DOI: https://doi.org/10.36489/nursing.2021v24i272p5098-5107

Budgetary impact on the purchase of personal protective equipment for coping with COVID-19

ABSTRACT | Covid-19 is caused by the coronavirus and transmitted by close contact, droplets and aerosols. To minimize the risk of transmission, healthcare professionals should use personal protective equipment, such as masks or respirators, aprons and gloves. The objective was to analyze the amount consumed of this personal protective equipment before and during the pandemic and also the budgetary impact caused for its acquisition. Retrospective study, comprising the months of January / February 2020 (before the Covid pandemic - 19) and March / April (during the Covid pandemic - 19), in a public hospital. Evaluation of consumption and cost of acquisition of inputs considered as personal protective equipment was performed. Data were collected in the institution's own information system. All the items analyzed showed an important increase in the quantity used and, mainly, in the purchase value, reaching 525% more expensive compared to the months without a pandemic. The increase in costs was related to the scarcity of products both in the national and international markets. Understanding the amounts paid and establishing equipment dispensing control, favors budgetary planning.
Keywords: Hospital Costs; Coronavirus Infections; Personal Protective Equipment.

RESUMEN | El covid-19 es causado por el coronavirus y se transmite por contacto cercano, gotitas y aerosoles. Para minimizar el riesgo de transmisión, los profesionales de la salud deben usar equipo de protección personal, como mascarillas o respiradores, delantales y guantes. El objetivo fue analizar la cantidad consumida de este equipo de protección personal antes y durante la pandemia y también el impacto presupuestario que ocasionó su adquisición. Estudio retrospectivo, que comprende los meses de enero / febrero de 2020 (antes de la pandemia Covid - 19) y marzo / abril (durante la pandemia Covid - 19), en un hospital público. Se realizó una evaluación de consumo y costo de adquisición de insumos considerados como equipo de protección personal, los datos fueron recolectados en el sistema de información propio de la institución. Todos los artículos analizados mostraron un aumento importante en la cantidad utilizada y, principalmente, en el valor de compra, llegando a ser un 525% más caro respecto a los meses sin pandemia. El aumento de costos estuvo relacionado con la escasez de productos tanto en el mercado nacional como internacional. Conocer los montos pagados y establecer el control de dispensación de equipos favorece la planificación presupuestaria.
Palabras claves: Costos de Hospital; Infecciones por Coronavirus; Equipo de Protección Personal.

RESUMO | A Covid-19 é causada pelo coronavírus e transmitida por contato próximo, gotículas e aerossóis. Para minimizar o risco de transmissão, profissionais de saúde devem fazer uso de equipamentos de proteção individual, como máscaras ou respiradores, aventais e luvas. Objetivou-se analisar a quantidade consumida destes equipamentos de proteção individual antes e durante a pandemia e também o impacto orçamentário causado para sua aquisição. Estudo retrospectivo, compreendendo os meses de janeiro/fevereiro de 2020 (antes da pandemia Covid – 19) e março/abril (durante a pandemia Covid – 19), em um hospital público. Realizado avaliação do consumo e custo de aquisição dos insumos considerados equipamento de proteção individual.Os dados foram coletados em sistema de informação próprio da instituição. Todos os itens analisados apresentaram aumento importante na quantidade utilizada e, principalmente, no valor de compra, chegando custar 525% mais caro comparado aos meses sem pandemia. O aumento dos custos estava relacionado à escassez dos produtos tanto no mercado nacional, quanto internacional. Entender os valores pagos e estabelecer controle de dispensação dos equipamentos, favorece o planejamento orçamentário.
Palavras-chaves: Custos Hospitalares; Infecções por Coronavírus, Equipamento de Proteção Individual.

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Received on: 10/09/2020
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INTRODUCTION

In December 2019, a group of pneumonia cases of unknown origin was reported in Wuhan, Hubei province, China. The causative agent has been identified as a new coronavirus (SARS-CoV), causing Covid-19, which has since infected millions of people worldwide. The clinical presentation can vary from asymptomatic cases to severe pneumonia, with septic shock and multiple organ failure. [1]

The virus is transmitted by close contact, droplets and also aerosols generated during the performance of procedures such as orotracheal intubation, cardiopulmonary resuscitation, bronchospia, etc. Precautions based on the mode of transmission are required of all healthcare professionals in order to prevent transmission of the virus in places of direct patient care. [2]

Optimizing the care offered to patients, especially those who are in a serious condition, helps to reduce harmful impacts to care. [3]

The Ministry of Labor and Employment, through Ordinance No. 25, OF October 15, 2001, NR 6, calls personal protection equipment (PPE) "any device or product, for individual use used by the worker, intended for protection of risks likely to threaten safety and health at work ", and must be provided to the employee, free of charge, by the contracting company. [4]

In order to provide assistance to suspected or confirmed cases of infection with the new coronavirus, Anvisa published technical note No. 04/2020, establishing the necessary PPE in each situation. [5]

PPE, including surgical masks, respirators, gloves, aprons and eye protectors, has a primordial and indispensable role in protecting health professionals, causing barriers that can prevent coronavirus infection. [2,3] The use of PPE does not prevent accidents and possible contamination, but minimizes the consequences of accidents at work, with a likelihood of harm reduction. [6,7]

“The virus is transmitted by close contact, droplets and also aerosols generated during the performance of procedures such as orotracheal intubation, cardiopulmonary resuscitation, bronchospia, etc. Precautions based on the mode of transmission are required of all healthcare professionals in order to prevent transmission of the virus in places of direct patient care.”

The rational and appropriate use of PPE are strategies that should be used to improve their availability in the assistance areas, in the face of global shortages, with coordination of supply chain and purchasing management mechanisms. [2]

Given this statement, planning the purchase and monitoring the dispensing and use of PPE can directly impact the cost of the product to hospital institutions, justifying the present study, which aimed to analyze the amount consumed of this equipment before and during the pandemic and also the budgetary impact caused for its acquisition.

METHOD

Retrospective study, with a quantitative approach, covering the months of January/February 2020 (before the Covid pandemic - 19) and March/April (during the Covid pandemic - 19), in a public hospital of quaternary level, located in the interior of the State of São Paulo, reference for serving 68 municipalities in the region, covering approximately 2 million inhabitants.

Evaluation of consumption and cost of acquisition of inputs considered PPE was carried out, grouped into: triple surgical mask and N95/PFF2 respirator, disposable procedure gloves (non-sterile) and sterile surgical gloves; disposable aprons.

The data referring to the quantity of items purchased, with their respective values, were extracted from the Extra Purchasing System (Compras Extras - CE), exclusive to the institution, and used daily for viewing and feeding data related to electronic bids and direct purchase requests. It allows the visualization of the purchased quantity of each item, value, delivery date, bidding period, commitments, etc.

The Soul MV computerized system,

supply module, was used to analyze the PPE dispensing, which includes all inputs and outputs of inputs, parts, perishables, etc.

After searching the CE and MV systems, the data were compiled in an Excel® spreadsheet, calculating the average amount of PPE dispensing per day and per month and the cost before and during the Covid-19 pandemic.

RESULTS

Table 1 shows the increasing increase in the use of masks and respirators in the period analyzed, increasing in the months of the pandemic. The average daily consumption of triple mask was 767 units in the first two months (before the pandemic) and 1284 units in the second two months (during the pandemic), and N95/PFF2 respirators, 39 units and 106 units, respectively.

The increase in the consumption of N95/PFF2 respirators in the months of March and April was caused by the mandatory use by the entire health care team, and previously they were only required in cases of care for infectious diseases with contamination by aerosols.

With regard to aprons, it is possible to observe an increase in the amount used per month, reaching a daily average of 1621 units in the first two months (before the pandemic) and 1906 units in the second two months (during the pandemic).

For the analysis of the gloves, sterile and procedural (non-sterile) surgical procedures were considered, where we detected an increase in consumption, however, not in the same proportion as the other PPE. This is due to the mandatory use of gloves to perform procedures, whether sterile or not, regardless of the patient's pathology. This did not apply to aprons and masks, since before the Covid-19 pandemic, as a protocol, they were mandatorily used in isolations and in some procedures. The reduction in the number of sterile gloves in April is due to the suspension of elective surgeries, as the beds were intended for the admission of suspected or confirmed patients with Covid-19.

In relation to financial values, the acquisition of a triple surgical mask suffered an even greater impact (Table 2), as the company holding the Price Register (Registro de Preço - RP) requested the cancellation of the event not fulfilling its commitments, resulting in the need to carry out the acquisitions by Direct Purchase Request (Solicitação de Compra Direta - SCD), the least advantageous type of price for the institution. Comparing the periods studied, there was an increase of 2.888% in unit costs for the triple mask and 331% in respirator N95/PFF2.

The costs related to the acquisition of aprons were also high, from R$ 1,70/unit to R$ 6,70/unit, an increase of 394%. Of the PPE used, the apron was the most difficult input to acquire due to scarcity in the supplier market.

Like the masks, when purchasing gloves, there was also a need to perform SCD, costing the institution more than planned since the amounts paid were much higher than previously practiced, reaching 414% for procedure gloves (non-sterile) and 233 % in sterile gloves.

Considering the daily average of inputs distributed, the current values of the product market and the change in assistance activities, there was an increase of 525% in the total cost with PPE during the months of March and April, beginning of the pandemic, from R$ 162.348,30/month to R$ 852.438,00/month.

Tabela 1. Média do quantitativo (em unidades) de EPI utilizados/mês. Botucatu. Brasil. 2020

EPI	Janeiro	Fevereiro	Março	Abril
Cirúrgica cirúrgica tripla	20.150	26.650	38.365	39.955
Respirador N95/PFF2	1.355	1.009	2.192	4.295
Avental descartável	48.603	50.261	57.168	69.506
Luvas de procedimento (não estéreis)	531.747	504.909	511.835	568.885
Luvas cirúrgicas estéreis	15.214	12.434	19.665	11.351

Tabela 2. Valores pagos (em reais) por unidade de EPI antes e durante a pandemia por Covid – 19. Botucatu. Brasil. 2020

EPI	Janeiro/Fevereiro	Março/Abril
Cirúrgica cirúrgica tripla	R$ 0,09	R$ 2,60
Respirador N95/PFF2	R$ 1,45	R$ 4,80
Avental descartável	R$ 1,70	R$ 6,70
Luvas de procedimento (não estéreis)	R$ 0,17	R$ 0,58
Luvas cirúrgicas estéreis	R$ 0,72	R$ 1,68

DISCUSSION

The Center for Disease Control and Prevention (CDC), recommended some guidelines on the use of the N95 respirator in healthcare environments, among them to implement practices that allow prolonged use and / or limited reuse, when acceptable, prioritizing its use to people at greater risk of contracting the infection. This statement corroborates the practice of dispensing N95 respirators in the studied institution, since all direct assistance workers started using PPE and the exchange was established every 30 days or when it was wet or damaged. [8]

The increase in consumption of PPE can have important financial impacts on public budgets due to the scarcity of these products on the market, causing difficulties in their acquisition. [7]

One of the causes of the scarcity of PPE on the market is due to the fact that the large global producer is the epicenter of the disease. China had the production and sale of PPE affected during the pandemic, affecting the world market, even when they resumed normal activities. [9]

At the beginning of the pandemic, in addition to the use of PPE by health professionals, misinformation and panic led to uncontrolled purchasing by the population, also contributing to an even greater shortage. [10]

To attend to suspected or confirmed cases with Covid-19, healthcare institutions must dispense at least 25 units of surgical scrubs and masks and 50 units of procedure gloves per patient per day. [11]

The management of PPE must be coordinated through basic supply management mechanisms, considering the usage forecasts based on the rational use of the requested items; encouraging the use of centralization in order management in order to avoid duplication of inventories; monitoring and controlling the distribution of PPE. [10]

There are still many doubts and debates around the measures to be taken by the government in order to minimize the economic impact caused by the pandemic. Regardless of the duration of the pandemic, the crisis and the degree of social isolation imposed, the damaging effects on the economy will have magnitudes compared to the greatest economic crises in the modern world, due to the paralysis and shortages of the production chains. As companies are links in the production chain, the shutdown, caused by social isolation, increasingly imposes a destructive economic crisis capable of destroying the productive links worldwide. [12]

The use of PPE is considered an active protection and depends on individual, repetitive and constant behavior, it is a less successful prevention strategy when compared to passive (collective) protection, which ensures relatively automatic protection.

Parallel to the use of protective measures, guidelines should be established regarding action as the work scenario evolves, changing rapidly and creating new risk situations, causing uncertainties that need to be managed. [3]

The use of PPE involves the right and safe way of use during dressing and de-dressing, and individual failures of workers may arise that do not adhere to the safe and correct way of acting. However, attributing the contamination of the worker to mistakes he may have made is part of the culture of blaming the victim 3, because its use only minimizes the effects or consequences of an eventual work accident. [13] The correct guidelines on the use of PPE, as well as the optimization of its use, must be provided not only in the face of a pandemic, but as a daily practice in the care environment.

The use of PPE is considered an active protection and depends on individual, repetitive and constant behavior, it is a less successful prevention strategy when compared to passive (collective) protection, which ensures relatively automatic protection. [14]

In a study developed in Primary Health Care in the city of Crato (CE), found an increase in the use of PPE, more expressively of surgical masks, causing a collapse in its supply, which can also be justified by the release of PPE to support professionals, as general service assistants, doormen and administrative agents. [7] This information differs from the reality of our study, since the support services are outsourced and the responsibility for providing PPE to employees lies with each contracted company.

The reflection of the increase in the use of PPE by health professionals, impacted on the difficulty of its acquisition by Brazilian municipalities and states, since they needed to guarantee biosafety measures. [13,15]

In Minas Gerais, the Municipal Health Council turned to Organs inspec-

tion agencies to denounce the exorbitant prices of PPE. Surgical masks increased by 3.800% when compared to the period before the pandemic. The product which cost R$ 0,10, started to cost R$ 3,90. The disposable apron accompanied the price increase and started to cost R$ 8, an increase of 224,9%. [16] Procedural gloves (non-sterile) increased by 157% [16], being inferior to the data found in our study. Data that corroborate with our results.

One of the limitations of the study was the absence, both nationally and internationally, of available literature to compare costs and consumption of PPE.

> Procedural gloves (non-sterile) increased by 157%, being inferior to the data found in our study.

CONCLUSION

The use of PPE by the assistance team is mandatory and helps to prevent the spread of Covid - 19. Therefore, there was a substantial increase in the use of this equipment, causing a significant budgetary impact during the pandemic, even with the extra release of resources by the State Government.

The maintenance of PPE during a pandemic should be the responsibility of governments, both state and federal, in addition to distributing to public institutions, controlling the unbridled and opportunistic increase in the supply market. It is understandable that the price increase at the beginning of the pandemic was caused by the scarcity of raw materials, however, after 7 months, there is still a scenario of overvaluation in PPE prices, with no prospect of improvement.

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