted to hospital, the total amounts to 7.65% of PCPs. Rapid serologic tests, PCR tests or both have been used to test PCPs in the last days of April in 6 ACs, and in 6 others in the first days of May. The only AC where testing has not been performed is Aragon. We found an association between the availability of protective equipment and health care expenditure.

Conclusions: the supply of protective equipment has been inadequate. Autonomous communities with the highest health care expenditures had adequate supplies of personal protective equipment earlier. There have been cases of infection in PCPs in every AC, with the highest frequencies reported in Madrid, Castilla y Leon and Valencia. Testing for detection of affected health professionals was performed at a late stage.

Key words:
• COVID-19
• Health care workers
• Prevention of occupational hazards

Sistemas de protección y detección de contagios en los pediatras de Atención Primaria en la epidemia por COVID-19

Abstract

Introducción: durante la pandemia de COVID-19, el uso de equipos y dispositivos de protección por parte de los profesionales es fundamental para evitar la transmisión de la infección en el colectivo de sanitarios.

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Material y métodos: el Grupo Laboral-Profesional de la Asociación Española de Pediatría de Atención Primaria (AEPap) ha realizado una encuesta a los vocales autonómicos de la AEPap para conocer la disponibilidad que han tenido los pediatras de Atención Primaria (PAP) de sistemas de protección frente a la enfermedad, y las pruebas diagnósticas realizadas para el diagnóstico de los contagios de los PAP.

Resultados: en marzo de 2020, solo en el 32% de las comunidades autónomas (CC. AA.), los pediatras tenían sistemas de protección adecuados. En abril ascendió al 70%. En todas las CC. AA. se han registrado casos de PAP enfermos, aunque es difícil cuantificar el número de afectados. De las que tenemos datos, sumando el número de pediatras enfermos conocido, más test de reacción en cadena de la polimerasa (PCR) positivo, los que han estado en aislamiento y los ingresados, la cifra asciende al 7,65% de la cifra total de PAP. Los test rápidos serológicos o PCR o ambos se han realizado en seis comunidades los últimos días de abril y en otras seis los primeros días de mayo. Entre las CC. AA. de las que hay información, Aragón es la única comunidad en la que no se ha realizado test. Se ha correlacionado la disponibilidad de los sistemas de protección y el gasto sanitario

Conclusiones: los sistemas de protección han sido insuficientes. Las CC. AA. con mayor gasto sanitario han contado más precozmente con sistemas de protección adecuados. Han resultado infectados PAP en todas las comunidades autónomas, especialmente en Madrid, Castilla y León y Comunidad Valenciana. La detección de profesionales afectos por la infección ha sido tardía.

Palabras clave:
- COVID-19
- Prevención de riesgos laborales
- Profesionales sanitarios

INTRODUCTION

The Occupational-Professional Working Group of the Asociación Española de Pediatría de Atención Primaria (Spanish Association of Primary Care Paediatrics, AEPap) is concerned by the lack of protective gear and supplies for diagnosis of diseased health professionals recently experienced, and the difficulties that this creates in offering adequate health care services to the paediatric and adolescent population during this pandemic.

To understand the current situation in different autonomous communities (ACs) in Spain, we carried out a survey of the representatives of regional chapters of the AEPap to assess the availability to primary care paediatricians (PCPs) of protective equipment against coronavirus disease 2019 (COVID-19), the diagnostic tests used to assess infection in PCPs and the management of the pandemic at the primary care level.

Based on data from the Centro de Coordinación de Alertas y Emergencias Sanitarias (Centre for Coordination of Health Alerts and Emergencies) of the Spanish Ministry of Health[1] (**Fig. 1**), cases of infection skyrocketed in March, peaking at the end of the month (9000 new cases/day). In March, the number of infected individuals reached approximately 100 000. It then decreased gradually through April 15 (5000 new cases/day) and from this date declined more steeply, with the incidence dropping to less than 1000 new cases/day in May.

We need to gain knowledge on the evolution of the pandemic and assess when protective equipment was used and the impact of the lack of such equipment at specific times.

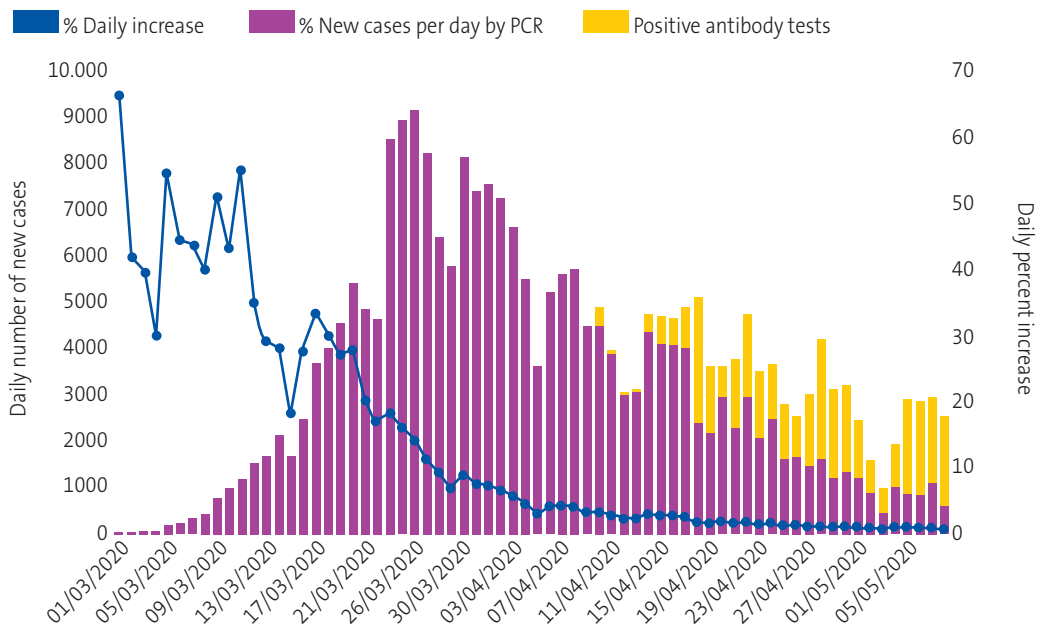
MATERIAL AND METHODS

We asked regional chapter representatives for information on their respective autonomous communities. We collected this information by means of a Google Docs form.

We requested information on personal protection equipment, and FFP2 or FFP3masks (FFP stands for filtering face piece). These masks protect against aerosols and pathogens, preventing their inhalation, with a filtration effectiveness of 92% (FFP2) and 98% (FFP3), corresponding to a protection for up to 12 times and 50 times the threshold limit value (TLV), respectively.[2,3] Correct use of masks requires fitting them to the face, completely covering the nose and mouth to protect membranes and mucosal surfaces. Providers need to put on their masks outside the room where the patient stays and dispose of them on exiting the room in a closed container placed outside the room for that purpose.

Protection of mucosal surfaces may also require face shields, goggles or both, personal protective

Figura 1. Temporal trends of infection in Spain. Data from the Ministry of Health[1]



equipment (PPE)[4] and doubling gloves, with longer gloves on top of shorter ones, to ensure that no part of the body is exposed to the virus.

To investigate all these aspects as well as the diagnostic tests used to assess health care providers and organizational aspects of the management of the pandemic, we developed a questionnaire that is shown in **Table 1**.

We sent the questionnaire out in May 5, 2020 and collected responses in the 15 days that followed.

A few emails were exchanged to clarify some questions and to make corrections to the information received.

RESULTS

We received 15 responses from different ACs. We did not receive data for Extremadura or Asturias.

We present the results for each section of the questionnaire in different sections of text.

Protective equipment to prevent contagion available in primary care paediatrics settings

In the analysis by AC, we assessed the times when PPE, FFP2/FFP3 masks, special long gloves, face shields and goggles were available.

Personal protective equipment was available in 40% of ACs in March and in 90% in April. Adequate PPE was not available in 10% of ACs.

When it came to the reutilization of PPE, which should be used just once, 60% of ACs reported re-using protective gear.

The situation was even worse when it came to FFP2/FFP3 masks. These masks were only available in 14% of ACs in March and were reused practically everywhere. In some health care centres, the message was to "take good care of them, as there are few".

Other protective measures include the use of special gloves that are longer than normal gloves to wear on top of the latter, which increases protection against infection. These gloves were only available in 14% of ACs in March and 14% more in

Table 1. Questionnaire: personal protection equipment and detection of infection during the COVID-19 pandemic

Questions		Answer choices
Items regarding the availability of personal protective equipment in PC	In your autonomous community, when did primary care paediatricians have access to PPE to care for patients with suspected COVID-19 in a sufficient amount and at the right time to guarantee their safety and the patients'?	March / April / Not available / I do not know
	Did PPE have to be reused?	Yes / No / I do not know
	When did you have an adequate supply of FFP2-FFP3 masks?	March / April / Not available / I do not know
	Masks had to be reused	Yes / No / I do not know
	When were special gloves (longer) available to manage these patients?	March / April / Not available / I do not know
	When were masks available?	March / April / Not available / I do not know
	When were goggles available?	March / April / Not available / I do not know
	In your autonomous community, did you need to resort to donations or home-made equipment?	Yes / No / I do not know
	If so, what PPE did this apply to?	Specify
Items regarding care delivery in paediatrics clinics	In your autonomous community, did you physically separate the areas where patients with suspected COVID-19 received care from those where other patients received care?	Yes / No / I do not know
	Was it possible to appoint paediatricians to manage patients with suspected COVID-19 exclusively for their entire shift?	Yes / No / I do not know
Enfermedad de pediatras de Atención Primaria (PAP)	¿Conoces si ha habido en tu comunidad PAP afectados por la COVID-19?	Sí / No / Lo desconozco
	Número de PAP con sospecha clínica	Número
	Número de PAP con test positivos	Número
	Número de PAP que han estado de baja/aislamiento	Número
	Número PAP ingresados	Número
Infection or disease in PCPs	Do you know if any PCPs in your AC have been affected by COVID-19?	Yes / No / I do not know
	Number of PCPs with clinical suspicion	count
	Number of PCPs with positive test results	count
	Number of PCPs given leave/quarantined	count
	Number of PCPs admitted to hospital	count

AC: Autonomous Community; **FFP:** filtering face piece; **PCP:** primary care paediatrician; **PCR:** polymerase chain reaction; **PPE:** personal protective equipment.

April. Providers in all other ACs did not have access to them.

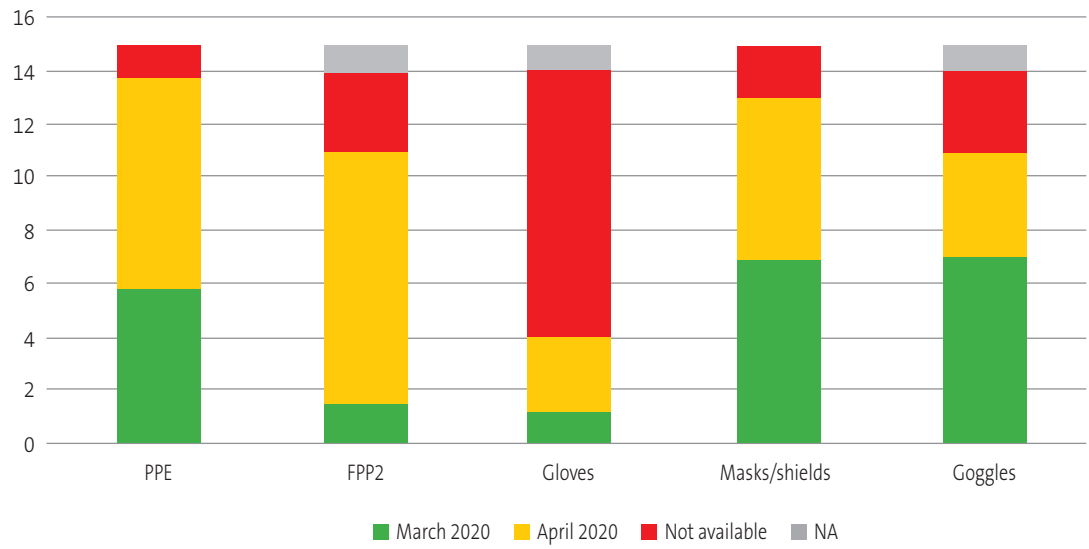
The availability of goggles was slightly greater, with goggles available in 50% of ACs in March and an additional 28% in April, and a similar availability of face shields, which were available in 50% of ACs in March and an additional 40% in April.

The results on the availability of PPE can be found in Fig. 2.

In March, when the coronavirus pandemic reached its peak, out of the 5 types of PPE under consideration, none were available in 5 ACs, 1 was available in 4 ACs, 2 were available in 2 ACs and 4 were available in 3 ACs.

The ACs that did not have access to any of the PPE in March were the Canary Islands, the Valencian Community, Cantabria, Andalusia and the Balearic Islands. A single type of PPE was available in the ACs of Catalonia, Madrid, Aragon and Galicia. Two types were available in Castilla-La Mancha and Murcia, and 4 types were available in Castilla y Leon, Navarre and the Basque Country. In the

Figure 2. Availability of different types of personal protective equipment by number of autonomous communities and month.



We tried to represent the level of protection of paediatricians using colours. Green: March, paediatricians protected from the outset. Yellow: April, equipment was available, but late. Red, equipment was not available and paediatricians were unprotected. Gray: no data available.

month of March, none of the ACs had all 5 types of PPE available for primary care paediatricians.

Solidary donations partly made up for this lack of equipment, with the following donations described by respondents: face shields donated by universities or made at home, other types of home-made shields, home-made caps, donations from hardware stores and various associations and firms, personal purchase of FFP2 masks by providers, cloth masks, plastic aprons, plastic gowns, gloves and goggles, and even posting of online tutorials on how to construct protective gowns with garbage bags, giving rise to the image of a country that does not have "one of the best health systems in the world," as government authorities claim.

Characteristics of care delivery in paediatrics clinics

In all ACs, separate care areas were set up for management of patients with suspected COVID-19. Ideally, to reduce spread among providers, a single provider would have been exclusively dedicated for the entire work shift to the management of children with suspected COVID-19 while the rest of providers managed patients "without suspicion", that is, children coming for routine child health visits and children with non-infectious disease. This was the most frequent approach, reported by all ACs except Madrid, Castilla-La Mancha, Aragon, Galicia, La Rioja and Navarra.

Primary care paediatricians that contracted COVID-19

One of the consequences of this lack of equipment and organizational resources was the high number of PCPs infected by the virus.

All the ACs that submitted information through our questionnaire reported cases of primary care paediatricians that contracted COVID-19.

We asked about the number of PCPs that were symptomatic, the number with positive test results, the number quarantined or removed from duty and the number hospitalised with COVID-19.

The representatives of some ACs informed us that while they were aware of cases of infection in paediatricians, they were not able to provide specific frequencies. The ACs for which we were able to

Table 2. Primary care paediatricians infected by SARS-CoV-2/with COVID-19

	Symptomatic	Positive test	Quarantined	Hospitalised
Frequency	38	23	47	2
Reference population of paediatricians	1469	1145	1575	1433

obtain quantitative data on this aspect were the Valencian Community, Cantabria, Aragon, Castilla y Leon, Navarre and Balearic Islands. Some of these regions provided information on every detail that we had asked about and others only provided information on some, and therefore the denominator is different for the results for each item. We obtained the total number of paediatricians in the primary care system of each AC from data on the statistics portal of the primary care system database.[5]

Diagnostic tests performed routinely on PCPs

We tried to determine the times when PCPs were tested routinely to determine whether they had an active infection or had had the infection in past, either by polymerase chain reaction (PCR) or rapid serology tests.

Tests to detect active infection in PCPs (PCR test) were only performed in half of the ACs. Rapid antibody tests were performed in 70% of ACs.

Both PCR and rapid antibody tests were performed from late April to early May, therefore at a late stage, as the number of cases was declining at the time, which means that there could have been paediatricians with asymptomatic infection that was detected late and that may have been managing patients during the active stage of infection.

Of the 15 ACs for which were able to obtain data, 1 did not use any tests, 5 used 1 test and another 5 used 2 tests. For Navarre, although we did obtain responses overall, we did not get information on this aspect.

Table 3 summarises the data on the tests performed on primary care providers and time they started being used by AC.

DISCUSSION

In late March, the lack of protective gear for health care professionals was a situation that even the health care authorities had to reluctantly acknowledge, if minimising the magnitude of the problem.

Thus, for example, in late March, as reported in different media outlets,[6] the lack of PPE was recognised as one of the causes of the surge in the number of infections in health care workers, while taking into account that some health professionals may have acquired the infection in the community as opposed to the workplace.

While health care professionals have been consistently aware of the lack of protective equipment, the objective of our study was to determine the times when adequate supplies of PPE were available in each AC. We found that in the month of March lack of availability was not, as some would claim, an isolated or momentary problem, but rather a widespread one. Thus, at the level of paediatric primary care, 68% of AC did not have PPE available for primary care paediatricians.

A previous study found a correlation between the health expenditure per capita in each of the ACs and inequalities in the access to certain services offered by the different ACs.[7] We thus went on to compare the availability of PPE to the health care expenditure in each AC.

We based this analysis in the consolidated public health expenditure per inhabitant and AC[8] (Table 4).

Table 5 compares the association with the consolidated primary care expenditure in ACs in which the availability of PPE was lower in the month of march compared to those where there was greater availability.

Thus, although all ACs had difficulty acquiring PPE for primary care workers, we found an association with the consolidated primary care expenditure of

Table 3. Diagnostic tests performed and date they started being used

Autonomous community	PCR	Rapid antibody tests	Number of tests used
Andalusia	No	05/May/2020	1
Aragon	No	No	0
Balearic Islands	06/May/2020	06/May/2020	2
Canary Islands	20/April/2020	20/April/2020	2
Cantabria	No	20/April/2020	1
Castilla y Leon	No	15/April/2020	1
Castilla-La Mancha	No	04/May/2020	1
Catalonia	Yes	Yes	2
Valencian Community	28/April/2020	01/May/2020	2
Galicia	No	05/May/2020	1
Madrid	No	06/May/2020	1
Murcia	No	28/April/2020	1
Navarre	No data	No data	?
Basque Country	27/April/2020	27/April/2020	2
La Rioja	29/April/2020	28/April/2020	2

PCR: Polymerase chain reaction.

the ACs, so that the greater the expenditure, the greater the availability of protective equipment to paediatricians.

The delivery of care to children with suspected coronavirus and children with other health care problems while maintaining the routine healthy child programme through age 15 months with the corresponding vaccinations has required considerable effort by PCPs in recent months, and has required separate care pathways in paediatric care, one for children with suspected COVID-19 and another for all other children.

In its position document on reopening and easing of restrictions in the context of COVID-19, the AE-

Table 4. Consolidated health care expenditure in 2018 by autonomous community[8]

	Euro per capita	Percentage allocated to PC	PC expenditure per capita (euro)
Spain	1416	13.9%	196.8
Andalusia	1212	17.4%	210.9
Aragon	1601	12.7%	203.3
Asturias	1676	12.6%	211.2
Balearic Islands	1407	11.9%	167.4
Canary Islands	1399	13.5%	188.9
Cantabria	1543	14.1%	217.6
Castilla y Leon	1577	15.2%	239.7
Castilla-La Mancha	1438	17%	244.5
Catalonia	1432	13%	186.2
Valencian Community	1415	13.1%	185.4
Extremadura	1626	15.8%	256.9
Galicia	1491	11.9%	177.4
Madrid	1274	11.5%	146.5
Murcia	1567	13.9%	217.8
Navarre	1651	14.4%	237.7
Basque Country	1753	13.9%	243.7
La Rioja	1477	14.3%	211.2

PC: Primary care.

Table 5. Comparison of consolidated primary health care expenditure and number of elements of personal protective equipment available to primary care paediatricians in March 2020

PPE elements	Autonomous community	Mean expenditure	Difference compared to national mean
None or 1	Canary Islands, Valencia, Cantabria, Andalusia, Balearic Islands, Madrid, Aragon and Galicia	166.25	-15.5%
More than 2	Castilla-La Mancha, Murcia, Castilla y Leon, Navarre and Basque Country	236.68	+20.2%
	National mean	196.8	

PC: Primary care; **PPE:** Personal protective equipment.

Pap recommends maintaining the 2 care pathways, as they will be necessary in new waves of the pandemic,[9] and this requires a greater number of primary care paediatricians.

CONCLUSIONS

- The availability of PPE at the peak of the pandemic was insufficient.
- Autonomous communities with greater health care expenditures managed to obtain adequate supplies of PPT earlier.
- Primary care paediatricians have been infected in every autonomous community, with the highest frequencies found in Madrid, Castilla y Leon and Valencia.
- Detection of infection in health care professionals was delayed.
- The care of children with suspected COVID-19 and of children without suspected COVID-19 requires separate care pathways, which increases the demand for PCPs.

RECOMMENDATIONS

- Supply all primary care centres with the necessary personal protective equipment and in sufficient amounts to prevent further infection of PCPs and other health care staff.
- Monitor PCPs and other health care staff by means of periodic serologic and PCR tests to remove those that are infected from duty and know the number of affected health care workers.
- Hire PCPs to cover providers on vacation and to increase the number of PCPs available to provide adequate coverage to the 2 separate care pathways. This would require hiring all residents in paediatrics that complete their training this year, allocating them to hospitals and primary care settings based on current health care demands.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare in relation to the preparation and publication of this article.

ABREVIATURAS

AC: autonomous community • **AEPap:** Asociación Española de Pediatría de Atención Primaria • **FFP:** filtering face piece (masks: FFP2/FFP3) • **PC:** Primary Care • **PCP:** primary care paediatrician • **PCR:** polymerase chain reaction • **PPE:** personal protection equipment • **TLV:** threshold limit value.

REFERENCES

1. Centro de Coordinación de Alertas y Emergencias Sanitarias. Actualización n.º 102. Enfermedad por el coronavirus (COVID-19). 11.05.2020 (data consolidated at 21:00 on 10.05.2020). In: Spanish Ministry of Health, Consumption and Social [online] [accessed 20/07/2020]. Available at www.mscbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov-China/documentos/Actualizacion_102_COVID-19.pdf
2. Mascarillas. In: Hospital Universitario Donostia. Basic Occupational Health Prevention Unit [online] [accessed 20/07/2020]. Available at www.osakidetza.euskadi.eus/contenidos/informacion/hd_publicaciones/es_hdon/adjuntos/GuiaSL23c.pdf
3. Clasificación internacional de mascarillas. In: AEPap [online] [accessed 20/07/2020]. Available at www.aepap.org/sites/default/files/mascarillas1.pdf
4. Quesada VJ (trans.). CDC-poster: colocación EPI. In: Dropbox [online] [accessed 20/07/2020]. Available at www.dropbox.com/s/htndud0ju8dnajo/CDC-poster_colocaci%C3%B3n%20EPI.pdf?dl=0
5. Statistics Portal of the Primary Care System Database [online] [accessed 20/07/2020]. Available at https://pestadistico.inteligenciadegestion.mscbs.es/publicoSNS/comun/Cubo.aspx?IdNodo=23644
6. Soto A. Sanidad reconoce que la falta de medios ha provocado contagios entre sanitarios. In: El Correo [online] [accessed 20/07/2020]. Available at www.elcorreo.com/sociedad/salud/gobierno-admite-falta-20200324184557-nt.html
7. Gorrotxategi Gorrotxategi PJ, Sánchez Pina C, Villaizán Pérez C, Suárez Vincent E, Mambie Meléndez M, vocales autonómicos y Grupo Laboral Profesional. Inequidades en salud. Posicionamiento de la AEPap. Rev Pediatr Aten primaria. 2020;22 [in press].
8. Rodríguez Blas MC. Estadística de Gasto Sanitario Público 2018: Principales resultados. Edición marzo 2020. Unidad responsable de la Estadística de Gasto Sanitario Público. Secretaría General de Sanidad Ministerio de Sanidad. In: Spanish Ministry of Health, Consumption and Social Welfare [online] [accessed 20/07/2020]. Available at www.mscbs.gob.es/estadEstudios/estadisticas/docs/EGSP2008/egspPrincipalesResultados.pdf
9. Propuesta de desescalada de la AEPap In: AEPap [online] [accessed 20/07/2020]. Available at www.aepap.org/sites/default/files/noticia/archivos-adjuntos/prpuesta_de_desescalada.grupo_laboral-profesional_y_junta_def.pdf