Pharmacist-led antiarrhythmic counseling clinic for supraventricular tachycardia in congenital heart disease patients

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Abstract: **Background**: Pharmacist provision in pediatric arrhythmia service is limited in low- to middle-income countries, despite this chronic condition demands adherence to prescribed regimens for better therapeutic outcomes. Pharmacist-led education to caregivers in developed countries resulted in better compliance with treatment; however, no similar studies were conducted in low and middle-income countries (Pakistan). **Objectives**: To evaluate the impact of pharmacist counseling on patients' and caregivers' knowledge of supraventricular arrhythmia care, and the participants' satisfaction with the pharmacist's services in the electrophysiology domain. To address this gap, an outpatient pharmacist-arrhythmia service was established in collaboration with an electro physiologist to assess the impact of pharmacist counseling on patients' knowledge of supraventricular arrhythmia care In patients with congenital heart defects. **Methods**: This quasi-experimental study was conducted at a cardiac tertiary care center in Pakistan. Caregivers received individualized counseling sessions from a pharmacist. Knowledge was assessed at baseline and two weeks post-counseling using a 22-item questionnaire (score range 0–100). Satisfaction was measured immediately after counseling via a 7-item, 5-point scale (score range 7–35). **Results**: Among 110 participants, the knowledge questionnaire demonstrated high reliability (Cronbach's alpha = 0.92). Median knowledge scores improved significantly from 50 [36.4-68.2] at baseline to 86.4 [81.8-83.4] post-counseling (p < 0.001). The average satisfaction score was 34.3 ± 0.8. **Conclusion**: Pharmacist-led counseling significantly enhances understanding of antiarrhythmic therapy in supraventricular arrhythmia, supporting its integration into outpatient care in resource-limited settings.

Keywords: Counseling; Electrophysiology; Pharmacist; Supraventricular arrhythmia

INTRODUCTION

Supraventricular tachycardia (SVT) is one of the most common arrhythmic conditions that requires emergent cardiac care with congenital heart defects and is a significant global health burden (Renwick *et al.*, 2022; Pratiwi *et al.*, 2025). Management of SVT includes medical treatment or radiofrequency catheter ablation (Moore JA *et al.,* 2022; Lavalle *et al.*, 2021). Close monitoring is necessary to achieve maximum therapeutic benefits of antiarrhythmic medications while minimizing adverse effects (Hamilton Sr *et al.*, 2020; Rolland *et al.*, 2022).

Pharmacists play a pivotal role in optimizing medical therapy, including dose calculation and frequency changes based on body weight and body surface area, avoidance of adverse effects, drug-drug interaction, drug-food interaction, and adjustment of dosing based on laboratory reports and therapeutic drug monitoring (Albayrak *et al.*, 2022; Osuala *et al.*, 2021). Pharmacists are also involved

in improving medication adherence and compliance, either through direct consultation or other education-related activities in inpatient and outpatient treatment regimens (Patel *et al.*, 2023; Batool *et al.*, 2024; Batool *et al.*, 2025).

Pharmacist counseling to patient caregivers has also been observed to be crucial to improving treatment adherence, and this improved knowledge about the disease, its management, and the satisfaction of caregivers with medical care may improve compliance with the regimen (Al-Arkee S *et al.*, 2022; Batool A *et al.*, 2025). This research is intended to measure the influence of pharmacists' counseling on the extent of knowledge given to congenital heart disease patients with supraventricular arrhythmia treatment among caregivers of patients, and also to evaluate their satisfaction with the pharmacist's services in the electrophysiology field. There is no study conducted to investigate the impact of pharmacist counseling on arrhythmic care in developing countries.

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MATERIALS AND METHODS

Study design and settings

This was a Quasi-Experimental Design, pre to post-educational intervention study conducted between January 2023 and June 2023 in the specialized outpatient electrophysiology (EP) clinic of the National Institute of Cardiovascular Disease, Karachi-Pakistan. The NICVD, Pakistan, is a public sector and adult cardiac specialized hospital.

Sample size

A convenience sampling technique was employed, and data were collected from 110 participants.

Participants selection and specification

The study participants were the caregivers and patients themselves over the age of 18 years, on treatment for congenital SVT, who were primarily responsible for the day-to-day medication management. A required number of patients and their caregivers who visited the EP clinic were enrolled in this study using a non-probability consecutive sampling technique. Participants with language barriers or those who cannot be reached for follow-up after 2 weeks of post-counseling were excluded.

Procedures and the educational session
Instrument

The study questionnaire consisted of three sections: a demographic section, a 22-item knowledge questionnaire, and a 7-item 5-point satisfaction rating questionnaire. The basic structure of the knowledge instrument was adopted from a study conducted by Chen and colleagues (Chen C *et al*., 2013), and the satisfaction scale was adopted from Larson (Larson LN *et al*., 2002). The questionnaire was validated in the following manner:

- *Content validity*: Content verified by five subject experts (one electrophysiologist and four cardiologists) using a five-point agreement scale for the relevance of the question to the subject matter, and their response was assessed by computing the inter-rater reliability coefficient. One question was omitted from the study because the average rating was 2.4 out of 5.
- *Face validity*: Face validity was assessed by real-life interviews with 20% (10 respondents) of the study sample. The knowledge questionnaire was administered to the same respondents twice, 24 hours apart. The questions with more than 10% discordance were rephrased and restructured to make it clearer for the respondents.
- *Translations*: The final instrument was translated and back-translated from English to Urdu for the participants' clarification and comprehension. Both Languages, Urdu and English, were used in this study as per the participants' understandings.

Pre-counseling phase

After the EP consultation, patients and caregivers were facilitated by the pharmacist in a separate counseling clinic. After patient consent, the demographics of participants were recorded, and then the participant was asked to fill in a self-administered 22-item knowledge questionnaire (Set A)

Interventional educational counseling phase

A pharmacist educational service in collaboration with electrophysiologists was set up to increase knowledge about SVT and its management among caretakers and patients. Pharmacists educated the participants for about 20 to 25 minutes by using the hardcopy material during counseling sessions. The information was provided to participants during the session, agreed upon by the electrophysiologist. The session syllabus included: The definition of arrhythmia, types of arrhythmias, signs and symptoms of arrhythmia, factors that trigger the arrhythmic episodes, medication administration, storage, medication-associated adverse effects, monitoring of narrow therapeutic drugs, monitoring of heart rate at home, vagal maneuver, first aid during the onset and worsening of episodes, what to do in an emergency, when to bring in to the emergency department (Chen C *et al.*, 2013).

Post-counseling phase

All the participants were asked to fill 7-item 5-point satisfaction rating questionnaire (Set B) just after the counseling session. After 2 weeks of the session, all the participants were contacted on their registered contact number, and their responses to the 22-item knowledge questionnaire (Set C) were obtained.

Study measures and outcomes

Three questionnaires (sets A, B, and C) were designed for this study. Sets A and C included knowledge base questions covering the information expected to be given to the patients and their caregivers. Set B was the perception-based questionnaire to evaluate the pharmacist's impact on patient understanding and satisfaction (Chen C *et al.*, 2013).

Result scoring

The 22 knowledge questionnaires were scored as 1 if the answer was correct and 0 if incorrect. A total knowledge score for a patient was obtained as 100 × Number of correct responses/ the total number of questions (22), ranging from 0 to 100.

The satisfaction questionnaire scored 5=excellent, 4=very good, 3=good, 2=fair, and 1=poor for the evaluation of patient satisfaction and evaluation of pharmacist performance. A satisfaction score was computed as the sum (range 7-35) of responses to the 7-item satisfaction scale.

Data analysis

The response from each participant was recorded, and their data was confidential. The median [interquartile range

(IQR)] of both sets of questionnaires, sets A and C, was calculated using the software IBM SPSS (version 21.0.0), and pre- and post-intervention knowledge scores were compared by using a Wilcoxon signed-rank test. Pre- and post-intervention correct responses to the individual item were compared using the McNemar test at a 5% level of significance.

RESULTS

A total of 110 participants received the educational session, including a complete set of questionnaires (Sets A, B, and C). Out of 110 caregivers, there were 56 mothers, 30 were fathers, 6 were siblings, and 10 were self. The patient's demographics include, there were 78 (70.9%) males, 32 (29.1%) females, and 92 under 18 years, whereas 10 participants were over 18 years of age. In our study, 86 patients had regular narrow complex tachycardia, and the remaining had irregular narrow complex tachycardia on baseline ECG. 36 patients had wolf Parkinson white syndrome (WPW) and 24 had atrial flutter/fibrillation. The total number of prescriptions was four medications. There were 70 patients on beta-blockers, 8 patients on amiodarone, 12 patients on flecainide in combination with beta-blockers, 10 patients on ivabradine, and 10 patients on beta-blockers with ivabradine.

Knowledge and satisfaction score
The median participant's knowledge score was significantly improved from pre-counseling (set A) to post-counseling (set C) at 50 [36.4-68.2] *vs.* 86.4 [81.8-83.4] (p<0.001). The overview of scores for the knowledge questions pre and post-counseling is summarized in Table 1. The mean score of participants' satisfaction was 34.3 ± 0.80 (score range 7-35) as shown in fig. 1.

The highest knowledge improvement after pharmacist educational session was observed (p< 0.001) for question no. 1 (Arrhythmia is the disorder of electrical activity of heart?), question 5 (If my child stops having SVT recurrence while taking medication, medications should not be stopped without doctor advice?) and question no. 11 (If my child having SVT episode, he/she should be immediately taken to hospital?) and question no. 13 (If my child heart rate is low without having symptoms after taking medication, I should continue medication but inform doctor at next appointment?)

A few questions illustrate that participants had better pre-counseling knowledge, which was further improved by pharmacist counseling. For example, question no.6 (Do I need to shake antiarrhythmic medication liquid form before administration?), question no. 9 (Storage temperature of medication?), and question no. 10 (All medications have the same dose/route/frequency?). Knowledge scores among participants were lowest for question 15 (When should I bring my child to seek medical

emergency care immediately) and question 17. (Patients with SVT may swim alone?) and 21. (What are the expected side effects of prescribed antiarrhythmic medication, except? These were improved to 69, 92.7, and 58.2%, respectively, after receiving counseling sessions from a pharmacist.

The confidence score was calculated using a 4-point confidence scale (highly confident, very confident, less confident, and not confident) in question number 22. There was a noteworthy enhancement in confidence score in medication administration from (54.5%-76.4%).

DISCUSSION

This study depicts that counseling with a pharmacist regarding anti-arrhythmic medication leads to significant improvement in the knowledge of patients and their caregivers. Previous research conducted by Chen et.al highlighted the crucial role of the pharmacist in empowering caregivers (Chen C *et al*., 2013). However, no such study was conducted for congenital patients on chronic antiarrhythmic medications. The novelty of our study is the significant enhancement of Supraventricular Arrhythmia Care through education provided by pharmacists in LMICs. Given the prevailing illiteracy rates and financial constraints faced by a large portion of the Pakistani population, the integration of pharmacists in clinical activities might be more crucial.

The secondary outcome of this study was the satisfaction score among participants regarding pharmacist-specialized services. The participants were found to be satisfied in our study, as a similar finding of satisfaction compared to the study conducted by Chen (Chen C *et al*., 2013). It depicts the importance of pharmacist counseling for better knowledge.

The findings of our study revealed a significant knowledge improvement from 30.9% to 87.3% about the need for continuing medical therapy if their child experienced no further episodes of SVT, with the intention of a physician's recommendation. Furthermore, our study showed a lack of awareness regarding the correct dose of compounded medications, which was improved to 74.5% in the post-intervention test.

Our results illustrate that participants had a better understanding that the next dose should not be doubled if their child missed a dose, need to inform the doctor if their child is using any herbal supplements, and inform other doctors that their child is on SVT medications and when to seek emergency care, which was further improved after pharmacist counseling. Furthermore, there was a significant improvement in participants' knowledge that their child can swim alone, increasing from 20% to 92.7% after the pharmacist session.

Table 1: Comparison of pre- and post-intervention knowledge

	Pre	Post	p-value
Total Knowledge (median [IQR]) Score	50 [36.4-68.2]	86.4 [81.8-83.4]	<0.001
01 Arrhythmia is a disorder of the electrical activity of the heart?	40 (36.4%)	108 (98.2%)	<0.001
02 Is supraventricular tachycardia (SVT) is life-threatening disorder?	50 (45.5%)	98 (89.1%)	<0.001
03 My child has more SVT episodes if he/she does not take medication regularly?	30 (27.3%)	66 (60%)	0.001
04 If my child misses a dose of medication, then the next dose should not be doubled?	80 (72.7%)	108 (98.2%)	0.001
05 If my child stops having SVT recurrence while taking medication, should not be stopped without a doctor's advice?	34 (30.9%)	96 (87.3%)	<0.001
06 Do I need to shake the antiarrhythmic medication liquid form before administration?	96 (87.3%)	102 (92.7%)	0.508
07 For compounding medications, prescribed dose in mg is equal to the same volume in ml?	30 (27.3%)	82 (74.5%)	<0.001
08 The best way of medication administration is with a syringe?	52 (47.3%)	94 (85.5%)	<0.001
09 Storage temperature of medication?	108 (98.2%)	110 (100%)	0.999
10 Do all medications have the same dose/route/frequency?	96 (87.3%)	102 (92.7%)	0.508
11 If my child has an SVT episode, he/she should they be immediately taken to the hospital?	34 (30.9%)	70 (63.6%)	<0.001
12 Carotid massage should be done with SVT recurrence?	62 (56.4%)	100 (90.9%)	<0.001
13 If my child's heart rate is low without having symptoms after taking medication, should I continue medication but inform the doctor at the next appointment?	66 (60%)	100 (90.9%)	<0.001
14 I can bring my child to see other doctors, but I must inform them that my child is on SVT medication?	76 (69.1%)	102 (92.7%)	0.004
15 I should bring my child to seek medical emergency conditions immediately if he/she look unwell?	26 (23.6%)	66 (60%)	0.001
16 There is a need to inform the doctor if I want to give any herbal supplement or other medication to my child?	76 (69.1%)	100 (90.9%)	0.012
17 Children with SVT may swim alone?	22 (20%)	102 (92.7%)	<0.001
18 Heart rate needs to be checked routinely, 5 times a day?	56 (50.9%)	94 (85.5%)	<0.001
19 Is there any need to check the interaction before adding any other medication?	52 (47.3%)	94 (85.5%)	<0.001
20 When you experience any reaction or side effect, and if you think it is linked with prescribed medicines, the doctor should be informed?	50 (45.5%)	86 (78.2%)	<0.001
21 What are the expected side effects of prescribed antiarrhythmic medication, except? (Hypoglycemia, bradycardia, respiratory illness, headache/blurred vision, Hallucinations)?	20 (18.2%)	64 (58.2%)	<0.001
22 Are you confident in giving antiarrhythmic medication to your child?	60 (54.5%)	84 (76.4%)	0.017

In our center, typically a total of four medications were prescribed by an electrophysiologist: Amiodarone, flecainide, beta-blockers (such as atenolol, propranolol, and bisoprolol), and ivabradine. Many antiarrhythmic drugs need to be started in admitted patients to look for side effects for at least six doses (Șorodoc V *et al*., 2024; Basza M *et al*., 2023). However, these strategies of monitoring antiarrhythmic medication are not completely implemented in LMIC. This current study proved to be effective in knowledge increment regarding memorizing the side effects of antiarrhythmic medications in participants, which was noticed from 18.2% to 58.2%.

Similarly, Chen C (Chen C *et al*., 2013) observed a significant impact of pharmacist counseling in improving the knowledge of the side effects of medications among participant caregivers in the post-intervention phase. This ultimately would be beneficial in preventing life-threatening events such as drug absorption issues, electrolyte imbalances, QT prolongation, and sudden cardiac deaths (Do U *et al*., 2023). The applicability of these findings extends beyond the population, as compliance and diligent monitoring are essential for maximizing the efficacy of antiarrhythmic medication while minimizing associated adverse effects. Therefore,
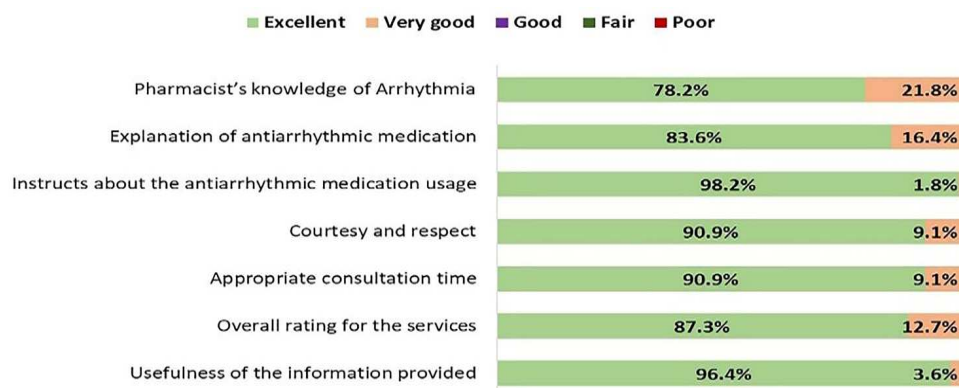
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Fig. 1: The mean satisfaction score among participants, derived from the Set B perception questionnaire, was 34.3 ± 0.80, within a possible range of 7 to 35.

the successful implementation of this study's approach could be extrapolated to adult patients as well.

The limitations of this study are the small sample size and the absence of physical follow-up that might warrant further investigation. The effectiveness of medication compliance, treatment adherence, complications, and hospitalization was not the primary outcome of this study. Additionally, this study is a single-center study, and future multi-center studies are recommended for the development of more effective evidence. We suggest future research to evaluate the improvement and outcome of patients with SVT through pharmacist counseling.

CONCLUSION

This study demonstrates that pharmacist-led counseling is an effective method for enhancing the understanding of antiarrhythmic medication among congenital patients and their caregivers. Consequently, it can be inferred that the inclusion of pharmacists in clinical activities is imperative for optimizing patient compliance.

Data availability statement
The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

REFERENCES

Al-Arkee S, Mason J, Lindenmeyer A and Jalal Z (2022). Pharmacist management of atrial fibrillation in UK primary care: A qualitative study. *J. Pharm. Policy. Pract.,* **15**(1): 98.

Albayrak A, Başgut B, Bıkmaz GA, Karahalil B (2022). Clinical pharmacist assessment of drug-related problems among intensive care unit patients in a Turkish university hospital. BMC. *Health. Serv. Res.,* **22**(1): 79.

Basza M, Maciejewski C, Bojanowicz W, Balsam P, Grabowski M, Mitkowski P, Kempa M, Kowalski O, Kalarus Z, Jaguszewski M, Lubiński A, Daniłowicz-Szymanowicz L, Szumowski Ł, Sterliński M and Kołtowski L (2023). Flecainide in clinical practice. *Cardiol. J.,* **30**(3): 473-82.

Batool A and Mohsin M (2025). The Role of Clinical Pharmacists in Pediatric Cardiology in Low-and Middle-Income Countries. Intechopen book, selected topic in pediatric cardiology.

Batool A, Sangi R, Yousuf JB, Shaikh AS, Mohsin M (2025). Role of the clinical pharmacist in ensuring safe medication practices for pediatric cardiac care in low- and middle-income countries. Antimicrob. Steward. *Healthc. Epidemiol.,* **5**(1): e67.

Batool A, Shamim S and Mohsin M (2024). Leveraging clinical pharmacy expertise for pediatric cardiology in low and middle-income countries. *Pak. Heart. J.,* **57**(1): 71-4.

Chen C, Lee DSH and Hie SL (2013). The impact of pharmacists' counseling on pediatric patients'

caregivers' knowledge of epilepsy and its treatment in a tertiary hospital. *Int. J. Clin. Pharm.,* **35**(5): 829-34.

Do U (2023). Adverse reactions to antiarrhythmic drugs. *Cardiovasc. Prev. Pharmacother.,* **5**(1): 1-14.

Hamilton Sr D, Nandkeolyar S, Lan H, Desai P, Evans J, Hauschild C, Choksi D, Abudayyeh I, Contractor T, Hilliard A (2020). Amiodarone: A comprehensive guide for clinicians. *Am. J. Cardiovasc. Drugs,* **20**(6): 549-58.

Larson LN, Rovers JP and MacKeigan LD (2002). Patient satisfaction with pharmaceutical care: update of a validated instrument. *J. Am. Pharm. Assoc. (1996).,* **42**(1): 44-50.

Lavalle C, Magnocavallo M, Straito M, Santini L, Forleo GB, Grimaldi M, Badagliacca R, Lanata L, Ricci RP (2021). Flecainide: How and when: A practical guide in supraventricular arrhythmias. *J. Clin. Med.,* **10**(7): 1456.

Moore JA, Stephens SB, Kertesz NJ, Evans DL, Kim JJ, Howard TS, Pham TD, Valdés SO, de la Uz CM, Raymond TT and Morris SA (2022). Clinical predictors of recurrent supraventricular tachycardia in infancy. *J. Am. Coll. Cardiol.,* **80**(12): 1159-72.

Osuala EC, Ojewole EB (2021). Knowledge, attitudes and practices of healthcare professionals regarding drug–food interactions: A scoping review. *Int. J. Pharm. Prac.,* **29**(5): 406-15.

Patel A, Nguyen CM, Willins K, Wang EY, Magedman G, Yang S (2023). Improving pharmacist-led pediatric patient education on oral chemotherapy at home. *Children.,* **10**(10): 1656.

Pratiwi BB, Rizal A and Yogibuana V (2025). Supraventricular tachycardia in a young adult with congenital heart disease: Successful ablation after patent ductus arteriosus closure. *Eur. J. Case. Rep. Intern. Med.,* **12**(10): 005699.

Renwick C (2022). Challenges in prescribing antiarrhythmic medications for infants and children. *J. Prescrib. Pract.,* **4**(8): 344-51.

Rolland T, Badenco N, Maupain C, Duthoit G, Waintraub X, Laredo M, Himbert C, Frank R, Hidden-Lucet F, Gandjbakhch E (2022). Safety and efficacy of flecainide associated with beta-blockers in arrhythmogenic right ventricular cardiomyopathy. *Europace,* **24**(2): 278-84.

Șorodoc V, Indrei L, Dobroghii C, Asaftei A, Ceasovschih A, Constantin M, Lionte C, Morărașu BC, Diaconu AD and Șorodoc L (2024). Amiodarone therapy: Updated practical insights. *J. Clin. Med.,* **13**(20): 6094.