PHARMACY TECHNICIAN TURNOVER RATES DURING A PANDEMIC AT A CHILDREN'S AND WOMEN'S HEALTH-SYSTEM

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Abstract

Purpose: This study assessed pharmacy technician turnover rates during a pandemic at a children's and women's health system and within different practice areas.

Methods: This study was a single-center, retrospective, longitudinal study of turnover rates in pharmacy technicians at Texas Children's Hospital. Data for turnover numbers and rates were collected via an organizational dashboard. Turnover incidences in three defined years were analyzed utilizing chi square tests and an interrupted time series (ITS) analysis to assess significant changes in turnover during the pandemic when adjusting for the different years and increments of time.

Results: There was no significant association in turnover found when comparing the pre-pandemic year with the first year of the pandemic X^2 (1, N = 445) = 0.04, p = .850 or when compared to the second year of the pandemic X^2 (1, N = 445) = 0.1, p = .750. Through the ITS analysis, a significant change in turnover was detected, t(1) = 2.3, p = .047, in the composite population at the start of the pandemic. A significant turnover change was also observed among pharmacy technicians employed at a community campus, t(1) = 2.26, p = .049

Conclusion: At a children's and women's health system, turnover occurrences were not significant between the different years of the pandemic. However, there was a significant change in turnover that is contributed to factors outside of time. Further studies are warranted to assess other influencing factors and their impacts on turnover.

Keywords: turnover, pharmacy technicians, COVID-19, pandemic

Tables

Table 1. Turnover Data

	Pandemic Year	# of Turnover, n	# of Active Employees, n	Turnover Rate, %
Composite	**Pre-Pandemic**	39	227	17.18%
	Pandemic: Year 1	36	218	16.51%
	Pandemic: Year 2	35	218	16.06%
Pavilion for Women/ Batch Pharmacy	**Pre-Pandemic**	7	54	12.96%
	Pandemic: Year 1	11	57	19.30%
	Pandemic: Year 2	12	55	21.82%
Satellite Pharmacy, EC, Cancer Center Services	**Pre-Pandemic**	12	59	20.34%
	Pandemic: Year 1	9	56	16.07%
	Pandemic: Year 2	7	63	11.11%
Community Campuses	**Pre-Pandemic**	7	31	22.58%
	Pandemic: Year 1	7	24	29.17%
	Pandemic: Year 2	5	24	20.83%
Ambulatory Care Services	**Pre-Pandemic**	9	60	15.00%
	Pandemic: Year 1	4	59	6.78%
	Pandemic: Year 2	8	55	14.55%
Pharmacy Ancillary Services	**Pre-Pandemic**	4	23	17.39%
	Pandemic: Year 1	5	22	22.73%
	Pandemic: Year 2	3	21	14.29%

	Pandemic Year	# of Turnover Observed Count (Expected Count)	# Non-Turnover Observed Count (Expected Count)	X^2	p-value
Composite Population	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	39 (38.26)	188 (188.74)	0.04	.477
	Pandemic: Year 1	36 (36.74)	182 (181.26)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	39 (37.75)	188 (189.25)	0.1	.750
	Pandemic: Year 2	35 (36.25)	183 (181.75)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	36 (35.5)	182 (182.5)	0.02	.477
	Pandemic: Year 2	35 (35.5)	183 (182.5)		
Pavilion for Women/ Batch Pharmacy	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	7 (8.76)	47 (45.24)	0.82	.365
	Pandemic: Year 1	11 (9.24)	46 (47.76)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	7 (9.41)	47 (44.59)	1.48	.477
	Pandemic: Year 2	12 (9.59)	43 (45.41)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	11 (11.71)	46 (45.29)	0.11	.741
	Pandemic: Year 2	12 (11.29)	43 (43.71)		
Satellite Pharmacy, EC, Cancer Center Services	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	12 (10.77)	47 (48.23)	0.35	.554
	Pandemic: Year 1	9 (10.23)	47 (45.77)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	12 (9.19)	47 (49.81)	1.97	.160
	Pandemic: Year 2	7 (9.81)	56 (53.19)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	9 (7.53)	47 (48.47)	0.63	.429
	Pandemic: Year 2	7 (8.47)	56 (54.53)		
Community Campuses	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	7 (7.89)	24 (23.11)	0.31	.578
	Pandemic: Year 1	7 (6.11)	17 (17.89)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	7 (6.76)	24 (24.24)	0.02	.876
	Pandemic: Year 2	5 (5.24)	19 (18.76)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	7 (6.00)	17 (18.00)	0.44	.505
	Pandemic: Year 2	5 (6.00)	19 (18.00)		

	Pandemic Year	# of Turnover Observed Count (Expected Count)	# Non-Turnover Observed Count (Expected Count)	X^2	p-value
Ambulatory Care Services	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	9 (6.55)	51 (53.45)	2.07	.151
	Pandemic: Year 1	4 (6.45)	55 (52.55)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	9 (8.87)	51 (51.13)	0.005	.945
	Pandemic: Year 2	8 (8.13)	47 (46.87)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	4 (6.21)	55 (52.79)	1.82	.177
	Pandemic: Year 2	8 (5.79)	47 (49.21)		
Pharmacy Ancillary Services	**Pre-Pandemic_Pandemic: Year 1**				
	Pre-Pandemic	4 (4.6)	19 (18.4)	0.2	.655
	Pandemic: Year 1	5 (4.4)	17 (17.6)		
	Pre-Pandemic_Pandemic: Year 2				
	Pre-Pandemic	4 (3.66)	19 (19.34)	0.08	.778
	Pandemic: Year 2	3 (3.34)	18 (17.66)		
	Pandemic: Year 1_Pandemic: Year 2				
	Pandemic: Year 1	5 (4.09)	17 (17.91)	0.506	.477
	Pandemic: Year 2	3 (3.91)	18 (17.09)		

Table 3. Interrupted Time Series Analysis

	Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Composite R^2= 0.1177	Intercept	1	3.12125	1.35892	2.3	.047*
	Time	1	0.47	0.44382	1.06	.317
	PP	1	-2.05125	1.87642	-1.09	.303
Pavilion for Women/ Batch Pharmacy R^2= 0.6807	Intercept	1	3.32467	2.1262	1.56	.152
	Time	1	0.023	0.9171	0.03	.981
	PP	1	1.033	3.87738	0.27	.796
Satellite Pharmacy, EC, Cancer Center Services R^2= 0.1620	Intercept	1	3.71792	2.18914	1.7	.124
	Time	1	0.504	0.71497	0.7	.499
	PP	1	-3.10725	3.02281	-1.03	.331
Community Campuses R^2= 0.0351	Intercept	1	7.8525	3.46865	2.26	.049*
	Time	1	-0.50767	1.13286	-0.45	.665
	PP	1	1.47817	4.78958	0.31	.765
Ambulatory Care Services R^2= 0.2890	Intercept	1	1.85967	4.45742	0.42	.686
	Time	1	3.57467	1.92263	1.86	.096
	PP	1	-13.11867	8.12864	-1.61	.141
Pharmacy Ancillary Services R^2= 0.0119	Intercept	1	5.45683	3.20741	1.7	.123
	Time	1	-0.38567	1.38346	-0.28	.787
	PP	1	1.21017	5.84909	0.21	.841

*p<0.05

Introduction

It is projected that there will be an increased demand for pharmacy technicians in the workforce over the next several years.[1] Rising demands for prescription medications will lead to a higher demand for pharmaceutical services, necessitating technicians to take on a more significant role within pharmacy operations to collect patient information, prepare a wider variety of medications, and verify other technicians' work. As pharmacy technicians transition into a wider variety of roles, it is predicted that more employees will be needed in the workforce. According to the US Bureau of Labor Statistics (BLS), there is a projected 4% growth in the number of pharmacy technicians by 2029.[1]

Despite an increased need for pharmacy technicians in the workforce, a 2018 pharmacy staffing survey by the American Society of Health-System Pharmacists (ASHP) reported a rising vacancy in pharmacy technician positions.[2] The BLS estimates that there are 31,700 openings for pharmacy technicians, on average, each year.[1] Furthermore, the reported vacancy rate among pharmacy technicians was more than twice the rate seen in pharmacists.[2] A survey among pharmacy technicians reported that greater than 50% have considered leaving the profession in the past year.[3] Although organizations were already facing pharmacy technician staffing challenges, turnover and retention became even more challenging during the COVID-19 pandemic.

In March 2020, the World Health Organization (WHO) declared the outbreak of the COVID-19 pandemic .[4] The turn of events that have been experienced during the pandemic has sparked an unprecedented mass exit from the workforce, which many have come to refer to as

the Great Resignation. During this time, the BLS has reported over 47 million Americans quitting their jobs and an increase in turnover by 4.8% within healthcare in the first year of the pandemic.[5,6] A survey of pharmacy administrators reported pharmacy technician turnover rates of 21% in 2021, with 1 in 10 losing more than 40% of technician staff.[7]

Turnover can be detrimental to an organization and is associated with various direct and indirect costs. Direct costs include advertising and recruitment through costs related to the use of newspaper ads and employment websites. Financial costs also come in the form of salary and time spent by directors and managers to interview potential candidates. However, indirect costs that may not be as apparent can include a loss of productivity of existing employees to train new hires, a loss in morale, and the loss of skills and knowledge of past employees.[8,9] Overall, the cost of employee turnover can be as much as $4,000 to $8,000 per pharmacy technician.[10] However, this does not account for the loss in the quality and continuity of service or the other intangible effects turnover can have on an organization. To mitigate the substantial costs associated with turnover, it is important to understand what factors contribute to an employee
leaving.

The causes of turnover are complex, with multiple factors leading to an employee's departure from their job. In addition to the life style and demographic factors that contribute to turnover, job-specific factors can contribute to turnover and include work climate, poor salary, and a lack of advancement opportunities.[11–13] Many of these factors play a role in the psychological factors such as burnout, job satisfaction, and workplace ambiguity.[13,14] Furthermore, COVID-19 has exacerbated existing stress factors and introduced new concerns.

During the pandemic, healthcare employees have reported uncertainties of when things will settle down and return to normal, higher rates of burnout, and the fear of exposing people they live with to COVID-19.[15] These concerns have led to emotional and physical exhaustion, work-related dread, anxiety, and increased turnover.[15,16] With heightened rates of turnover during the pandemic in other populations, we set out to assess whether this occurs at a pediatric and women's health system.

Texas Children's Hospital (TCH) is an 865-bed pediatric and women's health system in Houston, Texas. An academic medical center, TCH includes 10 different specialties (Cardiology & Heart Surgery, Pulmonology, Neurology & Neurosurgery, Neonatology, Nephrology, Cancer, Gastroenterology & GI Surgery, Diabetes & Endocrinology, Urology, and Orthopedics). Pharmacy technicians at TCH prepare over 3 million inpatient doses from 12 inpatient areas and dispense over 250,000 outpatient prescriptions from its 5 outpatient areas. These individuals work under a leadership model that is broken down by practice area and location to allow for cross-training to their practice areas.

This method of distributing technicians amongst leadership allows for technicians to be cross trained to the different areas under the manager's purview. Technicians staffing our emergency center, satellite, and cancer center areas prepare IV first doses, last minute preparation medications, chemotherapy orders, medications for our operating rooms, delivering doses, COVID-19 vaccines, and support our central verification center calls. Within our Pavilion for Women (PFW) and batch pharmacy areas, technicians are tasked with preparing scheduled doses, solid oral doses, respiratory medications, and TPNs for patients throughout our main campus. Our ancillary services work to ensure that our pharmacy areas

and automated dispensing cabinets are appropriately stocked with medication. To service our outpatient and specialty pharmacy patients, our ambulatory care areas primarily work to prepare outpatient prescriptions. Across the two community campuses, pharmacy technicians have a more diversified role compared to our pharmacy technicians on main campus. The technicians at our community campuses rotate to perform most of the pharmacy technician roles seen at main campus, but to fulfill a smaller number of orders in comparison.

Currently, no literature evaluates how turnover rates have changed during the first two years of the pandemic and turnover differences amongst pharmacy technicians in various practice areas. Thus, this study aims to assess if there are changes in turnover over the first two years of the pandemic within pharmacy technicians at our institution. The secondary objective of this study is to evaluate if there are differences in turnover rates within the first two years of the pandemic in each practice area at Texas Children's Hospital. We hypothesize that there is an increased turnover rate during the pandemic and that there are differences in turnover amongst different practice areas.

Methods

Participants, Data Collection, and Measures

All pharmacy technicians employed by TCH between April 1, 2019, through March 31, 2022, are assessed in this study. All pharmacy technicians at TCH were included in our study. Pharmacy technicians are defined by the institution via a job code and encompasses those that play a traditional role in the preparation of medications. All employees that are not defined by

the institution as a pharmacy technician were excluded. Turnover data was collected via a dashboard available through the health-system's human resources department. Turnover was defined as the number of individuals that had left the institution in a quarter over three years: the pre-pandemic year, year one, and year two of the pandemic. The pre-pandemic year is defined as April 1, 2019 – March 31, 2020. The first and second year of the pandemic was defined as April 1, 2020 – March 31, 2021, and April 1, 2021 – March 31, 2022, respectively. Practice areas to be assessed included TCH's community campuses, Pavilion for Women/ Batch Pharmacy, satellite/EC/cancer center services, ambulatory care services, and pharmacy ancillary services. These areas were defined based on the role of pharmacy technicians in the respective area and where they are cross trained. Turnover counts and rates for each practice area, as well as the composite population, were obtained by collecting information via the turnover dashboard for the pharmacy technicians of the respective practice area leaders. Turnover data was collected by filtering by job title, date, and leadership. The Pareto principle is commonly used within operations and states that 80% of consequences are a result of 20% of causes.[18] This principle was utilized to define a 20% variance as a significant difference in turnover.

Research Design

This study is a retrospective, single-center, longitudinal study. A power analysis was conducted utilizing an alpha of 0.05, a power of 0.8, and an effect size of 20% which resulted in a calculated sample size of 908 study participants. A univariate and multivariate analysis was performed for the composite population and each practice area. To assess if there is a

difference in composite pharmacy technician turnover, a univariate analysis consisting of Chi Square, 2 by 2 contingency tables was utilized for the following comparisons: pre-pandemic year versus year one, pre-pandemic year versus year two, and year one versus year two data. A multivariate test was then be utilized to assess against each year and quarter of the observed time frame using an interrupted time series (ITS) analysis to assess if annual turnover is independent of quarterly influences. The same process was then used for the secondary objective. The univariate and multivariate analysis used assess composite turnover was repeated for each practice area to assess if there are significant changes in turnover. The data analyses for this study was generated using SAS software.[19]

Results

Chi-Square Analysis

Turnover numbers and annual turnover rates for are described in table 1. A chi-square test of independence was utilized to assess an association between pre-pandemic and pandemic turnover rates in the overall pharmacy technician population and specifically in different practice areas. The data comparing pre-pandemic and pandemic turnover is displayed in table 2. There was no significant difference in turnover found when comparing the pre-pandemic year with the first year of the pandemic X^2 (1, N = 445) = 0.04, p = .850 or when compared to the second year of the pandemic X^2 (1, N = 445) = 0.1, p = .750. Additionally, there was no significant difference in turnover when comparing the different pandemic years in the other practice areas.

Interrupted Time Series Analysis

An ITS analysis was utilized to account for the different years and overall time affecting turnover. The results of the ITS analyses are reported in table 3. When assessing turnover within the composite technician population, a significant change in turnover was detected, R^2 = 0.1177, t(1) = 2.3, p = .047, at the start of the pandemic. Additionally, a significant turnover change was also observed at the start of the pandemic among pharmacy technicians employed at a community campus, R^2 = 0.0351, t(1) = 2.26, p = .049. However, looking at other practice areas, no other significant changes were detected in turnover.

Discussion

Turnover is an unavoidable aspect of doing business. However, the impact that the COVID-19 pandemic has on turnover is not fully understood. Therefore, this study aimed to assess if there is a relationship between turnover observed before and during the pandemic.

The first year of the pandemic brought forth several financial challenges for health-systems to address. During this time, institutions have had to care for higher acuity patients, address increasing operational costs, and compensate for a reduction in outpatient visits and elective procedures.[20,21] Additionally, institutions have had to enact methods to reduce the spread of COVID-19 among patients and staff. In an effort to address these various challenges, organizations have had to either layoff and furlough employees, as well as implement remote-

work opportunities.[22] At TCH, we also implemented hiring freezes during this time, which affected the number of active employees utilized to calculate turnover rates within the study.

As the pandemic progressed into a second year, healthcare institutions began facing employee burnout, turnover, and retention issues. To help combat turnover and increase retention, many institutions implemented various incentive programs. Some of the financial incentive programs that institutions have implemented include wage increases, extra-shift bonuses, and retention bonuses. However, these incentives can be costly for an organization, with reports of $50 million in investments to retain current employees and attract new employees.[23] At TCH, the financial incentives listed above were also implemented during the second year of the pandemic. Unfortunately, although our institution implemented multiple financial incentive programs during this time, we did not experience a significant reduction in turnover.

With no significant changes in turnover observed in the chi-square tests, it is intriguing that the interrupted time series analysis resulted in a significant finding in the composite population. The non-significant finding in the univariate analysis could have been a result of the number of participants that were able to be enrolled in the study. However, the significant finding in the multivariate analysis could suggest that the different years still play a factor in turnover within these populations when taking turnover over smaller increments of time into account. It is important to note that the small coefficient of determination indicates much of the variance seen in turnover is not explained by the time or pandemic years. This low proportion of variance emphasizes the importance of being able to assess other factors to understand the multifactorial causes of turnover.

Additionally, a significant change in turnover was observed utilizing the ITS analysis in pharmacy technicians working at a community campus. Technicians working at a community campus have a more diversified role compared to their colleagues at the main campus. With a broader range of responsibilities, the pandemic may have impacted turnover rates differently in this group. Workplace ambiguity has been found to negatively impact job satisfaction and organizational commitment, which then induces turnover. [13] With the wider range of tasks and responsibilities that technicians in this area work to fulfill, it is possible that not having defined roles contributed to turnover rates in the community campuses. Differences in workflows and operations at the community campuses may have also contributed to a significantly different change in turnover. When developing workflows and practices for the department, it is the expectation that the community campuses mirror the processes at our main campus. However, due to differences such as size, staff roles, and available service lines, it becomes increasingly more difficult to follow the same practices. This could potentially contribute to increased stress in these technicians.

Limitations

There are other limitations to note in this study beyond having a small study population. Additional limitations include a convenience sampling that provides findings specific to our pediatric and women's health-system pharmacy technicians. Furthermore, this study could not account for other factors that contribute to turnover, including work stressors and demographic characteristics. Additionally, at TCH, position lock-downs were implemented during the first year of the pandemic, which affected the number of study participants observed during that period.

However, to address some of the limitations in this study, an ITS analysis was utilized. An ITS analysis is a quasi-experimental approach to assessing the longitudinal effects of turnover during the pandemic. The main advantage of using this method of data analysis allowed for pre-pandemic turnover trends to be taken into account prior to the pandemic's start.[24] Using an ITS analysis also addresses that there was no randomization in observed turnover results. An ITS analysis allowed for a comparison of turnover variance, taking both overall time and pandemic year into account, despite an unobserved relation in the chi-square analysis.[25] Being able to assess turnover through smaller increments of time allowed for a more detailed assessment of turnover revealing significant changes.

Conclusion

Pharmacy technicians play a significant role in the management, preparation, and dispensing of medications within a health-system. As the profession of pharmacy continues to evolve and pharmacy technicians take on more roles, more individuals will be needed in the workforce to fulfill these new positions. However, recent trends have shown that there has been an increase in vacancy for technician positions and higher reported rates of turnover. Assessing turnover within pharmacy technicians at a pediatrics and women's health system, no significant difference in turnover was found when comparing the different years of the pandemic. However, a significant change was detected at the start of the pandemic in the composite and community campus populations when adjusting for different increments of time. Our findings suggest a significant change occurred, but was not entirely explained by the year of the pandemic.

More extensive studies will need to be conducted to assess whether or not the pandemic affects turnover among pharmacy technicians. At first glance, the pandemic does not seem to affect turnover significantly within the health system, but a multivariate analysis does reveal a significant change during that time. Nevertheless, this study does implicate that the pandemic may have been a factor that significantly impacted observed turnover in the overall pharmacy technician population, specifically in those that work at a community campus. Further studies are needed to assess additional factors that influence turnover and within a larger study population.

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