

ORIGINAL ARTICLES

Covid-19' impacts on inpatient admission changes at National Hospital of Dermatology and Venereology, Hanoi, Vietnam

Pham Tien Dung¹, Le The Vinh¹, Pham Quoc Thanh^{2*}

ABSTRACT

Objective: Since the Coronavirus disease in 2019 (COVID-19) was announced as a worldwide pandemic, it has affected all aspects of life, including the economy, society, and the healthcare system. The impact of COVID-19 on co-morbidities is a concern however, there are few studies on dermatological patients. To determine COVID-19's impact on the number of hospital admissions and the changes of common diseases at the National Hospital of Dermatology and Venereology.

Methods: A cohort study is conducted to collect all admission over four years from Feb 2018 to Jun 2021. The dataset including 10506 records was extracted from the hospital information system database. Descriptive statistical was used to analyse the admission differences between the four-year periods.

Results: The number of patients markedly decreased by about 30% in 2020 and about 60% in 2021. The male/female ratio did not change significantly between before and after the pandemic. Benign neoplasia was the greatest change from 5.9% (2018) to 21% (2021). The allergic/reactive group decreased from 40% (2018) to 25% (2021). The infectious group also decreased from 20% (2018) to 10.8% (2021). The autoimmune group fluctuated at 9%-10%. The top 10 common diseases show that the first position was psoriasis then switched to Carcinoma in situ of skin during the Covid-19 time.

Conclusion: The results of this study are significant in predicting the trend of dermatology patients' admission during a pandemic. The results assist health system leaders and public health authorities in adjusting policies and procedures to suit the pandemic situation that is still complicated.

Keywords: COVID-19, SARS-CoV-2, hospital admission, hospitalizations, dermatology service

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is now becoming one of the most deadly worldwide pandemics caused by infecting the sufferer with severe acute respiratory syndrome virus (SARS-CoV-2) (1,2). Globally, the pandemic affects people's daily activities and the whole healthcare systems (3).

In the absence of vaccination and medication,

many countries have been reorganized and limited the number of hospitalizations to reduce the risk of virus transmissions between patients in healthcare sectors (4-6). This situation requires the revision of the medical admission patterns to the group of non-COVID-19 patients in general and specialist dermatological hospitals in particular. Conversely, this redesign provides opportunities for alternatives ways to reach patients and various methods of health care service and delivery, such as telehealth



Corresponding author: Pham Quoc Thanh
Email: pqt@huph.edu.vn

¹ National Hospital of Dermatology and Venereology

² Hanoi University of Public Health

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consulting, and for example, policy changes in resizing the number of beds in dermatological health sectors.

Vietnam, similar to other countries in the world, announced the pandemic status in February 2020. Along with this announcement were regulations restricting inpatient treatment except for high acuity, emergency cases to limit the spread of disease (7). As a result, at the end of June 2021, which is the end of data collection in this study, Vietnam was a country with a low COVID-19 case record of 3985 before the outbreak in July at Ho Chi Minh City (8).

This study examined the COVID-19 impacts on the change of disease patterns and the numbers of dermatological patients in the inpatient department of the Hospital of Dermatology and Venereology, Hanoi, Vietnam, during the first wave of the pandemic (Feb 2020-Jun 2021).

METHODS

Study design: This cohort study was carried out at the Inpatient Department of National Hospital of Dermatology and Venereology (NHDV), located in Hanoi, Vietnam.

Samole size: A total of 10506 de-identified records were extracted from the hospital's information system (HIS) on all inpatient admissions from February 2018 to June 2021. Data for each year were collected within 12 months sequence from February of the previous year to January of the following year to coincide with announcement of the pandemic in February 2020. The data was provided in a Microsoft Excel 2013 then defined into seven main disease groups (described below) based on principle diagnosis and coded following the International Classification of Disease (ICD 10).

The dataset collected then excluded patients hospitalized for specific purposes, such as taking part in other studies and biologic therapy. The principal diagnosis was categorized into seven main disease groups based on ICD10 guideline: benign neoplasia, infectious, allergic/reactive, inflammatory, autoimmune, malignant, and other. The data for the years 2018, 2019, 2020, and the first six months of 2021 are analyzed and compared by the number and percentage of disease groups to explore the change due to the impact of COVID-19.

Statistics Analysis

Data were analyzed using Stata 14. Descriptive statistics were performed to estimate frequencies and percentages for dependent and independent variables. A chi-square test was conducted to compare the proportion of patient admissions with a significant level of 95%.

Ethics approval

The NHDV ethics committee granted ethical approval to collect and use data from HIS (No: 2214/ACS-NHDV). However, this was a secondary analysis of this anonymized data set with permission from NHDV, so further ethical approval was not required.

RESULTS

Demographics of cases distributed by year

Table 1 shows the numbers of hospitalized patients and the proportion of patients by age group from 2018 to 2021 (in 2021, data ended in June). However, an apparent change in the number of hospitalized patients can be seen after the restrictions were applied due to the impact of the COVID-19 pandemic (Feb 2020).

Table 1. Number and percentage of hospital admissions by age groups, genders, and length of stay

Year	2018		2019		2020		2021		p
	n		n		n		n		
	n	%	n	%	n	%	n	%	
Age groups									
0-19	837	22.8	776	21.1	492	19.2	78	13.1	< 0.001
20-44	994	27.1	942	25.6	650	25.3	141	23.7	
45-54	402	11.0	433	11.8	296	11.5	84	14.1	
55-64	544	14.8	540	14.7	450	17.5	130	21.8	
65-74	480	13.1	534	14.5	400	15.6	89	15.0	
75+	410	11.2	454	12.3	277	10.8	73	12.3	
Gender									
Male	1908	52.0	1896	51.5	1343	52.4	312	52.4	0.92
Female	1759	48.0	1783	48.5	1222	47.6	283	47.6	
Length of stay Mean (SD)	10.4 (9.3)		10.6 (9.2)		9.9 (8.7)		9.1 (8.2)		< 0.001

Table 1 illustrates that in 2018 and 2019, before the pandemic, the number of hospital admissions was approximately the same at 3667 and 3679, respectively. However, by 2020, the number of patients decreased to 2565 (about 30%) and in the first six months of 2021 to 595 (about 60%).

Notably, the rate of hospitalization age group also changed in 2 main groups: 0-19 and 55-64 years old. In the age group from 0-19, there is a change from 23% in 2018 to only 13% in 2021 ($p < 0.001$). In contrast, the group of 55-64 tends to increase from 15% (2018) to 22% (in 2021). Meanwhile, the proportion of the remaining age groups fluctuated almost insignificantly, only approximately 1-2%.

Distribution by sex, in all years before and after the COVID-19 pandemic, the proportion of male patients hospitalized for treatment was higher than that of female patients. It is worth mentioning that this ratio is quite stable. In

2018, the proportion of male-female patients was 52%-48%, in 2019 it was 51.5%-48.5%, in 2020 and 2021 both 52.4%-47.6%.

Regarding the length of stay, data shows that in 2019 the average number of days of treatment was 10.6 (SD=9.2), only a slight increase compared to 2018 of 10.4 (SD=9.3). After the pandemic announcement and restriction orders, in 2020 and 2021, the number of hospital stays decreased to only 9.9 (SD=8.7) and 9.1 (SD=8.2), respectively.

Number of admission by months

Figure 1 depicts the fluctuation in the number of hospitalized patients by month over the years from 2018 to 2021. The data is calculated within 12 consecutive months with the cutoff point being February of the previous year and extending to January next year corresponds to the time of restriction of admission due to the impact of Covid-19.

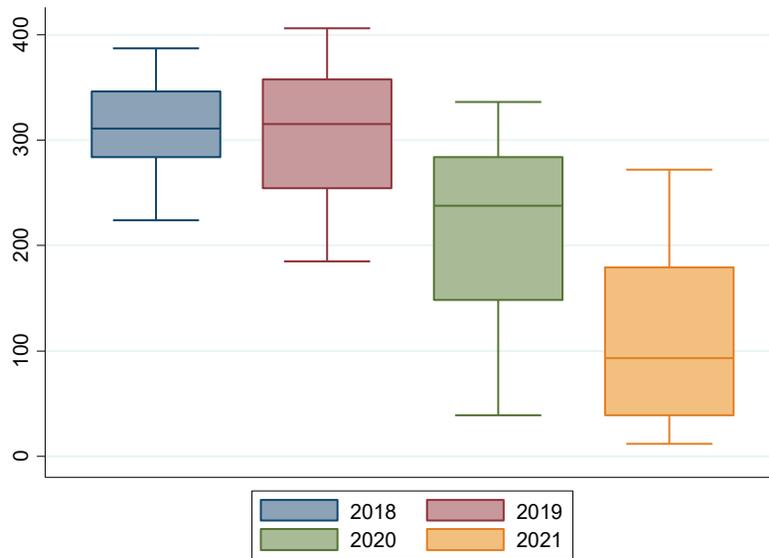


Figure 1. Number of hospital admissions compared by months over the years 2018-2021

In Figure 1 above the similarity in the number of hospitalized patients before the COVID-19 pandemic is 2018 and 2019. Strikingly, the changes in 2020 and 2021, two years before the pandemic, shows the number of hospitalized patients tended to increase gradually from the beginning to the middle of the year and peaked in March and May, then steadily decreased and the lowest in January and February. In contrast, in 2020, the number of hospitalized patients peaked in June and July and bottomed in April and August. By 2021, the number of hospital admissions will tend to change entirely with 2021 and peak in April, which will plummet to

the bottom in June.

Changes in disease distributions by groups

The first significant variation is the group of benign neoplasia. In 2018, the ratio of this group of patients to the total number of hospitalized patients was only 5.9%, slightly increased to 6.9% in 2019. However, after applying restrictions on hospitalization, the proportion of patients in this group spiked to 16%. Although in 2021, the data collected is only in the first six months of the year, the percentage of this group has jumped to 21%, to be the second behind the allergic/reactive group.

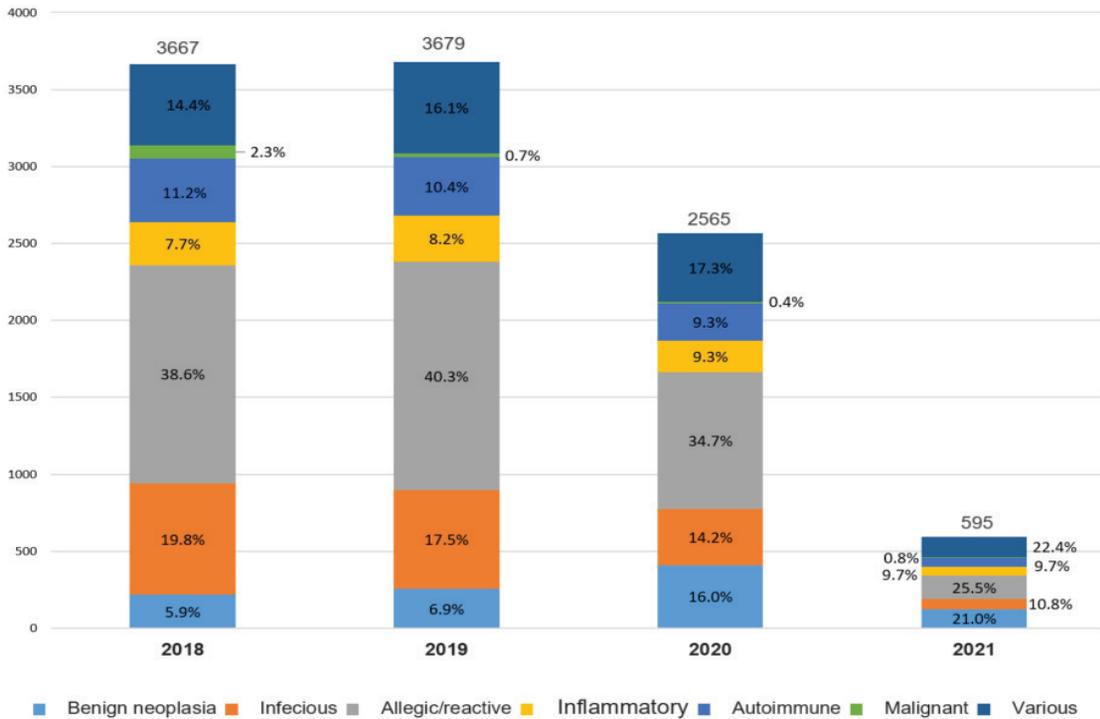


Figure 2. Percentage of admission by year and disease classification

In contrast to the increase in the proportion of benign neoplasia group in the total number of hospital admissions in the years surveyed, the rate of allergic/reactive disease group and infectious group tended to decrease markedly. For the allergic/reactive group, the rate was the highest in all the survey years compared to the rest of the disease groups. However, this group tended to decrease from approximately 40% before the pandemic to only 34.7% in 2020 and 25.5% in 2021 after the pandemic. Similarly, in the infectious group, the proportion of this group decreased significantly before and after the pandemic from approximately 20% in 2018 down to nearly half (10.8%) in 2021.

For the malignant group, although the rate is the smallest over the time of the study when compared to other disease groups, the overall trend tends to decrease. The number of hospital admissions for malignant treatment in 2018 accounted for 2.3% of the total number of

inpatients and decreased to 0.7% in 2019. By 2020, that is, after the pandemic, this number further reduced to 0.4%, however by the first six months of 2021, this rate has increased to 0.8%.

The autoimmune disease group is considered a group with a tendency to decrease but the slightest fluctuation compared to the rest of the disease groups in the study. The rate of 11.2% in 2018 decreased slightly to 10.4% in 2019, 9.3% in 2020, and increased slightly to 9.7% in 2021.

Besides, the data also shows that the various groups have the most evenly increasing trend rate compared to the remaining groups. This rate has grown steadily over the years, unaffected by the impact of the pandemic. In 2018, various groups accounted for 14.4% of the total number of hospitalized patients, increasing to 16.1% in 2019, 17.3% in 2020, and 22.4% in 2021.

Changes in top 10 diseases of hospitalizations before and after Covid-19.

Figure 3 shows the percentage of the ten most common diseases in the total number of

diseases diagnosed and hospitalized before and after the Covid-19 pandemic (Feb 2020). The difference in rates of 10 common diseases can be seen over the years.

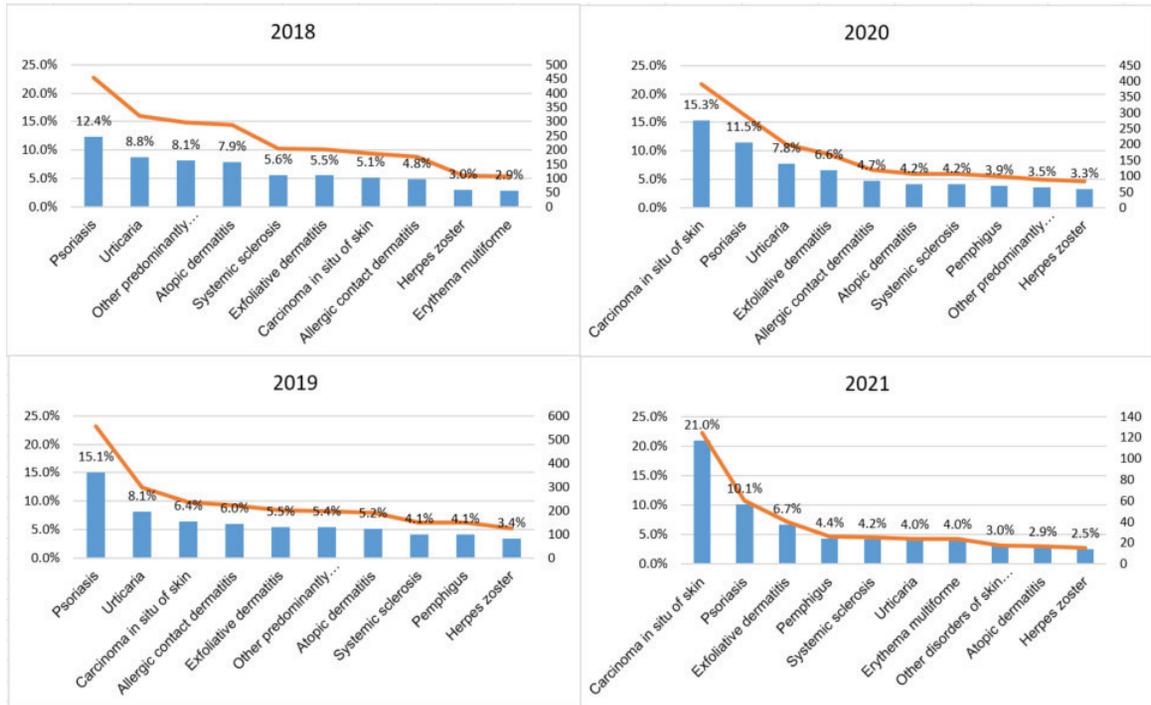


Figure 3. Top 10 disease of hospitalizations over the years 2018-2021

Significantly, the first place is ranked No. 1 in 2018 and 2019, which was the time before the Covid-19 pandemic, the leading position in hospitalized patients was psoriasis, accounting for 12.4% and 15.1%, respectively. Figure 3 however, indicates by 2020 and 2021, the No. 1 condition was Carcinoma in Situ of Skin (CSS) with a high rate of 15.3% and 21.0%, respectively. Before this time CSS was only the 7th ranked condition in 2018 and number 3 in 2019. Similarly, psoriasis has dropped from the number one position in 2018 and 2019 to the second position in both 2020 (11.5 %) and 2021 (10.1%).

Other predominantly sexually transmitted diseases, on the other hand, this group of

diseases tends to decrease over the years, from the positions of 3 in 2018, 5 in 2019, 9 in 2020, and disappear from the top 10 most common hospital admissions 2021. This is a positive epidemiological signal that we need to discuss in the next section.

In contrast, pemphigus presentations changed below the 10 most common diseases in hospitalized patients in 2018, to 2019 to 9th most prevalent condition, increasing to 8th position in 2020 and 5th position in 2021. The remaining diseases, including atopic dermatitis, systemic sclerosis, exfoliative dermatitis, allergic contact dermatitis, still maintain the rate in the top 10 of hospital admissions for regular treatment over the

years and the difference is not significant. Remarkably, herpes zoster remained stable with the 9th and 10th positions, with the rate fluctuating around 2.5%-3.5%.

DISCUSSION

The first is the decrease in the number of inpatients after the announcement of the Covid-19 pandemic and the imposition of admission restrictions. This study shows an apparent decline of about 30% (in 2020) and a further downward trend in 2021 (due to data as of the end of June 2021). This result is higher than the study of Ho, Blake (9) with the dermatological inpatients without Covid-19 infection subjects. However, this study data is lower than that of Rafał, Iga (10). The sharp decrease in the number of dermatological inpatients can be attributed to two main reasons. The first is that the indications for hospitalization are carefully considered for the necessity of disease conditions as recommended by the Ministry of Health of Vietnam (11). That is, minimize inpatient treatment to ensure a safe distance in pandemic prevention (7). At NHDV, there are 150 beds divided into rooms, and inpatient rooms are divided into separate male and female rooms; each room has four beds. To ensure the distance as recommended by the Ministry of Health of Vietnam, each ward has a maximum of 2 patients. Along with that is only for hospitalization for cases of necessary needs. Therefore, the decrease in quantity is also easy to explain. Second is the fear of infection when going to the hospital (12-14). Patients also find alternative forms of treatment for themselves to avoid hospitalization for a while.

Regarding the age group distribution, this study also shows the similarity in reducing the

age group 0-19 ratio with the study of Rafał, Iga (10). For the elderly population, the first phase of this study showed a slight decrease in 2020 but a recovery in 2021, showing a different trend from the study by Rafał, Iga (10) and Wang, Helf (5). On the other hand, variation is found in the 55-64 age group, increasing from 15% (2018) to 23% (2021). With the age group of 55-64, in Vietnam, this is the large age group in the working age, it can be surmised that this age group has solid economic conditions and is more interested in health issues. The difference found in the age group in this study is the basis for further studies with a more extended comparison period with the change of the Covid-19 pandemic situation at different stages.

What was unique about this study was the maintenance of the ratio of male to female patients. Four-year data shows that these ratios are almost unchanged and the differences fluctuates around 4%-5% male to female ratio. This result contrasts the results found in the study by Wang, Helf (5) and Rafał, Iga (10). The study of Rafał, Iga (10) showed that the proportion of female patients decreased from 58.8% (2019) to 41.5% (2020). Meanwhile, the study by Wang, Helf (5) again showed that the proportion of male patients decreased from 63.8% (2019) to 59.3% (2020). This indicates that the level of concern about health issues in Vietnam is quite similar by gender before and after the pandemic.

The mean hospital stay was found to decrease from 10.4 (± 9.3) in 2018, 10.6 (± 9.2) in 2019 to 9.9 (± 8.7) in 2020, and 9.1 (± 8.2) in 2021. This figure shows the average number of days in hospital after the pandemic has decreased by about one day. Considering the total number of patients, this decrease is significant. Nor have studies been found directly related to the average number of days in the hospital of

dermatological patients. This can be said to be helpful information in adjusting the length of hospital stay. Before the guidance of the Ministry of Health on hospital admission, follow preventive measures to minimize cross-infection, discharge patients when their health problems are stable, and transfer to lower levels. It also reduces the workload for medical staff and saves an amount of money.

Regarding the change of disease groups before and after the pandemic, the study shows remarkable changes. The most notable is the group of benign neoplasia. There is a significant jump to 21% in 2021 compared to the years before the covid-19 pandemic. This result is contrary to the trend in the study of Wang, Helf (5) is that the rate of this group of diseases is halved compared to before the Covid-19 pandemic, but it is still the group with the highest proportion and number. Next, the study also showed the agreement on the reduction and the lowest proportion of the malignant group before and after the Covid-19 pandemic with the studies of Wang, Helf (5) and Rafał, Iga (10). Similarly, the autoimmune disease group is considered the most stable group in terms of prevalence, although it tends to decrease slightly from 11.2% to 9.7%. The group that accounted for the most hospital admission over the years was the allergic/reactive group, which also decreased from approximately 40% to 25.5%. The results of these disease groups are the basis for medical facilities to adjust resources to serve patients during the Covid-19 pandemic that is still complicated and shows no signs of ending.

Regarding the top 10 common hospital admissions, psoriasis, which always held the first position before the pandemic, dropped to second place and was replaced by Carcinoma in situ of psoriasis skin. Urticarial, herpes

zoster, atopic dermatitis, systemic sclerosis, exfoliative dermatitis, and pemphigus remained stable for four consecutive years before and after the pandemic, with other predominantly sexually transmitted diseases have disappeared from the top 10 by 2021. These results show that Carcinoma in situ of skin is quite similar to the studies of Rafał, Iga (10) but different from the study of Ho, Blake (9). This can be explained by the difference in awareness of the urgency of skin cancer treatment in different countries. The travel and contact restrictions can also explain this during the pandemic period. Patients with non-serious illnesses are discouraged from hospitalization and outpatient treatment. Patients tend to avoid attending medical facilities, where the risk of encountering people infected with the virus is high.

This study itself also has limitations. Firstly, the study was merely a cross-sectional description, the study was performed only at the Dermatology hospital, so it was only inferred for 1 hospital, not for the whole city. However, the research results are considered a reference for the authorities and the Ministry of Health to refer to similar contexts of hospitals in Hanoi. Second, the travel restrictions in different localities across the country vary because depending on the epidemic situation, the number of patients may not reflect the consistent trend. This is also the basis for the health sector to build an expanded data system for unified management and monitoring.

CONCLUSION

COVID-19 has substantially impacted across all aspects of life. In health, the pandemic has had direct consequences on the health and lives of patients it has also led to major

changes in patient's access to medical services. The results of this study are significant in predicting the trend of inpatient treatment of dermatology patients, and adjusting policies to suit the pandemic situation is still complicated. Saving healthcare workers and medical facilities to fight Covid-19 in the hot spots in Vietnam is one of the most significant adjustments, for example.

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