

# Performances and Activities of Virtual Pediatrics Medication Counselling Clinic in Riyadh City, Saudi Arabia

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## ABSTRACT

**Objectives:** To explore the activities and performances of a virtual pediatrics medication counseling clinic in Riyadh City, Saudi Arabia. **Methods:** it was a retrospective analysis of activities and performances of a virtual pediatric medicine counseling clinic operated by the pharmacist at a public pediatric and maternity hospital. The pharmacist documented all the activities, including demographic information of patients visiting the clinic, the reason for the counseling, medication requirements to be counseled, and patient counseling items based on international guidelines. The data analysis was done through SPSS version 20 and Microsoft Excel version 2021; descriptive analysis and logistic regression of factors associated with the reason for counseling. **Results:** The total number of patients who visited the virtual pediatric medicine clinic through 20 months was 1955, with (97.75) per month. The majority of patients were female in the year 2021, 204 (63.55%) vs. female 900 (61.19%) in 2021, compared to male 117 (36.46%) vs. males in year 2022 628 (38.81%) with non-significant differences ( $p=0.149$ ). The majority of patients were diagnosed as Diabetic Miletus in both years, 145 (45.17%) vs 884 (54.47%), with statistical significance differences between two 2021 and 2022 ( $p=0.000$ ). The majority of patients counseled due to high alert medication was 230 (71.65%) in 2021 vs. 1198 (73.32%) in 2022, with non-statistically significant difference between them ( $p=0.539$ ), and chronic diseases such as diabetes and asthma 224 (69.78%) vs. 901 (55.14%) in the year 2021 and 2022 respectively with statistical significance differences between both years ( $p=0.000$ ). Most medication counseled was Insulin Aspart in both years, 121 (21.72%) vs. 909 (31.92%), insulin Glargine 104 (18.67%) in 2021 vs. 555 (19.49%) in 2022, and Enoxaparin in both years 40 (7.18%) vs. 205 (7.20%). **Conclusion:** The virtual pediatric medicine counseling clinic served many patients, emphasizing pediatric chronic diseases such as Diabetes and Asthma. Future studies are highly recommended to measure the clinical and economic outcomes and patient satisfaction.

**Keywords:** Virtual, Pediatric, Medication, Counseling, Clinic, Saudi Arabia.

## INTRODUCTION

The pharmacist provides pharmaceutical care nationwide and locally through principles of international guidelines.<sup>[1,2]</sup> He or she distributes medication to different types of patients and information requirements for those medications. The information on those medicines needs to be appropriate through patient counseling skills.<sup>[1-5]</sup> Patient education is one of the pharmacist's significant responsibilities.<sup>[1-5]</sup> Patient counseling might reduce drug-related problems and avoid unnecessary economic burdens on the healthcare system.<sup>[6,7]</sup> Besides, it improves patient compliance with their medication. During the previous coronavirus pandemic in 2020, healthcare providers changed regular patient care to telemedicine and virtual patient care.<sup>[8]</sup> That is to reduce direct contact with the patients and prevent infection from disseminating throughout society. Various publications should show that healthcare professionals provide patient care through telemedicine and virtually and excellent subsequent patient outcomes and satisfaction.<sup>[8]</sup> The pharmaceutical care provider also switched several services to virtual procedures to care for

the patient.<sup>[9-14]</sup> Some clinical pharmacy services become virtual through telepharmacy. The ambulatory care clinic operated by a pharmacist provides virtual pharmacy activities and is called a virtual pharmacy clinic.<sup>[13,15]</sup> Several researchers illustrated the virtual clinics operated by physicians and pharmacists during the coronavirus crisis.<sup>[8-11,13,15,16]</sup> The virtual pharmacy clinic has advantages, such as more convenience and patient satisfaction.<sup>[8]</sup>

Besides, there is a more significant coverage number of patients. Therefore, the virtual pharmacy clinic continued after the pandemic, such as the pharmacy clinic for patient medication counseling. The public pediatric and maternity hospital in Riyadh City, Saudi Arabia, provides those services through comprehensive pharmaceutical care to patients virtually called the virtual pediatric medicine counseling clinic.<sup>[15]</sup> An expert pharmacist operates the clinic and provides extensive patient counseling through telepharmacy procedures.<sup>[15]</sup> Over more than one year, the experience needs to be assessed and evaluated to improve the services. The virtual pediatric medication counseling clinic is seldom published nationwide and internationally.

Therefore, activity and performance need to be explored, which was the aim of the current study.

## METHODS

It is a retrospective analysis of the activities and performance of the virtual medication-counseling clinic operated by a pharmacist at Pediatrics and Maternity Public Hospital in Riyadh City, Saudi Arabia. The analysis includes the addressograph of patients visiting the clinical virtually and documentation of the pharmacist counseling activities involved in the reasons for counseling, medication reconciliation, and medication counseling for patients. Besides, if necessary, patient instructions include dosing information, therapy duration, consideration during pregnancy and breastfeeding, adverse drug reactions, medication storage conditions, and medication administration during the holy month of Ramadan. The pharmacist documents all previous information on a Microsoft Excel sheet and sends the report monthly to the pharmacy director. Full details about policy and procedures were discussed in the previous report.<sup>[15]</sup> The Pharmaceutical Care Department is meant to provide care jointly related to patients and physicians. Supervise all pharmacy functions to ensure that all relevant elements and human resources are available to suit patients' needs through direct administrative and technical supervision and distribution of tasks to all pharmacists and technicians in the pharmaceutical care department. They were establishing pharmacy services based on the Standards of Practice guide by the Ministry of Health (MOH), the Saudi Central Board for Accreditation of Health Institutions (CBAHI), the Food and Drug Administration (FDA) and Saudi Food and Drug Administrations (SFDA). It consisted of an inpatient pharmacy section, emergency pharmacy, outpatient pharmacy, intravenous injections, clinical services, and drug information services, besides the Extemporaneous Preparation Unit, Medication safety services, and Patient Counseling Clinic. The pharmacy services are provided through public pediatrics and maternity hospitals in Riyadh, Saudi Arabia.

The hospital has 300 beds with various specialties such as pediatric infectious, pediatric neurology, pediatrics endocrinology, neonatal critical care, and critical maternity sections.<sup>[17]</sup> The descriptive and frequency analysis used the Statistical Package of Social Sciences (SPSS) and Microsoft Excel sheet version 2020. Chi-Square was used to determine the difference between categorical variables. The logistic

regression multinomial analysis with odds was used for correlation analysis. A  $p$ -value of 0.005 was set as statistical significance at a 95% confidence interval. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of the current study.<sup>[18]</sup>

## RESULTS

The total number of patients who visited the virtual pediatric medicine clinic through 20 months was 1955, with (97.75) per month. In 2021, 312 patients with (35.66) patients per month, while a statically significant increase in the next year, 2022, with 1634 patients with (148.54) patients per month (Table 1). The majority of patients were female in the year 2021, 204 (63.55%) vs. female 900 (61.19%) in 2021, compared to male 117 (36.46%) vs. males in the year 2022 628 (38.81%) with non-significant differences ( $p=0.149$ ). Most parents aged 5-19 years, 205(63.86%) and 1114 (68.18%) in 2021 and 2022, respectively, with non-statistically significant differences between them ( $p=0.053$ ). The majority of patients were diagnosed with Diabetic Miletus (DM) in both years, 145 (45.17%) vs 884(54.47%), with statistical significance differences between two 2021 and 2022 ( $p=0.000$ ). Most of the visitors were referred from the outpatient pharmacy and physicians clinic with statistically significant differences between them, 123 (38.32%) vs. 198 (61.68%) in years 2021 and 1050 (64.26%) vs. 584 (35.74%) 2022, respectively ( $p=0.000$ ) (Table 2).

The counseling information was provided to 246 caregivers (76.64%) in 2021 and increased in 2022 to 1324 (81.03%) with statistically significant differences between them ( $p=0.018$ ). The majority of patients counseled due to high alert medication, 230 (71.65%) in 2021 vs. 1198 (73.32%) in 2022, with non-statistically significant difference between them ( $p=0.539$ ), and chronic diseases such as diabetes and asthma 224 (69.78%) vs 901 (55.14%) in the year 2021 and 2022 respectively with statistical significance differences between both years ( $p=0.000$ ). Followed by diabetes with insulin treatment 152 (47.35%) in 2021 vs. 912 (55.81%) in 2022, with statistical significance differences between them ( $p=0.005$ ), and related medication devices 142 (44.24%) in 2021 vs 584 (35.75%) with statistical significance differences between them ( $p=0.004$ ) (Table 3). Most medication counseled was Insulin Aspart in both years, 121 (21.72%) vs. 909 (31.92%), insulin Glargine 104(18.67%) in 2021 vs 555(19.49%) in 2022, and Enoxaparin in both years 40 (7.18%) vs. 205 (7.20%) (Table 4).

The pharmacist advised ten points about medication: names, dosing, mission doses, drug storages, and possible adverse effects. The most item that increased during medication counseling was medication and pregnancy 95 (29.60%) vs. 822 (50.31%), medication side effect 241 (75.08%) vs. 1625 (99.45%), and medication reconciliation 235 (73.21%) vs 1614 (98.78%) with statistical significance differences between both years for previous three item ( $p=0.000$ ) (Table 5). By the

**Table 1: Number of Patients at Virtual Counselling Clinic.**

Months	2021 Patients	2022 Patients	Total	$p$ -value
1	0	66	66	0.000
2	0	78	78	
3	0	134	134	
4	12	95	107	
5	7	116	123	
6	34	96	130	
7	35	0	35	
8	46	32	78	
9	47	101	148	
10	51	285	336	
11	42	333	375	
12	47	298	345	
Total	321	1634	1955	
Average	35.66	148.54	97.75	

**Table 2: Demographic, social information.**

Diagnosis	2021		2022		p-value
Diabetes Mellitus (DM)	145	45.17%	884	54.47%	NA
Pregnancy	51	15.89%	242	14.81%	
Epilepsy	31	9.66%	147	9.00%	
Asthma	24	7.48%	154	9.42%	
Growth Hormone Deficiency (GHD)	2	0.62%	114	6.98%	
Others	47	14.64%	93	5.69%	
Total	321		1634		
Age	2021		2022		
Less than five years	23	7.17%	143	8.75%	0.053
5-19 years	205	63.86%	1114	68.18%	
20-34 years	44	13.71%	158	9.67%	
35-49 years	47	14.64%	207	12.67%	
50 -64 years	1	0.31%	11	0.67%	
65-79 Years	0	0.00%	1	0.06%	
More than 80 years	1	0.31%	0	0.00%	
Total	321		1634		
Gender					
Female	204	63.55%	900	61.19%	0.149
Male	117	36.45%	628	38.81%	
Total	321		1634		
Referral from					
Pharmacy (OPD)	123	38.32%	1050	64.26%	0.000
Physician clinic	198	61.68%	584	35.74%	
Total	321		1634		
The information delivered to					
Caregiver	246	76.64%	1324	81.03%	0.018
Patients	74	23.05%	310	18.97%	
Total	321		1634		
Type of clinic					
Regular Clinic	49	15.26%	91	5.57%	0.000
Virtual Clinic	272	84.74%	1543	94.43%	
Total	321		1634		

NA: Non-applicable

Logistic multinomial regression analysis, all factors (diagnosis, gender, age) had non-statistically significant differences in reasons for medication counseling.

## DISCUSSION

Virtual pharmacy services have been expanding since the coronavirus crisis until now.<sup>[9]</sup> Each service covered special services and patients, such as anticoagulation, counseling clinics, and other clinical pharmacy services.<sup>[9,13,16,19-21]</sup> One of the critical services founded in Riyadh City is The virtual pediatric medicine counseling clinic, one of the virtual

pharmacy services at public pediatric and maternity hospitals.<sup>[15]</sup> The current study is to determine the activity and performance of the clinic.

The total number of patients visiting tremendously increased from the first to the second year, which transferred from physician and ambulatory care pharmacy to the clinic, higher than in the previous study.<sup>[8]</sup> That was not documented before to demonstrate the high demand of the clinic because they were facing a high number of patients not aware of their medication and a high need for basic information about their medication. Thus, over time, there were

more transfers from outpatient pharmacies than physician's clinic transfers in the second year. The pharmacy staff became more aware of the patient's status and needed education about their medications. No statistically significant differences existed between all patients' demographic information, including gender and age. That is related to equal demand for counseling regardless of gender or age level. Despite that, most patients were children, which was expected because it was a pediatric hospital; subsequently, most of the recipient's information was caregivers on behalf of children. That is a regular situation for pediatric patients. The common diseases visited the clinic during the research period are Diabetes Multitudes, Epilepsy, and Asthma. That is expected because those diseases highly demand medication counseling, and the impact of counseling was well established.

Most patients receive counseling due to high-alert medication or medication for chronic illness, as discussed before, besides specific concerns about DM and medication devices. That is expected of chronic illness, and medication device counseling is rarely available for patients, which was a beneficial candidate to be counseled and prevent drug-related misadventures.<sup>[6,7]</sup> Besides, the anticoagulation medication or medication for asthma is prescribed adequately to pregnant women while visiting the clinic. That is expected because those need specific counseling for their medications.<sup>[7,13,22-24]</sup>

Using telepharmacy technology, the pharmacist provided various information such as drug information, dosing instructions, administration, drug storage, drugs during pregnancy, and breastfeeding. There were specific items such as medication and pregnancy medication side effects and medication reconciliation. There were statistically significant differences between the two years, with an increase significantly that is expected because those items are essential for patients, which significantly impacts drug-related mortality and morbidity in practice.<sup>[25-28]</sup> Emphasis on those items is highly recommended.

The results showed that logistic regression was a non-significant relation of reasoning and association factors such as diagnosis, gender, and gender. All patients need almost the same basic understanding of medication and necessary basic knowledge of counseling of medications such as DM, Asthma, and Epilepsy. There is no existing study on the same topic to compare the results. We assumed that it was the first publication.

**Table 3: Causes of medication counseling.**

Sl. No.	Reason for counseling	2011		2022		p-value
1	About the medication Device	142	44.24%	584	35.74%	0.004
2	Medication use in Ramadan	13	4.05%	0	0.00%	0.000
3	Dispensing medication errors/Transcription medication errors	3	0.93%	0	0.00%	0.000
4	Adverse Drug reaction	1	0.31%	1	0.06%	0.398
5	Patient has a chronic disease (e.g: hypertension, diabetes, asthma,...etc)	224	69.78%	901	55.14%	0.000
6	Patient on new medication	177	55.14%	18	1.10%	0.000
7	Pregnant or breastfeeding	51	15.89%	305	18.67%	0.238
8	The patient is on central medication	7	2.18%	70	4.28%	0.077
9	Patient using Narcotic medication	0	0.00%	0	0.00%	NA
10	It phoned the patient, but he/she does not need any information	54	16.82%	0	0.00%	0.000
11	The patient received his/her medication via pharmacy mail order	1	0.31%	0	0.00%	0.024
12	Drug Dosing/Drug Interaction	26	8.10%	5	0.31%	0.000
13	Suspect non-adherence	0	0.00%	0	0.00%	NA
14	High alert medication	230	71.65%	1198	73.32%	0.539
15	Poly Pharmacy	0	0.00%	0	0.00%	NA
16	Diabetic patients in insulin treatment	152	47.35%	912	55.81%	0.005
17	Anticoagulant Medication	31	9.66%	130	7.96%	0.311
	Total	321		1634		

NA: Non-applicable

**Table 4: The Top 15 medications counseled while visiting a virtual clinic.**

Sl. No.	Medications	2021		Medications	2021	
1	Insulin Aspart	121	21.72%	Insulin Aspart	909	31.92%
2	Insulin Glargine	104	18.67%	Insulin Glargine	555	19.49%
3	Enoxaparin	40	7.18%	Enoxaparin	205	7.20%
4	Insulin	39	7.00%	Salbutamol Inhaler	141	4.95%
5	Calcium	29	5.21%	Growth Hormone	114	4.00%
6	Iron	22	3.95%	Fluticasone Inhaler	98	3.44%
7	Levetiracetam	22	3.95%	Iron	82	2.88%
8	Salbutamol Inhaler	18	3.23%	Levetiracetam	77	2.70%
9	Thyroxin	17	3.05%	Aspirin	70	2.46%
11	Iron + Folic Acid	14	2.51%	Glucagon Syringe	69	2.42%
12	Fluticasone Inhaler	12	2.15%	Calcium	59	2.07%
13	Glucagon Syringe	11	1.97%	Insulin Detemir	53	1.86%
14	Aspirin	9	1.62%	Thyroxin	39	1.37%
15	Others	99	17.77%	Others	469	18.88%
	Total medications	557		2848		
	Total medication per patient	1.73		1.74		

## LIMITATION

The study was new, with various results and additional information about activities and performances of virtual pediatric medicine counseling clinics. However, it contained several limitations, such as measuring the impact and patient clinical outcomes, patient satisfaction with the services provided, and the economic benefits of

the virtual pediatrics medicine counseling clinic. The role of pharmacist-related interventions was not documented. All those drawbacks should be assessed in the study of the clinic's future.

## CONCLUSION

The new technology serves the pharmacy practice to provide patients care with high

efficiency and productivity. Telepharmacy is used for various purposes through the preparation and distribution of medicine. Besides, patients were counseled for their medication. The foundation of virtual pharmacy services is the new digital pharmacy era. Virtual clinical pharmacy services emphasize that virtual pediatric medicine counseling clinics offer new services



**Table 5: Pharmacist Counselling Performances and Activities.**

Sl. No.	Items discussed with the patient	2011		2022		p-value
1	Medication name, dose, indication, route of administration, and frequency	320	99.69%	1601	97.98%	0.032
2	Duration of the therapy	319	99.38%	1632	99.88%	0.070
3	Steps to be taken in case of a missed dose	293	91.28%	1632	99.88%	0.000
4	Medication adverse reaction	241	75.08%	1625	99.45%	0.000
5	Taking into account if the patient is pregnant or breastfeeding	95	29.60%	822	50.31%	0.000
6	Medication reconciliation (including all medication, OTC or herbal)	235	73.21%	1614	98.78%	0.000
7	Appropriate storage of the medications	312	97.20%	1632	99.88%	0.000
8	Advice on appropriate lifestyle modifications	246	76.64%	1605	98.23%	0.000
9	Nothing; the patient does not need any information	187	58.26%	1417	86.72%	0.000
10	Medication used in Ramadan	72	22.43%	687	42.04%	0.000
	Total	321		1634		

to the pediatric and related caregivers.<sup>[15,21]</sup> It can handle a high number of patients very quickly and more conveniently. The pharmacist provides comprehensive activities and performance to pediatric and adult patients, including counseling chronic disease medication such as diabetes, Asthma, and Epilepsy. The virtual pediatric counseling clinic must expand to cover more patients with considerable clinical and economic benefits, besides determining patient satisfaction with clinic services for improvement. The virtual pediatric medicine counseling clinic is crucial and highly recommended to be involved in patient care nationwide.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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None.

## CONSENT FOR PUBLICATIONS

Informed consent was obtained from all the participants.

## ETHICAL APPROVAL

This research was exempted from research and ethical committee or an institutional review board (IRB) approval.


<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

## ABBREVIATIONS

**MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **ASHP:** American Society of

Health-System Pharmacists; **CBAHI:** Saudi Central Board for Accreditation of Health Institutions; **FDA:** The Food and Drug Administration; **SFDA:** Saudi Food and Drug Authority; **SPSS:** Statistical Package of Social Sciences; **DM:** Diabetes Mellitus; **GHD:** Growth Hormone Deficiency; **OTC:** Over the counter.

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