

Evaluation of a remote hybrid staffing model for ambulatory clinical pharmacists in a pediatric health system during the COVID-19 pandemic

Kristen Baron, PharmD, BCACP,
Department of Pharmacy, Nationwide
Children's Hospital, Columbus, OH, USA

James Herbst, PharmD, BCPPS,
Department of Pharmacy, Nationwide
Children's Hospital, Columbus, OH, USA

Megan McNicol, PharmD, BCACP,
Department of Pharmacy, Nationwide
Children's Hospital, Columbus, OH, USA

Emily Stephan, PharmD, BCACP,
Department of Pharmacy, Nationwide
Children's Hospital, Columbus, OH, USA

Mahmoud Abdel-Rasoul, MS, MPH,
Center for Biostatistics, Department
of Biomedical Informatics, College of
Medicine, The Ohio State University,
Columbus, OH, and Biostatistics
Resource at Nationwide Children's
Hospital (BRANCH), Columbus, OH, USA

Kelly Wise, PharmD, BCACP,
Department of Pharmacy, Nationwide
Children's Hospital, Columbus, OH, USA

Purpose. To describe and quantify patient care activities performed by ambulatory clinical pharmacists supporting medical specialty clinics in a pediatric health system utilizing a hybrid staffing model during the coronavirus disease 2019 (COVID-19) pandemic.

Methods. Five ambulatory clinical pharmacists, integrated within a health-system specialty pharmacy (HSSP), utilized a web-based data collection tool to record time spent performing patient care activities over a 2-week period. Work location (onsite or offsite) of the pharmacist was reported for each activity. Activities were classified as direct or indirect patient care. Direct patient care activities were subcategorized as telemedicine appointments, in-person clinic appointments, HSSP call center work, medication access support, electronic medical record consults, and previsit planning/postvisit documentation. Administrative tasks and precepting were considered indirect patient care activities.

Results. A total of 1,190 activities were completed, with 77% of all activities performed offsite. Direct and indirect patient care activities accounted for 871 (73.2%) and 319 (26.8%) of total activities, respectively. No activity took longer for the pharmacists to complete offsite versus onsite.

Conclusion. Using a hybrid staffing model employed by a pediatric health system, ambulatory clinical pharmacists were able to efficiently provide a high volume of direct patient care activities even when working offsite. Rapid adaptation and implementation of telemedicine services was critical for pharmacists to continue to provide essential services within pediatric medical specialty clinics.

Keywords: ambulatory clinical pharmacist, coronavirus disease 2019 pandemic, specialty pharmacy, telemedicine

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Address correspondence to Dr. Baron
(Kristen.Baron@nationwidechildrens.org).

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The coronavirus disease 2019 (COVID-19) pandemic introduced unprecedented challenges and potential disruptions to direct patient care provided across the nation in the ambulatory setting. Pharmacy departments took initiative to rapidly reallocate pharmacy services to support timely and necessary projects, including but not limited to developing COVID-19 treatment guidelines, evidenced-based drug evaluations, remote inpatient and outpatient order review, drive-up diagnostic testing, and expansion of drive-up

medication dispensing.¹⁻³ Furthermore, telemedicine gained popularity as a method of supporting comprehensive medication management in the ambulatory setting while promoting social distancing. Historically, the use of videoconferencing and other telemedicine resources has proven to be a cost-effective and accepted means of providing clinical pharmacy services for patients who cannot travel to clinic appointments, specifically those who live in rural areas.⁴⁻⁶ Pharmacy services provided via telemedicine have

demonstrated positive impacts on patient outcomes, including adherence and disease management, in chronic adult disease states such as hypertension, diabetes, depression, and heart failure.⁷ Nevertheless, these telemedicine services have likely been underutilized in other settings.

The COVID-19 pandemic was the catalyst for our pediatric health system to establish telemedicine as a means to continue to provide ambulatory clinical services while limiting the number of onsite staff. In particular, our pharmacy department's health-system specialty pharmacy (HSSP) team was identified early in the pandemic as a potential group to transition to a hybrid staffing model due to the nature of its established workflow of telephonic patient outreach (Figure 1). In March 2021, the HSSP staff, including the ambulatory clinical pharmacists, officially transitioned to a hybrid staffing model. The newly established use of telemedicine within the specialty clinics allowed the pharmacists to work onsite or offsite, as determined by patient need, in an effort to maintain social distancing.

Due to this large shift in our practice model, we identified an opportunity to evaluate the variations in our practice when completing pharmacist activities onsite versus offsite. To our knowledge, pharmacy support by telemedicine services has not previously

KEY POINTS

- The COVID-19 pandemic has led to increased utilization of telemedicine by pharmacists to provide patient care remotely.
- When utilizing a hybrid staffing model, most patient care activities did not take longer to complete when ambulatory clinical pharmacists worked offsite as compared to onsite.
- Adaptation of a hybrid staffing model for ambulatory clinical pharmacists with access to telemedicine may be a viable alternative to exclusive onsite staffing.

been described in the pediatric ambulatory care setting. The primary objective of our study was to describe and quantify patient care activities performed by ambulatory clinical pharmacists supporting medical specialty clinics in a pediatric health system utilizing a hybrid staffing model during the COVID-19 pandemic. The secondary objective was to assess the difference in time that ambulatory clinical pharmacists spent performing clinic-related services when patient visits were

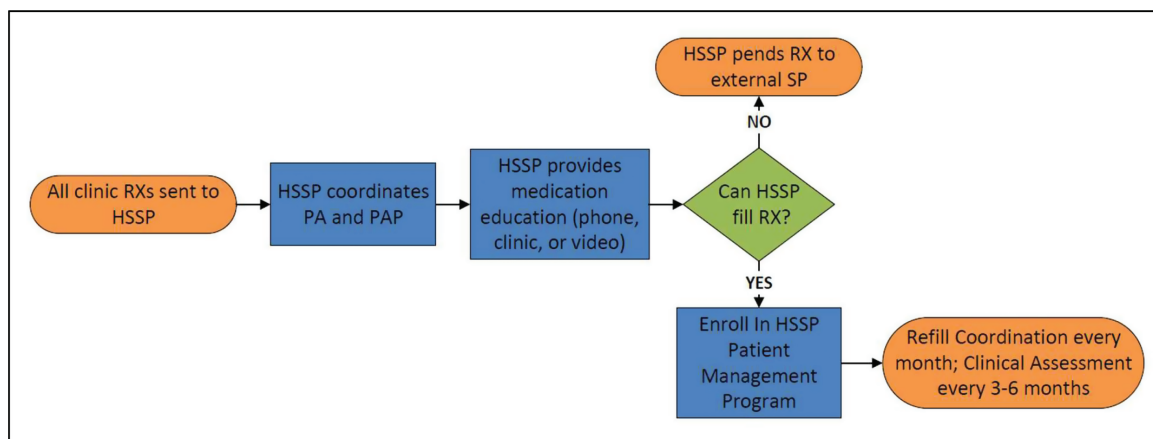
completed in person rather than via telemedicine.

Methods

Setting. This study was conducted at Nationwide Children's Hospital (NCH), the nation's second-largest freestanding pediatric hospital. The organization cares for patients from 49 states and 54 countries. In 2019, NCH had over 1.6 million outpatient visits, of which more than 400,000 occurred in medical specialty clinics. Many of these clinics prescribe specialty medications and are supported by ambulatory clinical pharmacists who divide their time between clinic and HSSP responsibilities. Five ambulatory clinical pharmacists (5 full-time equivalents) who provide patient care in allergy, dermatology, endocrinology, gastroenterology, neurology, pulmonology, rheumatology, and transplant clinics are among those pharmacists.

Practice models. *Health-system specialty pharmacy.* Integrated HSSP models utilize an institution's internal specialty pharmacy to provide in-house patient care, with additional benefits gained from ambulatory clinical pharmacists who work alongside multidisciplinary healthcare teams in order to improve patient care and efficiency of the complex specialty medication process. Our HSSP is a dual-accredited specialty pharmacy department, employing the 5

Figure 1. Health-system specialty pharmacy (HSSP) workflow. PA indicates prior authorization; PAP, patient assistance program; Rx, prescription.



aforementioned clinical pharmacists, 1 manager, 4 staff pharmacists, and 8 pharmacy technicians. Our HSSP has developed a systematic approach to provide ongoing pharmacy services to new and established patients receiving specialty medications prescribed by one of the health system's medical specialty clinics (Figure 1). In addition to monthly refill coordination communications, an ambulatory clinical pharmacist or staff pharmacist contacts the patient or caregiver at regular intervals to complete a comprehensive clinical assessment. This encounter includes allergy and medication reconciliation, adherence assessment, review of systems to evaluate medication efficacy and identify potential adverse drug reactions, quality-of-life questions, and a recommended plan of care. In addition to the above activities, both ambulatory clinical pharmacists and staff pharmacists are responsible for medication counseling, clinically reviewing prescriptions for accuracy and appropriateness, and assisting with patient access issues. Ambulatory clinical pharmacists improve patient care within the HSSP by bridging communication with the healthcare team and providing guidance on patient- and disease-specific inquiries related to their respective clinical focus areas.

At the onset of the COVID-19 pandemic, the HSSP adopted a hybrid staffing model allowing all staff not physically preparing medications, including the ambulatory clinical pharmacists, to work offsite without disruption to the patient care activities described above.

Medical specialty clinics. In addition to participating in HSSP call center activities, our ambulatory clinical pharmacists are responsible for a variety of patient care activities relating to their respective medical specialty clinics. Each pharmacist collaborates with the multidisciplinary healthcare team to aid in the selection of appropriate drug therapies based on patient-specific factors, including concomitant disease states and medications, patient preference or needs, and insurance requirements.

Laboratory, procedure, and vaccine recommendations are provided by pharmacists when evaluating patients during pre-visit planning and at the time of the clinic visit. When pharmacists are physically in clinic, they are able to meet in person with patients and caregivers to complete medication reconciliation, adherence assessments, medication counseling, and injection or device trainings. Other activities commonly performed in clinic include addressing medication access issues and answering drug information questions. Prior to the COVID-19 pandemic, our ambulatory clinical pharmacists performed their daily activities in one of 2 onsite locations based on each specific pharmacist and clinic: in the medical specialty clinic or the HSSP call center.

In response to the COVID-19 pandemic, clinic visits were shifted significantly from in-person to telemedicine encounters. In April 2020, at the height of telemedicine utilization in our health system, over 85% of the pharmacist-integrated medical specialty clinic visits were conducted via telephone or video technology. The percentage of telemedicine appointments declined to 21% (range, 3%-33%) by the time of our study in October 2020 as the health system was able to safely expand in-person visits.

Telemedicine was utilized by the ambulatory clinical pharmacists to provide clinical services equivalent to those previously offered during in-person encounters. Numerous members of the multidisciplinary team were able to see the patient throughout the telemedicine appointment either in tandem with other team members or consecutively following an electronic medical record (EMR) handoff. For essential visits where patients required in-person assessments with providers, and as more patients returned for in-person visits in late 2020, the pharmacist had the ability to meet with the patient via a hybrid appointment. Hybrid visits allowed ancillary staff to see patients virtually during an onsite provider visit in an effort to promote social distancing and limit personnel physically present in clinic.

Study design. In this NCH institutional review board-exempt study, a web-based data collection tool was utilized to document and record time spent on ambulatory clinical pharmacist activities over a 2-week period in October 2020. At the time of the study, pharmacists had the ability to work onsite or offsite depending on patient care needs. Pharmacists manually documented each completed activity during the study timeframe. Data collected for each activity included the following: start and end time, associated medical specialty clinic, and location of pharmacist at time of activity (appendix).

Ambulatory pharmacist activities were classified as direct or indirect patient care. Direct patient care activities included telemedicine appointments, in-person clinic appointments, HSSP call center, medication access support, EMR consults, and previsit planning/postvisit documentation. Administrative tasks and precepting were considered indirect patient care activities. Clinic-related services consisting of telemedicine and in-person appointment activities were subcategorized as injection training, medication education, medication reconciliation, laboratory recommendations, and drug information inquiries. If more than one subactivity was documented by the pharmacist during any given patient encounter, a hierarchy was utilized based on clinical impact to classify the sub-activity for study purposes in the order listed in Table 1.

Data analysis. Activities were excluded if there was incomplete documentation. Counts of pharmacist tasks by activity and location were summarized as frequencies with percentages. Time to complete tasks in minutes was summarized as median time with interquartile range (IQR). Percentage of time by activity was calculated by dividing the sum of each activity time by the overall time. Linear regression was used to estimate geometric mean times by task and location and test differences within activities by location. The time outcome was modeled on the

Table 1. Classification of Pharmacist Activities

| Activity | Subactivity |
|---|------------------------------------|
| Direct patient care | |
| Telemedicine/in-person clinic appointment | Injection training |
| | Medication education |
| | Medication reconciliation |
| | Laboratory recommendations |
| | Drug information inquiries |
| | Other |
| HSSP call center | Clinical assessment calls |
| | Refill calls |
| | Prescription clinical review |
| | Answering HSSP staff questions |
| Medication access support | Appeal |
| | Prior authorizations |
| | Patient assistance support |
| | Insurance questions/overrides |
| | External pharmacy outreach |
| EMR consults | Patient outreach |
| | Laboratory recommendations |
| | Drug information inquiries |
| Previsit planning/postvisit documentation | Previsit planning |
| | Postvisit documentation |
| Indirect patient care | |
| Precepting | Resident |
| | Student |
| Administrative tasks | Meeting |
| | Project |
| | Email |
| Other | All other miscellaneous activities |

Abbreviations: HSSP, health-system specialty pharmacy; EMR, electronic medical record.

natural log scale due to violation of the normality assumption on the original scale. The model included main effects for activity and location and the interaction of activity and location as independent variables. Geometric means were then calculated by exponentiating the estimated mean natural log times and their respective confidence intervals by activity and location. Hypothesis testing was 2-sided and conducted at a 5% type I error rate ($\alpha = 0.05$). All statistical analyses were conducted using

SAS version 9.4 (SAS Institute, Cary, NC).

Results

Over the 2-week study period, ambulatory clinical pharmacists recorded a total of 1,190 activities. Of these activities, pharmacists completed 77% at an offsite location. Direct and indirect patient care activities accounted for 871 (73.2%) and 319 (26.8%) of all activities, respectively. The most frequent direct patient care activities reported were

EMR consults ($n = 285$, 24%), HSSP call center ($n = 169$, 14.2%), and telemedicine appointment ($n = 122$, 10.3%). Administrative tasks contributed to 23.6% ($n = 280$) of all activities and were the most common indirect patient care activity (Table 2).

Additionally, we evaluated ambulatory clinical pharmacists' time over the 80-hour study period. Pharmacists spent 72.7% of their work time completing activities offsite. Direct patient care activities accounted for 59.6% of total pharmacist time reported. EMR consults (14.2% of total time; median time per consult, 8.1 minutes [IQR, 3.5-16.1 minutes]), telemedicine appointments (11.8% of total time; median time per appointment, 20.2 minutes [IQR, 8.5-33.6 minutes]), and HSSP call center tasks (8.2% of total time; median time per task, 7.2 minutes [IQR, 4.3-14]) comprised the majority of time spent on direct patient care activities. Administrative tasks (median time per task, 21.1 minutes [IQR, 9.6-44.8 minutes]) made up 35% of total time spent on all activities (Table 3).

With the exception of telemedicine appointments, all activities were more time consuming when completed onsite versus offsite (Table 4). Of these activities, EMR consults and previsit planning/postvisit documentation took significantly less time when completed offsite ($P = 0.0076$ and $P = 0.0008$, respectively). The median times for the other activities were higher when completed onsite versus offsite, although the differences were not statistically significant. No differences in time were identified when comparing pharmacist clinic-related services conducted in person versus by telemedicine (Table 5).

Discussion

The use of telemedicine tools allowed ambulatory clinical pharmacists to overcome the barrier of limited in-person patient communication imposed by the COVID-19 pandemic and to continue providing essential services within medical specialty clinics in a pediatric health system. Efforts were made on all levels across our health

system to maintain high-quality patient care during the pandemic. On a health-system level, communication regarding COVID-19 protocols was distributed on a routine basis, primarily via email and the creation of an organization-wide intranet resource. This frequent communication allowed staff to be kept up to date with any new developments or practice changes. HIPAA-compliant videoconferencing

technology specifically designed for telemedicine services was rapidly implemented by the health system, and a support hotline was established for use by both clinicians and patients to troubleshoot technology issues. Staff quickly gained access to the videoconferencing technology on organization-supplied devices allowing telemedicine visits to be completed with patients when working offsite.

In addition to steps taken on the health-system level, each medical specialty clinic adapted to changing practices during the pandemic. Interdisciplinary meetings were converted to a virtual format, and frequent virtual huddles regarding COVID-19 updates, protocols, and best practices were established. Virtual training sessions were conducted for clinic staff to learn to use new technology, and updated workflows for patient appointments were created. One example of a clinic workflow element developed for telemedicine visits was the use of EMR direct messaging to assist with the handoff between clinicians during appointments. For clinic staff remaining onsite, dedicated telemedicine workspaces were created to ensure patient privacy while practicing social distancing.

Furthermore, the ambulatory clinical pharmacists in the HSSP regularly convened to share best practices and discuss barriers encountered in each of the medical specialty clinics. Knowledge sharing was integral in developing effective strategies to continue to provide direct patient care services, such as injectable medication trainings, via telemedicine. Patient portals in the EMR were utilized to send

Table 2. Summary of Pharmacist Activity Counts

| Activity | Frequency (%) | | |
|---|---------------|-------------|-------------|
| | Onsite | Offsite | Total |
| Direct patient care | | | |
| Telemedicine appointment | 26 (9.49) | 96 (10.48) | 122 (10.25) |
| In-person clinic appointment | 17 (6.2) | 31 (3.38) | 48 (4.03) |
| HSSP call center | 39 (14.23) | 130 (14.19) | 169 (14.2) |
| Medication access support | 18 (6.57) | 93 (10.15) | 111 (9.33) |
| EMR consults | 69 (25.18) | 216 (23.58) | 285 (23.95) |
| Previsit planning/postvisit documentation | 41 (14.96) | 95 (10.37) | 136 (11.43) |
| Indirect patient care | | | |
| Precepting | 12 (4.38) | 16 (1.75) | 28 (2.35) |
| Administrative tasks | 48 (17.52) | 232 (25.33) | 280 (23.53) |
| Other | 4 (1.46) | 7 (0.76) | 11 (0.92) |

Abbreviations: HSSP, health-system specialty pharmacy; EMR, electronic medical record.

Table 3. Summary of Pharmacist Time by Activity and Location

| Activity | Time, median (IQR), min | | | % of Total Time |
|---|-------------------------|---------------------|----------------------|-----------------|
| | Onsite | Offsite | Total | |
| Direct patient care | | | | |
| Telemedicine appointment | 19.39 (7.52, 34.95) | 20.2 (9.83, 31.53) | 20.2 (8.52, 33.62) | 11.79 |
| In-person clinic appointment | 20.48 (7.47, 63.38) | 14.83 (8, 20.42) | 16.31 (7.73, 27) | 4.37 |
| HSSP call center | 7.17 (4.40, 16.13) | 7.29 (4.10, 13.93) | 7.17 (4.33, 14.03) | 8.20 |
| Medication access support | 14.59 (8.8, 21.08) | 13.05 (7.37, 20.02) | 13.13 (7.58, 20.32) | 8.05 |
| EHR consults | 9.67 (5.03, 18.7) | 7.64 (3.16, 15.67) | 8.13 (3.47, 16.13) | 14.20 |
| Previsit planning/postvisit documentation | 22.58 (14.1, 40.2) | 11.5 (5.05, 24.05) | 15.53 (5.95, 29.32) | 12.95 |
| Indirect patient care | | | | |
| Precepting | 57.39 (13.45, 79.4) | 21.33 (9.19, 37.4) | 24.93 (11.42, 65.38) | 4.46 |
| Administrative tasks | 24.18 (11.1, 52.78) | 20.75 (9.47, 40.14) | 21.05 (9.56, 44.8) | 34.98 |
| Other | 21.77 (15.89, 22.89) | 9.78 (6.33, 21.82) | 11.32 (7.52, 21.82) | 0.99 |

Abbreviations: HSSP, health-system specialty pharmacy; EHR, electronic health record; IQR, interquartile range.

Table 4. Linear Model–Based Estimates of Activities by Location

| Activity | Geometric Mean (95% CI), min | | Ratio of Geometric Mean (95% CI) | P Value |
|---|------------------------------|-------------------|----------------------------------|---------|
| | Onsite | Offsite | | |
| Direct patient care | | | | |
| Telemedicine appointments | 16.2 (11.0, 24.0) | 16.8 (13.7, 20.6) | 1.0 (0.6, 1.5) | 0.8739 |
| In-person clinic appointment | 17.9 (11.1, 28.9) | 12.5 (8.8, 17.8) | 1.4 (0.8, 2.6) | 0.2404 |
| HSSP call center | 8.6 (6.3, 11.8) | 7.1 (5.9, 8.4) | 1.2 (0.8, 1.7) | 0.2906 |
| Medication access support | 14.2 (8.9, 22.7) | 12.5 (10.1, 15.3) | 1.1 (0.7, 1.9) | 0.6091 |
| EMR consults | 9.3 (7.3, 11.8) | 6.4 (5.6, 7.3) | 1.5 (1.1, 1.9) | 0.0076 |
| Previsit planning/postvisit documentation | 21.8 (16.0, 29.7) | 11.6 (9.4, 14.2) | 1.9 (1.3, 2.7) | 0.0008 |
| Indirect patient care | | | | |
| Precepting | 35.6 (20.1, 63.2) | 19.1 (11.7, 31.4) | 1.9 (0.9, 4.0) | 0.1067 |
| Administrative tasks | 20.8 (15.6, 27.7) | 18.5 (16.2, 21.1) | 1.1 (0.8, 1.5) | 0.4646 |
| Other | 18.4 (6.8, 49.5) | 13.2 (6.2, 27.8) | 1.4 (0.4, 4.8) | 0.5981 |

Abbreviations: HSSP, health-system specialty pharmacy; EHR, electronic health record; CI, confidence interval.

Table 5. Linear Model–Based Estimates by Subactivity and Appointment Type

| Telemedicine/In-Person Clinic Appointment Subactivity | Geometric Mean (95% CI), min | | Ratio of Geometric Mean (95% CI) | P Value |
|---|------------------------------|--------------------------|----------------------------------|---------|
| | In-Person Clinic Appointment | Telemedicine Appointment | | |
| Injection training | 79.4 (31.1, 202.5) | 40.7 (25.0, 66.4) | 2.0 (0.7, 5.6) | 0.213 |
| Medication education | 13.7 (8.2, 22.8) | 18.3 (15.0, 22.3) | 0.7 (0.4, 1.3) | 0.2924 |
| Laboratory recommendations | 5.1 (2.3, 11.4) | 5.2 (3.0, 8.8) | 1.0 (0.4, 2.6) | 0.9748 |
| Drug information inquiries | 14.8 (9.6, 22.8) | 24.0 (14.0, 41.1) | 0.6 (0.3, 1.2) | 0.169 |
| Other | 13.2 (8.9, 19.6) | 11.3 (8.1, 15.9) | 1.2 (0.7, 2.0) | 0.5612 |

Abbreviation: CI, confidence interval.

medication education and training documents directly to patients prior to teaching appointments. Pharmacists had access to proper training equipment, including medication demonstration devices, which permitted pharmacists to show patients and caregivers device preparation and proper administration technique via video demonstration.

The introduction of telemedicine in our health system enabled our ambulatory clinical pharmacists to maintain direct patient care services while working remotely. The results of our study supported this finding, as most activities performed by pharmacists

were related to direct patient care even when they were working offsite. No direct or indirect patient care activities took longer for pharmacists to complete offsite versus onsite, demonstrating that remote pharmacist work did not impact efficiency. EMR consults and previsit planning/postvisit documentation took significantly more time to complete onsite versus offsite. Distractions within the onsite environment could have contributed to this finding. The HSSP operates in an open space pod model with cubicles. This design allows for efficient communication amongst staff but also may contribute to increased interruptions.

Specialty medications frequently require medication access support. The relatively low frequency of medication access activities recorded by ambulatory clinical pharmacists in our study may be accounted for by the assistance of excellent support staff to whom these issues are often triaged.

When comparing time needed to complete pharmacist clinic-related services for in-person versus telemedicine visits, we observed no significant differences in time between activities. This suggests that pharmacy services provided during a telemedicine appointment can be an appropriate alternative to in-person visits

without imposing a time-related disadvantage.

To our knowledge, this is the first study to describe and quantify ambulatory clinical pharmacists' activities within a hybrid staffing model in a pediatric health system. The web-based data collection tool utilized by the pharmacists was simple to use and is easily reproducible for use by other health systems in capturing pharmacist productivity. The total number of study hours recorded over the 2-week period equaled 80 hours per pharmacist, demonstrating a high rate of pharmacist participation despite the manual nature of the data collection process.

The study was conducted several months into the pandemic after the implementation of telemedicine. At the time of the study, the pharmacists were already well versed in telemedicine tools; thus, reported time accurately portrayed time spent on activities without having to account for a learning curve. In October 2020, most medical specialty clinics had expanded in-person visits, allowing for the comparison of clinic-related services performed by the pharmacists during in-person and telemedicine appointments, since both types of appointments were being conducted during the study period.

This study was not without limitations. It was conducted at a single institution and included a small sample size. There may have been variability in the number of specific activities performed as well as the time needed to complete activities amongst individual ambulatory clinical pharmacists. This may be due to a multitude of reasons, including disease state, patient acuity, etc. Therefore, it is reasonable to be cautious when generalizing these results to other health systems with different workflows and resources.

As a manual survey was used, there was interpharmacist variability among how tasks were reported. For example, one pharmacist started the timer and performed previsit planning for all patients, while another pharmacist

started the timer anew for each patient. Summarizing time as medians and reporting geometric means of model-based estimates aided in reducing the influence of outliers. Additionally, pharmacists may have inadvertently forgotten to start the survey for any given activity.

During study analysis, a hierarchy was established for situations in which multiple activities were reported during one time stamp. This method simplified data analysis but had the potential to overestimate duration of time spent on some activities while decreasing the overall representation of others. For example, if a pharmacist documented a telemedicine visit as a single time entry and reported completing both injection training and medication reconciliation, this was classified as injection training because that activity comprised the majority of the visit.

The short duration of the study could be viewed as a weakness. However, a longer study would have the potential for reduced participation due to the burden of manual documentation. We believe that 2 weeks' data adequately captured the variety of activities completed by ambulatory clinical pharmacists in normal practice.

The adoption of telemedicine during the COVID-19 pandemic has created new opportunities for continued use post pandemic. While previous studies have demonstrated the positive impact of telemedicine-driven pharmacy services on outcomes including adherence and disease management in chronic adult disease states, the same level of outcomes research has yet to be conducted in the pediatric population.⁷ It will also be instrumental to establish patient and provider satisfaction with telemedicine as its use continues to expand. Future time studies should compare the hybrid staffing model to alternate models, including exclusively onsite or offsite locations, for clinical pharmacists in an ambulatory care setting.

Conclusion

Our time study completed in a pediatric health system during the COVID-19 pandemic found that ambulatory clinical pharmacists can efficiently perform a high volume of patient care activities when working offsite. Furthermore, no significant differences were observed when comparing the time required for pharmacists to complete clinic-related services for in-person versus telemedicine visits. Rapid implementation of telemedicine tools proved critical to the pharmacists' ability to continue providing high-quality patient care when utilizing a hybrid staffing model. This study demonstrates that a hybrid staffing model for ambulatory clinical pharmacists is a viable alternative to exclusive onsite staffing.

Disclosures

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Additional information

Drs. Baron and Dr. Wise contributed to the conception and design of the work. Drs. Baron, Wise, McNicol, and Abdel-Rasoul completed data acquisition, analysis, and interpretation. Drs. Baron, Herbst, McNicol, Stephan, Abdel-Rasoul, and Wise drafted, revised, and approved the final manuscript.

References

1. Li H, Zheng S, Liu F, et al. Fighting against COVID-19: innovative strategies for clinical pharmacists. *Res Social Adm Pharm.* 2021;17(1):1813-1818.
2. Mohammad I, Berlie HD, Lipari M, et al. Ambulatory care practice in the COVID-19 era: redesigning clinical services and experiential learning. *J Am Coll Clin Pharm.* Published online May 1, 2020. doi:10.1002/jac5.1276.
3. Elson EC, Oermann C, Duehlmeier S, Bledsoe S. Use of telemedicine to provide clinical pharmacy services during the SARS-CoV-2 pandemic. *Am J Health-Syst Pharm.* 2020;77(13):1005-1006.
4. Perdew C, Erickson K, Litke J. Innovative models for providing

clinical pharmacy services to remote locations using clinical video telehealth. *Am J Health-Syst Pharm.* 2017;74(14):1093-1098.

5. Litke J, Spoutz L, Ahlstrom D, et al. Impact of the clinical pharmacy specialist in telehealth

primary care. *Am J Health-Syst Pharm.* 2018;75(13):982-986.

6. Diedrich L, Dockweiler C. Video-based teleconsultations in pharmaceutical care — a systematic review. *Res Social Adm Pharm.* Published online December 13, 2020. doi:10.1016/j.sapharm.2020.12.002.

7. Niznik JD, He H, Kane-Gill SL. Impact of clinical pharmacist services delivered via telemedicine in the outpatient or ambulatory care setting: a systematic review. *Res Social Adm Pharm.* 2018;14(8):707-717.

Appendix—Time study data collection tool

Time Study Data Collection

Start Time: 00:00:00

Please select your disease state.

- Cystic Fibrosis
- Dermatology
- Endocrinology
- Gastroenterology
- General
- Hepatitis C
- Neurology
- Rheumatology
- Transplant
- Other

Your location

- Home
- HSSP
- Clinic
- Other

Please select type of activity performed and the appropriate sub-activity.

- HSSP Call Center
 - Clinical assessment calls
 - Refill calls
 - Prescription clinical review
 - Answering HSSP staff questions
- Telemedicine/In-Person Clinic Appointment
 - Injection training
 - Medication education
 - Medication reconciliation
 - Laboratory recommendations
 - Drug information inquiries
 - Other
- Pre-Visit Planning/Post-Visit Documentation
 - Pre-visit planning
 - Post-visit documentation
- Electronic Medical Record Consults
 - Patient outreach
 - Laboratory recommendations
 - Drug information inquiries

- Medication Access Support
 - Appeal
 - Prior authorizations
 - Patient assistance support
 - Insurance questions/overrides
 - External pharmacy outreach
- Precepting
 - Resident
 - Student
- Administrative asks
 - Meeting
 - Project
 - Email
- Other

If an outbound call was involved with the activity, did the patient answer?

- Yes
- No
- N/A

Did this activity require more time than it usually does?

- Yes
- No
- N/A

If yes to above, why was additional time required?

- Excessive time on hold
- Contact pharmacy
- Contact insurance
- Contact provider
- Other

Additional comments/clarification:

Pause/Resume Survey: 00:00:00

Stop Time: 00:00:00

Total Time: 00:00:00

SUBMIT

^aHSSP = health-system specialty pharmacy