



Three Years of X + Y Scheduling: Longitudinal Assessment of Resident and Faculty Perceptions

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ABSTRACT

OBJECTIVE: Five pediatric residency programs implemented true X + Y scheduling in 2018 where residents have continuity clinic in “blocks” rather than half-day per week experiences. We report the impact X + Y scheduling has on pediatric resident and faculty perceptions of patient care and other educational experiences over a 3-year timeframe.

METHODS: Electronic surveys were sent to residents and faculty of the participating programs prior to implementing X + Y scheduling and annually thereafter (2018–2021). Survey questions measured resident and faculty perception of continuity clinic schedule satisfaction and the impact of continuity clinic schedules on inpatient and subspecialty rotations. Data were analyzed using z-tests for proportion differences.

RESULTS: One hundred and eight six residents were sent the survey preimplementation and 254 to 289 postimplementation

with response rates ranging from 47% to 69%. Three hundred and seventy-eight to 395 faculty members were sent the survey with response rates ranging from 26% to 51%. Statistically significant ($P < .05$) sustained perceived improvements over 3 years with X+Y were seen in outpatient continuity, inpatient workflow, and time for teaching both inpatient and in continuity clinic.

CONCLUSIONS: X+Y scheduling can lead to perceived improvements in various aspects of pediatric residency programs. Our study demonstrates these improvements have been sustained over 3 years in the participating programs.

KEYWORDS: continuity clinic; pediatric residency; X + Y schedule

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WHAT'S NEW

X + Y scheduling in pediatric residency programs is rather novel and there is a paucity of literature evaluating its use. We report 3 years of outcome data from the only ACGME-approved pilot of X + Y scheduling in pediatric residency.

THE ACCREDITATION COUNCIL on Graduate Medical Education (ACGME) Residency Review Committee (RRC) for Pediatrics states that all pediatric residents must have at least 36 half-day continuity clinics each academic year and these must occur over no fewer than 26 weeks.¹ This core requirement is in place to help ensure continuity in outpatient clinics. Many pediatric residents have these scheduled as a half-day per week continuity clinic sessions during each rotation, including inpatient. Residents leaving inpatient rotations to attend clinic may fragment educational experiences for both inpatient

rotations and continuity clinic.^{2,3} Examples of this fragmentation can include signing out of the intensive care unit to be able to attend clinic and not finishing continuity documentation in order to be back to the inpatient floors to relieve colleagues who need to leave for clinic, among others.

X + Y scheduling was originally implemented in internal medicine (IM) residency programs to help decrease the educational fragmentation of half-day per week continuity clinics.^{3–8} This model has various rotations during the “X” block with no scheduled continuity clinics. The “Y” block has multiple scheduled continuity clinics that may or may not be paired with another type of ambulatory experience. Several improvements were noted with X+Y scheduling in IM programs including reduced fragmentation of care, improved satisfaction with continuity clinic, and improved learning environments.^{4,5}

X + Y scheduling is relatively novel in pediatric residency programs and there is a paucity of literature

evaluating its use. The first study evaluating the use of X + Y in pediatrics demonstrated a decreased number of handoffs on inpatient rotations and improved continuity in clinics in addition to a positive resident experience.⁹ However, this study was from a single center and reported on the use of a modified X + Y schedule as the program was still required to complete clinics over a minimum of 26 weeks per ACGME Pediatric Program Specific Requirements and had some clinics scheduled during inpatient rotations.¹ In 2018, our group implemented X+Y scheduling where residents did not have continuity clinics scheduled during inpatient rotations. This was developed at 5 pediatric residency programs across the country with approval from the ACGME under the Advancing Innovation in Resident Education (AIRE) pilot.^{10,11} This pilot granted the participating programs a waiver of the minimum of 26 weeks of continuity clinic rule but not the required number of 36 clinics per academic year. We were able to show that X + Y scheduling led to improved perceptions of patient continuity, inpatient workflow and handoff quality, and increased time for teaching during inpatient blocks and continuity clinic.¹¹ Here we report the perceptions of residents and faculty in programs with X + Y scheduling over a 3-year timeframe.

METHODS

Our research methods have been described in detail previously.¹¹ Five pediatric residency programs across the United States implemented “true” X + Y scheduling in July of 2018 with the approval of the ACGME. These programs include Advocate Children’s Hospital – Park Ridge in Park Ridge, Illinois; University of Texas at Austin Pediatrics Program, Austin, Texas; New York University Langone Health in New York, New York; Rainbow Babies and Children’s Hospital in Cleveland, Ohio; and University of Toledo in Toledo, Ohio. The residency programs are medium to large in size with total number of categorical residents at each program ranging from 24 to 84. Each participating residency program determined their X + Y schedule with 3 programs utilizing 3 + 1, and 1 program each implementing 4 + 4 and 6 + 2 (Table 1). Each of these models has their “X” blocks with no continuity clinic scheduled and the “Y” blocks have continuity clinics scheduled that may or may not be paired with other educational opportunities such as subspecialty clinics, individual curriculum, research, etc.

We utilized a cross-sectional survey design to evaluate X+Y scheduling. Surveys were sent prior to implementing

X + Y in July 2018 and then annually in June thereafter. Topics focused on resident and faculty perceptions of education in continuity clinic and inpatient rotations, continuity with patients, and inpatient workflow. Surveys were voluntary and anonymous and were distributed via email using Research Electronic Data Capture (REDCap - www.projectredcap.org) software.

The resident survey measured perceptions of outpatient continuity and the impact continuity clinic schedules had on inpatient and subspecialty rotation experiences utilizing a 5-point Likert scale. The faculty survey asked participants to self-identify their clinical focus as outpatient general pediatrics, hospital-based medicine, or other subspecialties. Questions were tailored to the faculty member’s area of focus to determine the perceived impact of continuity clinic schedules. The baseline and annual follow-up surveys for both residents and faculty were identical except for the follow-up surveys which asked faculty and residents to give a preference between X + Y and a traditional continuity clinic schedule. Please see the online [Supplementary Material](#) for the survey questions.

Quantitative data were analyzed using Microsoft Excel 2016 (Microsoft Corp. Redmond, Wash). The 2 positive responses (Strongly Agree/Agree or Always/Usually) on each 5-point Likert Scale were combined to determine the percent of positive responses. Z-tests for proportion differences were utilized to determine statistical significance between pre-X+Y and all subsequent years, including between each follow-up year.

This study was found to be exempt from full review by the institutional review boards at each of the participating programs.

RESULTS

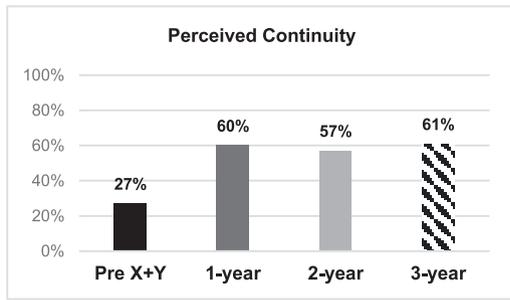
RESIDENT PERCEPTIONS

Data evaluating the perceptions of residents from pre-X + Y to 1 year post-X + Y have been reported previously.¹¹ Surveys were distributed to 186 residents across the 5 participating programs preimplementation and 259 residents at 1 year, 278 residents at 2 years, and 284 residents at 3 years post-X + Y. Response rates were 69% pre-X + Y and 47%, 68%, and 57% at 1, 2, and 3 years post-X + Y respectively. Resident outcomes evaluated can be divided into categories assessing continuity clinic, inpatient, and subspecialty experiences. The baseline and post-implementation data are shown in [Figure 1](#). X + Y was preferred over traditional half-day-per-week

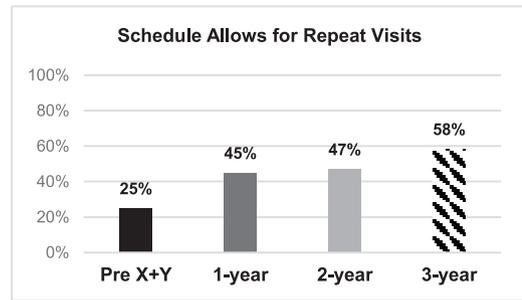
Table 1. X + Y Schedule Models

| Program Name | X + Y Model | Continuity Clinic Model on Y Block |
|------------------------------------------|-------------|-----------------------------------------------|
| Advocate – Park Ridge | 3 + 1 | 4 half days of clinic each week |
| Dell Children’s Hospital | 3 + 1 | 4 half days of clinic each week |
| New York University (NYU) Langone Health | 4 + 4 | An average of 2 half days of clinic each week |
| Rainbow Babies and Children’s Hospital | 6 + 2 | 3 half days of clinic each week |
| University of Toledo | 3 + 1 | 5-6 half days of clinic per week |

A. Outpatient Experiences

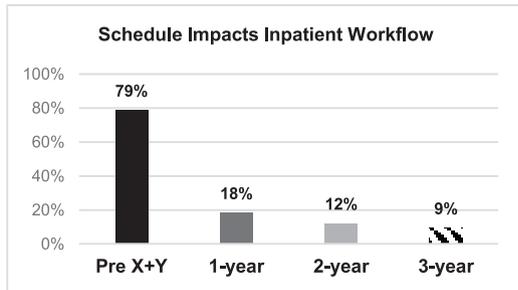


p<0.05: Pre:1-year, Pre:2-year, Pre:3-year

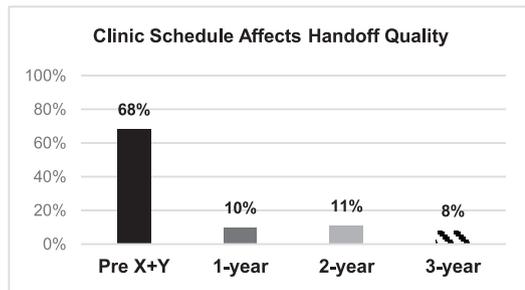


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B. Inpatient Experiences

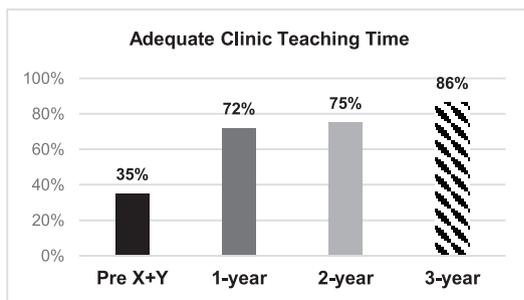


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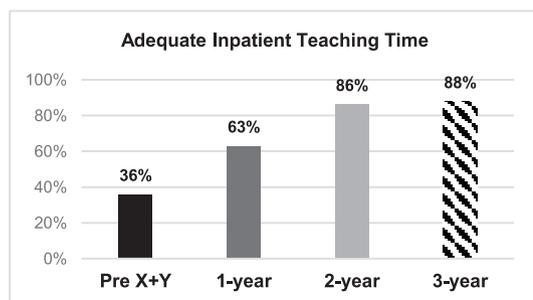


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C. Perceived Teaching Time

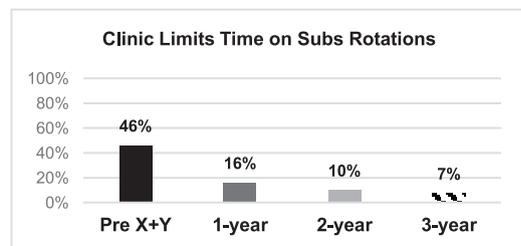


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p<0.05: Pre:1-year, Pre:2-year, Pre:3-year, 1-year:2-year

D. Subspecialty Experiences



p<0.05: Pre:1-year, Pre:2-year, Pre:3-year

Figure 1. Resident outcomes.

continuity clinic by the overwhelming majority of resident respondents - 94%, 100%, and 99% at 1, 2, and 3-years post-implementation. For the 1-year and 2-year schedule preference data, these percentages reflect those residents who participated in both traditional and X + Y scheduling. This would include post-graduate year (PGY)-2 and PGY-3 residents in year 1 and PGY-3 residents in year 2. The 3-year data includes residents who have only participated in X + Y scheduling.

The following resident perception metrics were noted to be significantly improved ($P < .05$) from pre-X + Y and remained stable during all 3 years of X + Y: ability to have continuity with patients, being able to see patients back for repeat visits, continuity clinic schedule impact on inpatient workflow and handoff quality, and limits on time spent on subspecialty rotations. Time for teaching was also perceived to be improved from baseline in both continuity clinic and inpatient rotations and these also

remained stable or improved for all 3 years. Residents perceived significant increases in outpatient clinic teaching time between years 2 and 3 of X+Y and in inpatient teaching time between years 1 and 2 of X+Y. When results were stratified by PGY level most responses continued to show significant ($P < .05$) improvements (Table 2). However, the PGY-1 respondent data did not show significant changes in ability to see patients back for repeat visits and limits on time spent on subspecialty rotations. Results were also stratified by program and are shown in Table 3.

FACULTY PERCEPTIONS

Surveys were sent to 384 faculty members across the 5 participating institutions with 51% overall response pre-implementation, 100/384 (26%) at 1 year, 157/395 (40%) at 2 years, and 147/378 (39%) at 3 years. Faculty outcomes are shown in Figure 2. X+Y was preferred by most respondents at all years post-X+Y: Outpatient General Pediatrics 67%, 76%, and 83%; Hospital Medicine 74%, 89%, 88%; and Subspecialty Faculty 56%, 63%, and 71% at 1 year, 2 years, and 3 years X+Y respectively.

For the outpatient general pediatric faculty data, perceptions of adequate teaching time significantly increased from pre-X+Y to 1-year post-X+Y and remained stable at 2 years post-X+Y. While there is an increase above baseline at 3 years post-X+Y, it was not statistically significant. Perceived patient continuity also significantly increased above baseline with X+Y and remained statistically significantly improved at all 3 years.

Hospital medicine faculty perceived improvements in teaching time with X+Y scheduling and years 2 and 3 post-X+Y were significantly above the pre-X+Y survey results. They also noted less impact to workflow due to continuity clinic scheduling with statistically significant improvements at all 3 years post-X+Y.

Subspecialty faculty did not have a significant difference in perceived teaching time at 1 and 2 years post-X+Y but did have an increase in perceived teaching time at 3 years. Subspecialty faculty also perceived a decrease in time limitations of residents on subspecialty rotations with X+Y scheduling at 2 and 3 years post-X+Y.

DISCUSSION

This is the first study to evaluate the longitudinal effects of X+Y scheduling on pediatric residents and faculty. While we have shown the initial benefits of X+Y scheduling, we now demonstrate that they can be sustained or even improved over 3 years.

Both residents and faculty perceived improvements in continuity with patients with X+Y scheduling over traditional half-day per week continuity clinic scheduling. This remained statistically significant over the 3-year study period. There was a downward trend of perceived continuity at the 2 and 3 year survey timeframes for the faculty. These were the 2019 to 2020 and 2020 to 2021 academic years, respectively, so this may demonstrate

the impact of the COVID-19 pandemic on patients seeking care rather than the scheduling model itself.¹² Residents and faculty also perceived improvements in the time for teaching in continuity clinic with X+Y scheduling, resident responses showing a positive trend from baseline through year 3. Again, year 3 is the 2020-2021 academic year so this may reflect increased time for teaching due to a lower patient volume rather than the schedule.¹²

Inpatient experiences also improved for both faculty and residents with implementation of X+Y scheduling. Both groups noted improvements in teaching time and in the impact clinic scheduling had on inpatient workflows. These remained stable during the 3-year timeframe. Interestingly, resident surveys showed an additional increase in perception of teaching time on inpatient services between years 1 and 2 post-X+Y. Year 2 is the 2019 to 2020 academic year so the perceived increase in teaching time may be due to low inpatient census of pediatric hospitals during the early part of the COVID-19 pandemic and various novel virtual methods utilized to continue resident education during the pandemic.¹³⁻¹⁶

Perceived teaching time only improved above baseline for subspecialty faculty at year 3, again possibly due to the COVID-19 pandemic. Limitations of time spent on subspecialty rotations improved with X+Y scheduling for residents at all 3 survey points post-X+Y and at years 2 and 3 for subspecialty faculty. Our survey was not designed to ascertain the reasoning for why subspecialty faculty did not perceive any difference at year 1 but did at years 2 and 3 for time spent on subspecialty rotations. There were no systemic changes made to the X+Y schedules at the institutions during the study period but there may have been some faculty development and discussion done at the participating institutions based on the data from the 1-year survey. The majority of residents and faculty prefer X+Y scheduling over traditional half day per week clinic, at all 3 time points. Notably, there is a trend of increasing percent of faculty preference of X+Y over the 3-year study period. The reason for the increase in faculty preference of X+Y is unclear but may have to do with additional discussion of X+Y scheduling at the faculty level over the study period. We speculate that it could also be from residents adapting to change faster than faculty.

This study is the first to evaluate X+Y scheduling in pediatric residency programs over a 3-year timeframe. However, our study does have some limitations as previously outlined.¹¹ Our surveys collected perception data and not objective data. Given this, we do not report objective data on patient continuity. Also, X+Y scheduling leads to decreased handoffs and likely less hassle getting from inpatient to clinic or vice versa possibly leading to a halo effect that could improve overall perceptions. Response rates for faculty were low at the 1-year survey period but improved to around 40% at years 2 and 3. With any survey study, there may be an element of response bias from both the residents and faculty. However, most of the results show such positive improvements,

Table 2. Results by PGY Level

| PGY-1 | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) | PGY-2 | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) | PGY-3 | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| I have continuity with my clinic patients. | 14% | 76%* | 52%* | 69%* | I have continuity with my clinic patients. | 25% | 54%* | 63%* | 52%* | I have continuity with my clinic patients. | 32% | 53%* | 57%* | 62%* |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 57% | 55% | 35% | 63% | How often does your continuity clinic schedule allow you to see patients for repeat visits? | 23% | 35% | 52%* | 52%* | How often does your continuity clinic schedule allow you to see patients for repeat visits? | 19% | 45%* | 55%* | 62%* |
| Resident staffing of continuity clinic impacts the work-flow of inpatient services. (ICU, NICU, Wards) | 64% | 8%* | 12%* | 7%* | Resident staffing of continuity clinic impacts the work-flow of inpatient services. (ICU, NICU, Wards) | 77% | 28%* | 16%* | 7%* | Resident staffing of continuity clinic impacts the work-flow of inpatient services. (ICU, NICU, Wards) | 83% | 29%* | 11%* | 17%* |
| Resident staffing of continuity clinic limits my time on sub-specialty rotations | 21% | 10% | 6% | 7% | Resident staffing of continuity clinic limits my time on sub-specialty rotations | 46% | 15%* | 13%* | 5%* | Resident staffing of continuity clinic limits my time on sub-specialty rotations | 51% | 37% | 13%* | 12%* |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 50% | 8%* | 8%* | 8%* | The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 69% | 9%* | 8%* | 5%* | The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 73% | 16%* | 19%* | 12%* |
| The resident schedule allows adequate time for teaching outside of rounds. | 50% | 76% | 83%* | 88%* | The resident schedule allows adequate time for teaching outside of rounds. | 35% | 57%* | 89%* | 83%* | The resident schedule allows adequate time for teaching outside of rounds. | 32% | 55%* | 87%* | 93%* |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 43% | 86%* | 66% | 88%* | The resident schedule allows adequate time for teaching during continuity clinic sessions | 35% | 65%* | 80%* | 80%* | The resident schedule allows adequate time for teaching during continuity clinic sessions | 32% | 63%* | 81%* | 93%* |

*denotes $P < .05$ compared to pre-X + Y data.

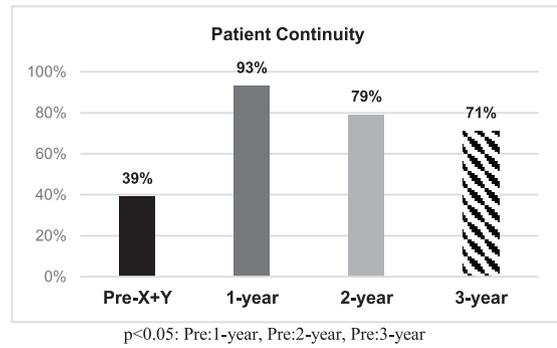
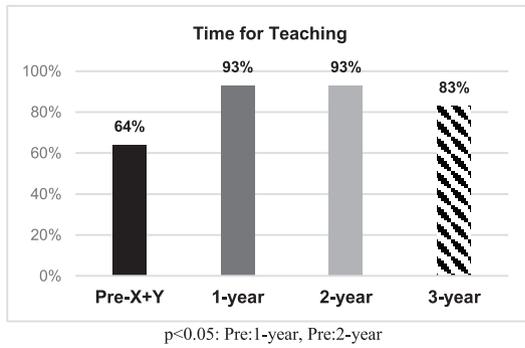
Table 3. Results by Program

| ADVOCATE | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------|--------------------------------|--------------------------------|
| I have continuity with my clinic patients. | 53% | 95%* | 86%* | 93%* |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 63% | 75% | 66% | 90%* |
| Resident staffing of continuity clinic impacts the workflow of inpatient services. (ICU, NICU, Wards) | 60% | 20%* | 10%* | 10%* |
| Resident staffing of continuity clinic limits my time on subspecialty rotations | 17% | 20% | 3% | 3% |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 53% | 15%* | 14%* | 7%* |
| The resident schedule allows adequate time for teaching outside of rounds. | 60% | 50% | 86%* | 73% |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 53% | 85%* | 86%* | 83%* |
| Percent Prefer X+Y | | 92% | 100% | 100% |
| DELL | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
| I have continuity with my clinic patients. | 0% | 41%* | 66%* | 67%* |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 0% | 18%* | 49%* | 63%* |
| Resident staffing of continuity clinic impacts the workflow of inpatient services. (ICU, NICU, Wards) | 92% | 9%* | 3%* | 7%* |
| Resident staffing of continuity clinic limits my time on subspecialty rotations | 52% | 0%* | 3%* | 4%* |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 76% | 3%* | 3%* | 11%* |
| The resident schedule allows adequate time for teaching outside of rounds. | 32% | 59%* | 97%* | 93%* |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 28% | 76%* | 94%* | 96%* |
| Percent Prefer X + Y | | 100% | 100% | 100% |
| NYU | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
| I have continuity with my clinic patients. | 43% | 75% | 74%* | 77%* |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 19% | 50% | 54%* | 68%* |
| Resident staffing of continuity clinic impacts the workflow of inpatient services. (ICU, NICU, Wards) | 76% | 33%* | 11%* | 0%* |
| Resident staffing of continuity clinic limits my time on subspecialty rotations | 48% | 42% | 17%* | 10%* |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 76% | 25%* | 11%* | 0%* |
| The resident schedule allows adequate time for teaching outside of rounds. | 14% | 67%* | 77%* | 87%* |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 10% | 50%* | 46%* | 74%* |
| Percent Prefer X + Y | | 100% | | |
| RAINBOW | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
| I have continuity with my clinic patients. | 12% | 45%* | 23% | 27% |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 10% | 41%* | 26%* | 28%* |
| Resident staffing of continuity clinic impacts the workflow of inpatient services. (ICU, NICU, Wards) | 90% | 11%* | 17%* | 12%* |
| Resident staffing of continuity clinic limits my time on subspecialty rotations | 62% | 7%* | 12%* | 5%* |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 79% | 2%* | 15%* | 10%* |
| The resident schedule allows adequate time for teaching outside of rounds. | 31% | 82%* | 91%* | 92%* |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 33% | 64%* | 75%* | 87%* |
| Percent Prefer X + Y | | 100% | 100% | 98% |
| TOLEDO | Pre-X + Y Agree (%) | 1-year Post-X + Y Agree (%) | 2-year Post-X + Y Agree (%) | 3-year Post-X + Y Agree (%) |
| I have continuity with my clinic patients. | 50% | 100%* | 100%* | 92%* |
| How often does your continuity clinic schedule allow you to see patients for repeat visits? | 50% | 82% | 83% | 92%* |
| Resident staffing of continuity clinic impacts the workflow of inpatient services. (ICU, NICU, Wards) | 50% | 55% | 33% | 23% |
| Resident staffing of continuity clinic limits my time on subspecialty rotations | 50% | 73% | 17% | 31% |
| The quality of patient handoff for inpatient services (ICU, NICU, Wards) is affected by resident continuity clinic schedules. | 25% | 36% | 0% | 15% |
| The resident schedule allows adequate time for teaching outside of rounds. | 38% | 18% | 58% | 92%* |
| The resident schedule allows adequate time for teaching during continuity clinic sessions | 63% | 91% | 75% | 100%* |
| Percent Prefer X + Y | | 83% | 100% | 100% |

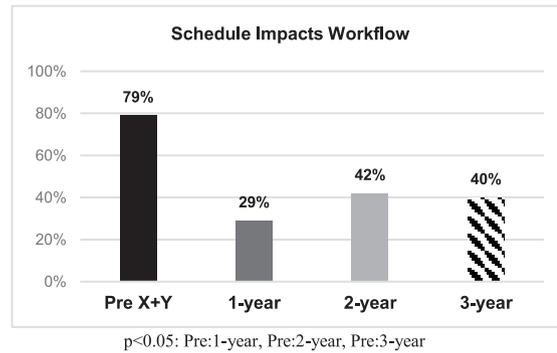
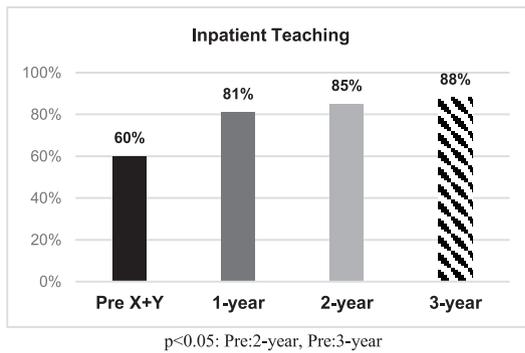
ICU indicates intensive care unit; NICU, neonatal intensive care unit; and NYU, New York University.

*denotes $P < .05$ compared to pre-X + Y data.

A. Outpatient General Pediatrics



B. Hospital Medicine



C. Subspecialty

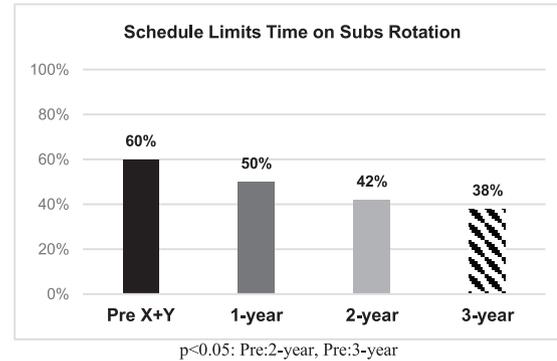
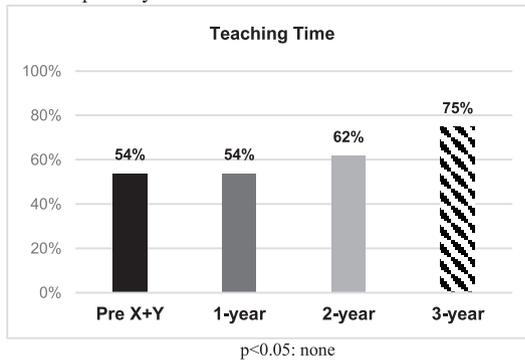


Figure 2. Faculty outcomes.

especially in the residency responses, that it is unlikely that response bias is playing a significant role at least in that portion of data. The COVID-19 pandemic had a tremendous impact on pediatric graduate medical education.¹⁷ Many programs transitioned to virtual educational offerings, performed telemedicine visits, experienced low inpatient census and fewer well child visits, and many more disruptions. The impact this has on the perception data described here is unfortunately impossible to measure.

One concern regarding X + Y scheduling is if time is being “lost” from other rotations. The AIRE pilot only granted a waiver of the ACGME requirement that clinics occur in no fewer than 26 weeks. All other ACGME core pediatric requirements must be followed including minimum time on inpatient, subspecialty electives, and intensive care unit rotations. Depending on the program in the pilot, X + Y scheduling may have decreased resident time

on individual rotations mentioned above compared to before X + Y but minimum time required by ACGME is still being met. A forthcoming manuscript detailing the implementation of X + Y at each of the original 5 pilot programs will describe this in further detail than is in the scope of this study.

We chose to focus our initial evaluation of X + Y scheduling in pediatrics on perceptions of continuity, inpatient workflows, and time for educational activities. There are numerous additional outcomes that can be explored and assessed such as in-training exam scores, American Board of Pediatric certifying exam pass rates, and burnout, especially now that the original cohort of 5 X + Y programs has graduated their first categorical residency class that has trained only with the X + Y schedule. More objective data regarding patient continuity in outpatient clinics would also be helpful to assess this scheduling model. Additional studies are on-going to determine

the effects of X + Y scheduling as more programs are joining the X+Y AIRE pilot.

CONCLUSION

Our data suggest that X + Y scheduling leads to perceived improvements in both patient care and educational outcomes that remain stable or improved over a 3-year study period. The majority of resident and faculty respondents preferred X + Y scheduling to traditional half-day per week continuity clinic scheduling at all survey time points. Our study shows that X + Y scheduling promotes the principles of the ACGME requirements of enhancing continuity and educational opportunities.¹ With the upcoming Pediatric RRC review of the ACGME pediatric common program requirements, we hope that our longitudinal data will support a change in the requirements to allow any interested pediatric residency program to implement X + Y scheduling.

ACKNOWLEDGMENTS

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Previous presentations: Material from this manuscript was presented in oral abstract form during the Association of Pediatric Program Directors Spring Meeting and the Pediatric Academic Societies meeting in 2021.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2022.01.014>.

REFERENCES

1. ACGME program requirements for graduate medical education in pediatrics. 2020. Available at: https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/320_Pediatrics_2020.pdf?ver=2020-06-29-162726-647. Accessed September 11, 2020.
2. Chaudhry SR, Hanna-Attisha M, LaChance J, et al. Primary resident physician: improving continuity of care. *J Grad Med Educ.* 2015;7:291–292.
3. Salerno SM, Faestel PM, Mulligan T, et al. Disruptions and satisfaction in internal medicine resident continuity clinic differ between inpatient and outpatient rotations. *Teach Learn Med.* 2007;19:30–34.
4. Mariotti JL, Shalaby M, Fitzgibbons JP. The 4:1 schedule: a novel template for internal medicine residencies. *J Grad Med Educ.* 2010;2:541–547.
5. Chaudhry SI, Balwan S, Friedman KA, et al. Moving forward in GME reform: a 4 + 1 model of resident ambulatory training. *J Gen Intern Med.* 2013;28:1100–1104.
6. Shalaby M, Yaich S, Donnelly J, et al. X + Y scheduling models for internal medicine residency programs—a look back and a look forward. *J Grad Med Educ.* 2014;6:639–642.
7. Harrison JW, Ramaiya A, Cronkright P. Restoring emphasis on ambulatory internal medicine training—the 3:1 model. *J Grad Med Educ.* 2014;6:742–745.
8. Heist K, Guese M, Nikels M, et al. Impact of 4 + 1 block scheduling on patient care continuity in resident clinic. *J Gen Intern Med.* 2014;29:1195–1199.
9. Osborn R, Bullis E, Fenick AM, et al. X + Y scheduling in pediatric residency: continuity, handoffs, and trainee experience. *Acad Pediatr.* 2019;19:489–494.
10. Advancing Innovation in Residency Education (AIRE). Available at: <https://www.acgme.org/What-We-Do/Accreditation/Advancing-Innovation-in-Residency-Education-AIRE>. Accessed September 11, 2020.
11. Myers RE, Thoreson L, Howell HB, et al. Impact of X+Y scheduling on pediatric resident and faculty perceptions of education and patient care. *Acad Pediatr.* 2021;21:1273–1280.
12. Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 pandemic on routine pediatric vaccine ordering and administration — United States, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69:591–593. <https://doi.org/10.15585/mmwr.mm6919e2external-internal>.
13. Wilder JL, Parsons CR, Growdon AS, et al. Pediatric hospitalizations during the COVID-19 pandemic. *Pediatrics.* 2020;146:e2020005983.
14. Geanacopoulos AT, Sundheim KM, Greco KF, et al. Pediatric intern clinical exposure during the COVID-19 pandemic. [published online ahead of print, 2021 Apr 16] *Hosp Pediatr.* 2021. <https://doi.org/10.1542/hpeds.2021-005899>. hpeds.2021-005899.
15. Chiel L, Winthrop ZS, Winn A. The COVID-19 pandemic and pediatric graduate medical education. *Pediatrics.* 2020;146:e20201057.
16. Rogers A, Lynch K, Toth H, Weisgerber M. Patient and family centered (Tele)rounds: the use of video conferencing to maintain family and resident involvement in rounds. *Acad Pediatr.* 2020;20:765–766.
17. Blankenburg R, Gonzalez Del Rey J, Aylor M, et al. The impact of the COVID-19 pandemic on pediatric graduate medical education: lessons learned and pathways forward. [published online ahead of print, 2021 Nov 23] *Acad Med.* 2021. <https://doi.org/10.1097/ACM.0000000000004532>.