

The Impact of the COVID-19 Pandemic on a Sydney Metropolitan Hospital Emergency Department

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Abstract

Introduction: The impact of the COVID-19 has resulted in a decrease in presentations in emergency departments (ED). This has been influenced by societal restrictions, lockdowns and access to services. This study aims to observe the patterns in ED presentations for Bankstown-Lidcombe Hospital over the course of the initial COVID-19 pandemic wave. **Methods:** A retrospective review of all presentations to Bankstown-Lidcombe Hospital ED was conducted comparing monthly patient encounters from February-August for 2017-2020. **Results:** The total number of ED presentations was 42,225. There was a statistically significant reduction during 2020 of 9.8% between the study periods (1546 vs 1395, $p = 0.014$). The period of greatest reduction was seen in March-May, the strictest lockdown period for New South Wales. The admitting disciplines that showed a reduction in this time were colorectal (76.62%, $p = 0.046$), emergency (25.53%, $p = 0.025$), endocrine (31.82%, $p = 0.026$), orthopaedics (33.63%, $p = 0.004$), and vascular (35.71%, $p = 0.017$). The disciplines that showed an increase in presentations over the entire studied time were gynaecology (26.54%, $p = 0.008$), and psychiatry (17.46%, $p = 0.011$). **Conclusion:** There were significant reductions in total number of ED presentations. Notably, there were significant reductions across multiple admitting disciplines, as well as in a decrease in presentations for those in younger age groups.

Keywords

COVID-19, Pandemics, Length of Stay, Emergency, New South Wales

1. Introduction

Emergency departments (ED) have experienced a change in the pattern of patient presentations during the COVID-19 pandemic [1]. The severe acute respiratory syndrome coronavirus-2 (SARS COV-2) was the contagious pathogen that triggered the pandemic. Following the declaration of this pandemic, the Australian government introduced “social distancing” with significant changes in the public health system. Hospital systems required a dramatic adaption of care with staff allocated to emergency and intensive care units, elective surgery suspended and training of staff to manage COVID-19 related illnesses and wards. On 23rd March 2020, the New South Wales (NSW) premier announced new restrictions following the decision by the National Cabinet in which non-essential activities and businesses would be temporarily shut down. A “ring of steel” was coined for the South Western Sydney district whereby the lockdown period from March to May 2020 was one of the strictest in the state. For this initial lockdown period, the easing of restrictions did not occur until 28th April 2020, with many restrictions remaining in place for the following month [2].

The implementation of these lockdown measures advised people to stay at home with an obvious decrease in outdoor activities and change in lifestyle. These changes were anecdotally reflected in ED presentations and invariably changes in the types of presentations across specialities that presented through emergency. The effect of these restrictions and fear of COVID-19 contributed towards a significant shift in patterns in ED presentations [1]. The literature from the international community who were experiencing COVID-19 first demonstrated drop offs in non-COVID-related ED presentations due to fear of interaction especially with the frontline health care system [3] [4]. Galvanised by their experiences, our concerns were a reluctance to present for common and life threatening conditions leading to shifts in presentations and worse clinical outcomes [1]. This study aims to critically analyse the trends of ED presentations to metropolitan Sydney base hospital during the first wave of the COVID-19 pandemic. The secondary objective is to identify the changes across specialities and age groups to guide and inform public health measures and planning regarding COVID-19 and future pandemics.

2. Methods

2.1. Study Setting

A retrospective review was conducted at Bankstown-Lidcombe Hospital, a metropolitan principal referral hospital in the South Western Sydney Local Health District (SWSLHD) with over 450 beds. The hospital serves a culturally and linguistically diverse catchment area, with the commonest languages spoken at home including English, Arabic and Vietnamese. The primary objective was to assess any differences in ED presentations and specifically amongst sex, age groups, and specialities. The control period (non-COVID-19) was February to August from

2017-2019 and the COVID-19 period was February to August 2020. The two time periods were compared using their average monthly presentations to those for the same period in 2020. A sub analysis for the lockdown period (March to May 2020) was analysed in a similar manner.

2.2. Data Collection and Design Analysis

For the present study, data was retrospectively collected via medical records. Ethics approval was granted from the Human Research and Ethics Committee [2021/ETH00746]. The recorded parameters included: age group, sex, time, admitting disciplines, and whether the patient was admitted to the intensive care unit (ICU) or sent directly to operating theatres (OT).

2.3. Statistical Analysis

A statistical analysis using SPSS (V 26.0) and Microsoft Excel was computed for continuous variables expressed as mean, median, standard deviation (SD), and range. Independent student t-test was used to compare the two time periods (2017-2019 vs 2020) and the lockdown period (March to May 2020).

3. Results

The total number of presentations over the total study period was 42,225. The mean monthly number of ED presentations from February-August in 2020 showed a statistically significant reduction of 9.8% compared to 2017-2019 (1546 vs 1395, $p = 0.014$, **Table 1**). The lockdown period of March-May showed a significant reduction of 18.1% (1616 vs 1323, $p = 0.013$, **Figure 1**). There were no significant variations in presentations requiring direct transfer to OT or ICU. The average ICU monthly presentations were similar between the study periods (87 vs 88, $p = 0.87$). There was a 30.4% decrease in monthly presentations for those admitted to theatre between the study periods (23 vs 16, $p = 0.067$). There were insufficient data for presentations that died in ED, were dead on arrival

Table 1. Total emergency department presentations to Bankstown-Lidcombe Hospital for February-August across 2017-2020.

	2017	2018	2019	Average 2017-2019	2020
February	1500	1437	1475	1471	1314
March	1646	1556	1700	1634	1254
April	1619	1534	1588	1580	1260
May	1627	1615	1662	1635	1457
June	1482	1505	1536	1508	1511
July	1491	1466	1566	1508	1555
August	1482	1507	1467	1485	1413
TOTAL	10,847	10,620	10,994	10,821	9764

or required interhospital transfer from ED.

There were significant reductions in the mean monthly number of presentations for certain specialties: 78.26% for colorectal (7 vs 1, $p = 0.002$), 16.55% for geriatrics (160 vs 134, $p = 0.01$), and 47.50% for vascular (5 vs 3, $p = 0.003$, **Table 2**). In contrary, there were significant increases in the mean monthly number of presentations for certain specialties: 26.54% for gynaecology (17 vs 22, $p = 0.008$) and 17.46% for psychiatry (37 vs 44, $p = 0.011$). Those not needing admission and deemed safe for discharge home from emergency showed a reduction of 15.52% (689 vs 582, $p = 0.049$). However, certain specialties did not show any significant change during the time period (**Table 3**). The average monthly presentations between the COVID-19 cohort periods remained relatively unchanged for certain specialties: ear nose and throat (10 vs 10), gastroenterology (58 vs 59), oncology (25 vs 27), plastics (28 vs 28), and orthopaedics (55 vs 53, **Table 3**). Certain disciplines upon ED admission including breast surgery, ophthalmology, head and neck, infectious diseases, neurosurgery, and rehab had too few presentations to constitute a reasonable analysis (**Table 3**).

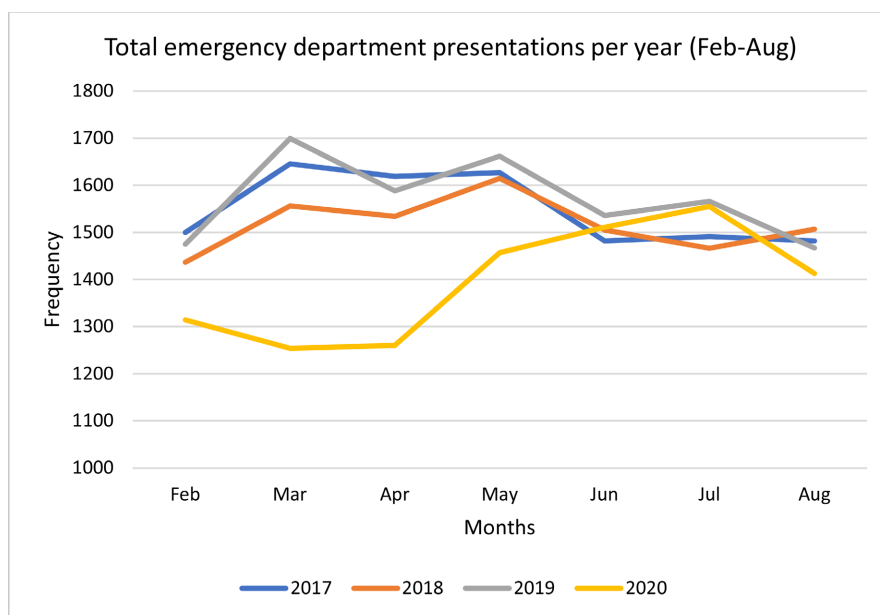


Figure 1. Total emergency department presentations to Bankstown-Lidcombe hospital from Feb-Aug for 2017-2020.

Table 2. Disciplines with statistically significant changes 2017-2019 to 2020.

February-August	Colorectal	Emergency	Geriatrics	Gynaecology	Psychiatry	Vascular
Change in mean monthly presentations	-78.26%	-15.52%	-16.55%	+26.54%	+17.46%	-47.50%
p-value	0.002	0.049	0.010	0.008	0.011	0.003
March-May (lockdown period)	Colorectal	Emergency	Endocrine	Orthopaedics	Vascular	
Change in mean monthly presentations	-76.62%	-25.53%	-31.82%	-33.63%	-35.71%	
p-value	0.046	0.025	0.026	0.004	0.017	

Table 3. Number of presentations to Bankstown-Lidcombe hospital by discipline of admission.

	Cardiology		Colorectal		Emergency		Endocrine		Ear, Nose, Throat		Gastroenterology		Geriatrics		Upper GI	
	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020
Feb	91	96	2	1	716	447	14	11	8	9	54	80	140	119	18	6
Mar	124	104	5	1	755	463	11	7	9	8	64	54	154	127	25	19
Apr	114	95	12	4	744	559	12	9	12	12	54	50	151	123	37	11
May	109	131	9	1	749	652	14	9	11	11	59	60	160	160	15	14
Jun	117	119	7	1	670	708	14	7	9	9	54	51	164	111	20	29
Jul	129	136	4	1	613	702	9	16	10	10	63	56	171	150	31	14
Aug	111	124	7	1	575	543	13	8	12	9	59	60	182	146	7	17
TOTAL	795	805	46	10	4822	4074	87	67	71	68	407	411	1122	936	153	110
Mean	113	115	7	1	689	582	12	10	10	10	58	59	160	134	22	16
	Gynaecology		POD		Neurology		Obstetrics		Oncology		Orthopaedics		Paediatrics		Plastics	
	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020
Feb	19	21	9	12	46	40	7	9	24	26	39	73	100	137	25	16
Mar	17	27	18	10	47	43	7	12	24	27	62	36	120	113	25	25
Apr	15	19	15	24	37	32	6	10	25	24	60	43	116	48	26	30
May	18	17	18	20	40	40	7	7	26	30	66	46	127	64	32	30
Jun	16	23	14	21	30	53	6	12	22	26	54	64	114	78	27	27
Jul	15	21	24	27	39	43	8	3	30	30	52	63	101	90	25	28
Aug	20	23	17	14	40	50	7	10	27	23	52	49	107	95	33	38
TOTAL	120	151	115	128	279	301	48	63	178	186	385	374	785	625	193	194
Mean	17	22	16	18	40	43	7	9	25	27	55	53	112	89	28	28
	Psychogeriatrics		Psychiatry		Renal		Rheumatology		General Surgery		Respiratory		Urology		Vascular	
	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020	Average 2017-19	2020
Feb	1	6	41	40	20	23	7	12	84	108	64	85	26	34	5	3
Mar	2	1	42	38	20	14	5	10	97	92	75	91	28	35	5	4
Apr	3	1	31	44	16	10	7	3	89	73	76	89	21	21	5	0
May	2	3	37	49	16	22	6	2	100	91	90	83	32	34	6	3
Jun	3	6	33	43	22	19	5	9	86	77	92	62	29	44	5	1
Jul	1	4	40	43	19	13	6	12	90	98	105	66	29	31	6	0
Aug	2	0	36	48	19	20	8	7	101	118	125	73	34	35	3	2
TOTAL	14	21	260	305	132	121	44	55	647	657	627	549	199	234	35	13
Mean	2	4	37	44	19	17	6	8	92	94	90	78	29	33	5	3

For the lockdown period of March to May 2020, colorectal, emergency and vascular further demonstrated significant reductions in their mean monthly presentations (**Table 2**). Colorectal had a 76.62% reduction (9 vs 2, $p = 0.046$), emergency had a 25.53% reduction (749 vs 558, $p = 0.025$), and vascular (5 vs 3, $p = 0.017$). There were also significant reductions in mean monthly presentations by 31.82% for endocrine (12 vs 8, $p = 0.026$) and 33.63% for orthopaedics (63 vs 42, $p = 0.004$).

Further analysis by sex demonstrated males had a significant reduction of 8.0% in average monthly presentations (806 vs 731, $p = 0.05$) and females also had a reduction of 10.9% for the study periods (849 vs 757, $p = 0.004$). The lockdown period (March-May) demonstrated males had a significant reduction by 17.1% (851 vs 764, $p = 0.02$) and females by 17.5% (877 vs 724, $p = 0.02$), respectively. The 0 - 9 age group demonstrated a significant reduction of 26.2% between the study period of February-August ($p = 0.02$). During lockdown period (March-May), there were significant reductions for multiple age groups: 0 - 9 years (-40.27%, $p = 0.05$), 10 - 19 years (-38.54% $p = 0.01$), 20 - 29 years (-22.66%, $p = 0.01$), 30 - 39 years (-28.62%, $p = 0.003$), 40 - 49 years (-16.17%, $p = 0.01$), and 60 - 69 years (-16.32%, $p = 0.05$, **Table 4**).

4. Discussion

The impact of the pandemic on a metropolitan Sydney based hospital showed significant overall reductions in presentations to ED and across specific specialities. This has also been reflected in other metropolitan EDs in Sydney, with a 25% reduction generally and specific reductions in infectious diseases and orthopaedic injuries [1]. Kam's COVID-19 study of presentations to an Australian metropolitan ED showed that social distancing enforced to limit the spread of COVID-19 likely led to reduced transmission of other infectious disease, for example influenza, that usually bolster ED presentation numbers. We demonstrated

Table 4. Emergency department presentations by age group.

Age Group	Average for February-August				Average for March-May			
	Average 2017-19	2020	Difference	p-value	Average 2017-19	2020	Difference	p-value
0 - 9 yrs	802	592	-26.22%	0.02*	377	225	-40.27%	0.05*
10 - 19 yrs	448	384	-14.35%	0.14	205	126	-38.54%	0.01*
20 - 29 yrs	952	870	-8.58%	0.24	471	364	-22.66%	0.01*
30 - 39 yrs	996	881	-11.55%	0.18	483	345	-28.62%	0.003*
40 - 49 yrs	976	916	-6.12%	0.27	462	387	-16.17%	0.01*
50 - 59 yrs	1158	1045	-9.73%	0.13	528	439	-16.86%	0.08
60 - 69 yrs	1409	1312	-6.86%	0.18	639	535	-16.32%	0.05*
70 - 79 yrs	1852	1732	-6.46%	0.10	802	743	-7.36%	0.32
80+ yrs	2994	2754	-8.01%	0.18	1219	1125	-7.69%	0.41

similar findings with a significantly greater reduction in presentations during the lockdown period of March-May 2020. The SWSLHD was one of the strictest areas in Sydney that experienced the lockdown during the COVID-19 pandemic. This time period was the strictest lockdown period for Sydney and hence the most “socially distant” time for the metropolitan area. During this time, strict measures with physical and social distancing impacted livelihoods and presentations to ED for provisions of care.

The impact of social and physical distancing affected how individuals changed the pattern of outdoor activities and the concept of working from home invariably changed the pattern of trauma presentations across the district and within the department (**Table 3**). There were certain specialties on presentation that had significant reductions impacted by restrictions and changes in outdoor activities. Notably, a reduction in trauma was observed and orthopaedic presentations to the ED experienced a 33.63% reduction during the lockdown period (March to May 2020), reflecting the changes in sporting activities and outdoor activities. The vast majority of these surgical presentations are injurious complaints likely linked to the removal of many traumatic mechanisms, such as road traffic accidents, sports, and other outdoor activities. Consistent with the literature, many local and international studies have reported similar experiences with reductions in metropolitan hospitals [5] [6] [7] [8]. Probert’s Sydney study on orthopaedic trauma presentations to a level 1 trauma centre corroborates these trends highlighting that injury types shifted from cycling-related compared to sports or multi-trauma [8]. Whereas, Woo, *et al.* orthopaedic study in regional NSW demonstrated a 77% increase in orthopaedic ED admissions from 2019 to 2020 (280 vs 496, $p < 0.001$). This difference is likely attributed by the difference of measures taken between regional and metropolitan experiences of lockdown, physical activity and outdoor recreation and occupational hazards.

Although trauma presentations generally experienced a reduction in metropolitan centres, there were significant decreases in presentations for those who were discharged from ED and not admitted to hospital (−15.52% for February-August, $p = 0.049$) and patients that were admitted under geriatrics (−16.55% for February-August, $p = 0.010$). Interestingly, sub analysis of the age groups can partly explain this change in admission and geriatrics whereby all except those aged 0 - 9 years had no significant change in proportion of presentations (**Table 4**). However, the lockdown period had an overall significant decrease in presentations across all age groups less than 50 years. Westgard’s American study of emergency presentations in the early pandemic demonstrated a similar decrease in patient’s over 65 years old [9], attributing this trend to elderly patients avoiding perceived COVID-19 hotspots due to their documented increased risk of contracting severe illness from the virus [10]. Our experience for the elderly, aged 60 - 69 years showed a 16.32% reduction in presentation, but those above 70 years did not show any significant change in the proportion of ED presentations.

Collectively, our study demonstrated significant shifts in presentations across age groups such as a significant reduction in age groups under 50 years old during the lockdown period (mean 29.5%, **Table 4**). Dann's retrospective review of paediatric emergency presentations in an Irish ED demonstrated a reduction in paediatric emergency cases attributed largely to public anxiety over hospitals with COVID-19 infection [11]. Our experience similarly demonstrated a mean 39.41% reduction in presentations for younger age groups. This may have reflected a fear of contracting the virus dissuading those with less acute complaints to seek medical care from general practitioners (GP) or the government COVID-19 hotline. Whereas, the elderly (70 - 80+ years) showed a 7.53% reduction in patients consistent with international experiences of the elderly population [12] [13], though this was not statistically significant. Our experience reflected many centres across Sydney and the introduction of seeking health care through GPs, COVID-19 hotline and telehealth were important measures that changed the patterns of ED presentations and expectant management. Compared to the pre-COVID-19 pandemic period, the significant reduction of those not admitted to hospital also meant that trainees and clinicians linked patients with outpatient services via telehealth as means for follow up.

Interestingly, we found certain disciplines demonstrated significant increases in presentations during the first wave of the pandemic, namely gynaecology (+26.54%, $p = 0.008$) and psychiatry (+17.46%, $p = 0.011$). These trends could be explained by the reduction in availability of outpatient clinics that tend to manage their specific medical complaints [1]. In the current era, women's health and mental health-related care is often shared between GPs and specialist services to whom they refer. GPs report that COVID-19 precautions advised by public health units have played a significant role in preventing their patients seeking care from their clinics for routine issues [14]. As such patients have instead turned to the ED for "faster" alleviation of concern or addressing the problem once more severe. Svetcic *et al.* comment on a decline in help-seeking behaviour contributing to the increase in mental health and suicide-related presentations to hospital during the initial COVID-19 pandemic period [15]. The causes for increase in mental health presentations at the beginning of the pandemic are multifactorial. The WHO Global Burden of Disease study 2020 showed a 27.6% increase major Depressive Disorder and 25.6% increase in Anxiety Disorders [16].

Bankstown-Lidcombe hospital was a relatively "clean" centre with comparatively few COVID-19 cases during the first wave, a factor allowing for better analysis of the effects pandemic restrictions and public perceptions have on ED presentations, as opposed to the effects of COVID-related illness and outcomes. There was an increase in presentations in the second half of 2020 compared to the combined average of 2017-2019 (**Figure 1**). This can be linked to the transformation of less urgent complaints into more serious conditions due to delayed presentation corroborated by multiple case reports. [17] [18] [19] Our previous studies have demonstrated instances of severe disease with delays in presenta-

tions for pathologies such as necrotising fasciitis [20], due to fears of contracting COVID-19 at hospitals and/or clinics. This study provided insight into the mindset of the SWSLHD population at the time where all patients denied any reason for delay to ED with sound knowledge of personal protection and sufficient access to COVID-19 information. However, progress notes and history taking identified that patients were more focused on respiratory symptoms of COVID-19, and other non-specific symptoms were considered less seriously.

The fall in presentations allowed the ED to train all healthcare workers in donning and doffing of Personal Protective Equipment (PPE), simulation of intubation of a COVID-19 patient including different departments such as ED, Anaesthetics and Intensive Care Unit (ICU). It also allowed for protocols to be written on ED space allocation (setting up of HOT and COLD zones), triage, testing of patients with COVID-19 symptoms), staffing and improved disaster response. The stress of the pandemic highlighted the importance of non-clinical skills and teamwork. An international survey on this notion underlined how multidisciplinary trauma teams need to operate under great pressure, and tailored mechanisms and processes should be put in place to facilitate teamwork and performance [21]. These were especially important as there were no available vaccines at that time. Limitations of this study are impacted by retrospective and selection bias. As the data is largely population-based, specific patient presentations, including diagnoses and severity were not captured in this study. Our future study on the impact for surgical specialities would explore this in greater detail. To date this is the largest analysis of data in Sydney, NSW analysing the experience of a single, metropolitan ED who has been detrimentally affected by COVID-19. Further analysis of ED presentations during the second and third waves of the COVID-19 pandemic would provide insight into whether these trends are consistent and what differences in outbreaks affect them, contributing to better resource allocation planning for metropolitan EDs in the face of viral pandemics.

5. Conclusion

The initial wave of the COVID-19 pandemic led to significant reductions in ED presentations at Bankstown-Lidcombe Hospital. The most significant reductions were seen during the lockdown period of March-May 2020 in orthopaedics and age groups under 50 years old.

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Contributors

The authors contributed to the conception and design of the manuscript, revised

it critically for important intellectual content, approved the final version to be published and agreed to be accountable for all aspects of the work.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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