

BACKGROUND

Population-based studies in adults¹ and children²⁻⁶ show long-term persistence of symptoms after COVID-19

Few data exist on the symptoms and outcomes of children referred for persistent unwellness after COVID-19

The Pediatric Infectious Diseases (PID) service at Norton Children's and the University of Louisville School of Medicine established one of the first pediatric Post-COVID Clinics (PCCs) in the U.S.⁷⁻⁸

This afforded an opportunity to explore the demographics, symptoms, and natural history of post-COVID unwellness in referred children

POST-COVID CLINIC

Regional providers notified of availability of the PCC

Minimum criteria for evaluation

- Proven or strongly suspected prior COVID-19
- ≥10 days following onset of COVID-19 symptoms
- Afebrile
- New or lingering symptoms, or a sense of not being well
- Referral by a medical provider
- No concern for multisystem inflammatory syndrome

Intake assessments performed by one of 4 PID providers using a standardized template

Diagnostic tests performed and referrals made as deemed necessary by PID provider

Sub-specialists agreed to see referred patients within 1 week of initial assessment

Follow-up PCC visits scheduled for most patients

METHODS

All patients evaluated 10/12/2020–12/6/2021 included (N=104)

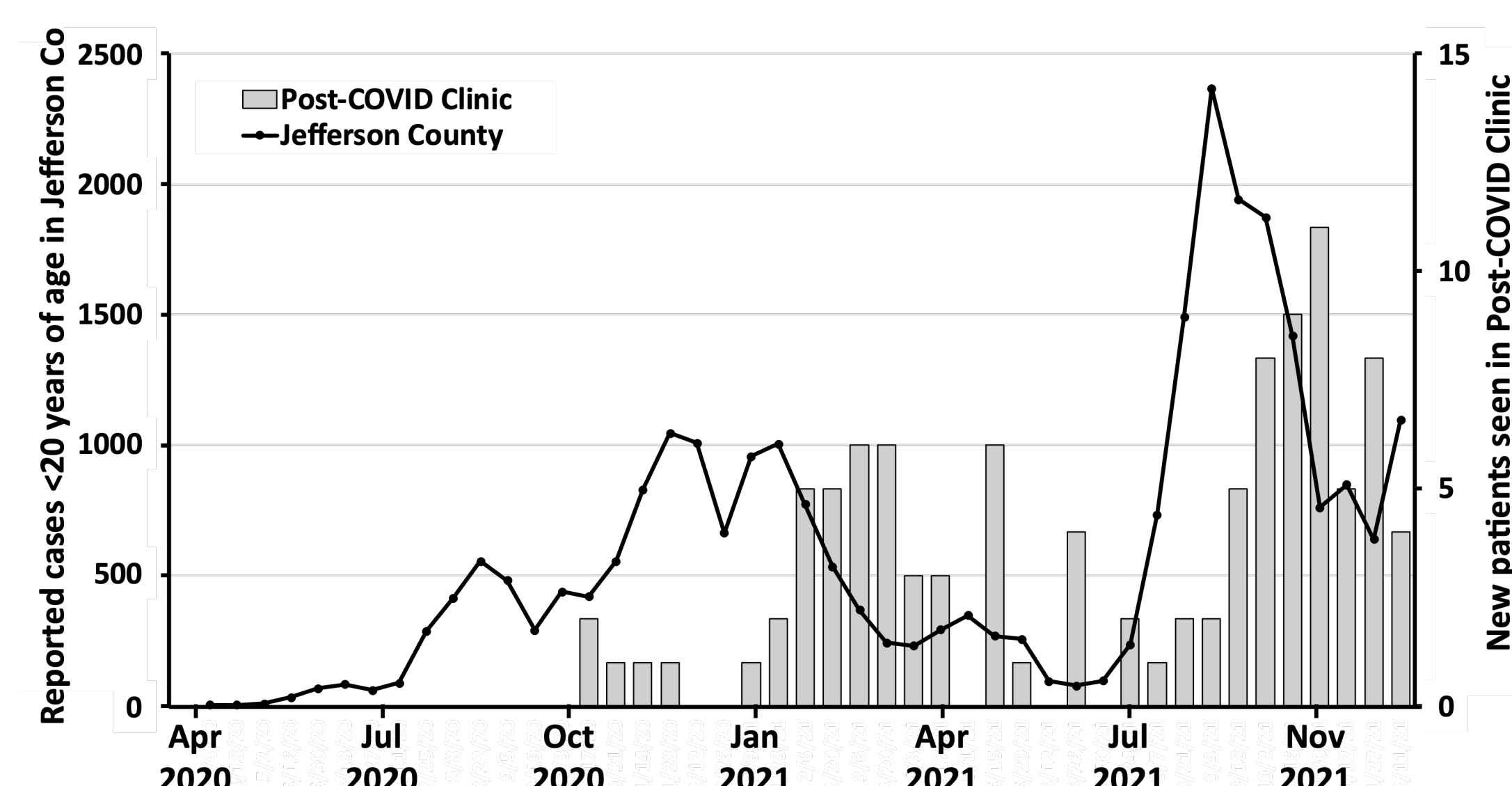
Data abstracted from intake visit, follow-up visits, and subspecialty consultations

Follow-up telephone survey conducted (N=63)

Descriptive analysis performed

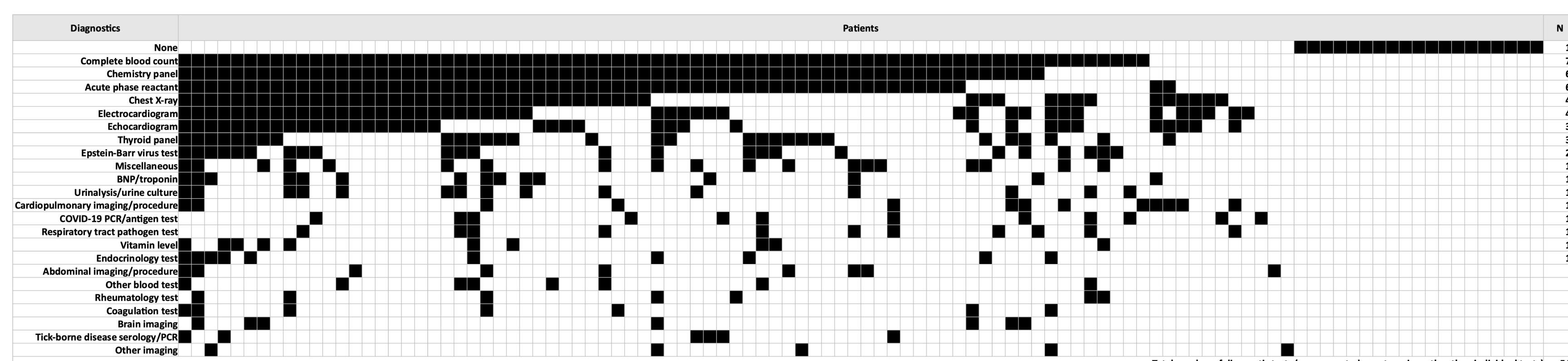
RESULTS

Figure 1



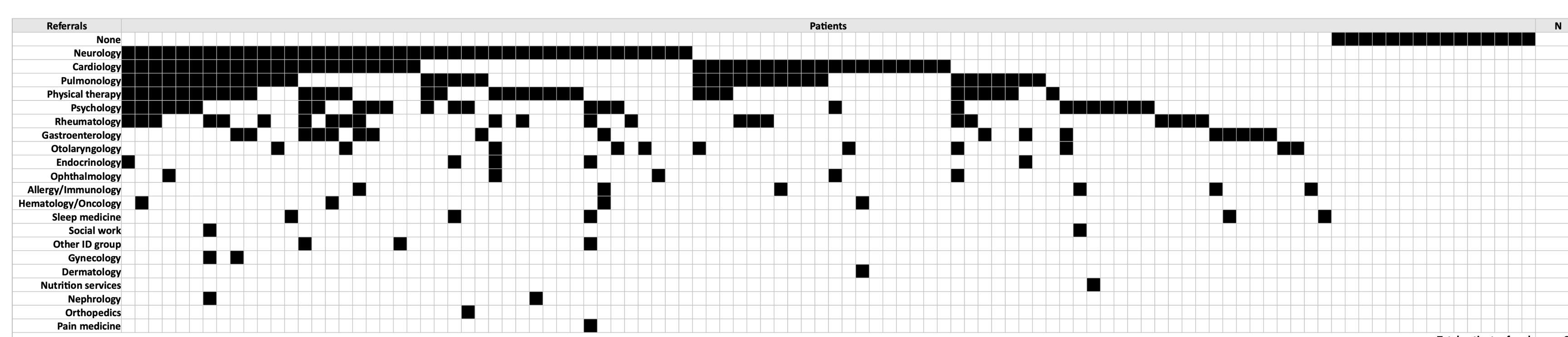
Reported COVID-19 cases in persons <20 y of age in Jefferson County, KY⁹ and number of new patients seen in PCC, by 2-wk intervals. Referrals to PCC spiked approximately 2 mo after each wave of COVID-19 in the community.

Figure 3



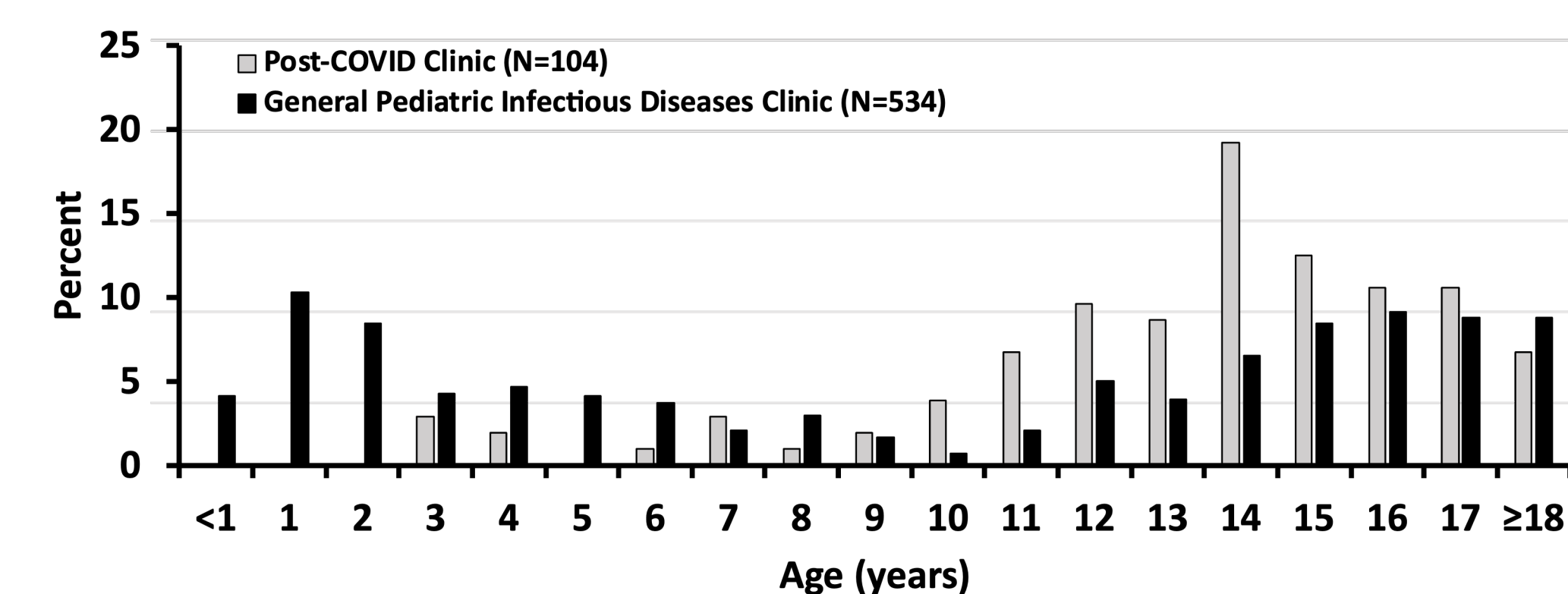
Diagnostic tests (first column) performed on PCC patients. Tests were ordered by a PID provider or by another medical provider prior to PCC evaluation. Each column represents an individual patient, and black shading represents a test performed. Totals are shown in the last column. A wide variety of diagnostic tests were performed. Common tests: CBC, chemistry panel, acute phase reactants, chest x-ray, electrocardiogram, echocardiogram.

Figure 4



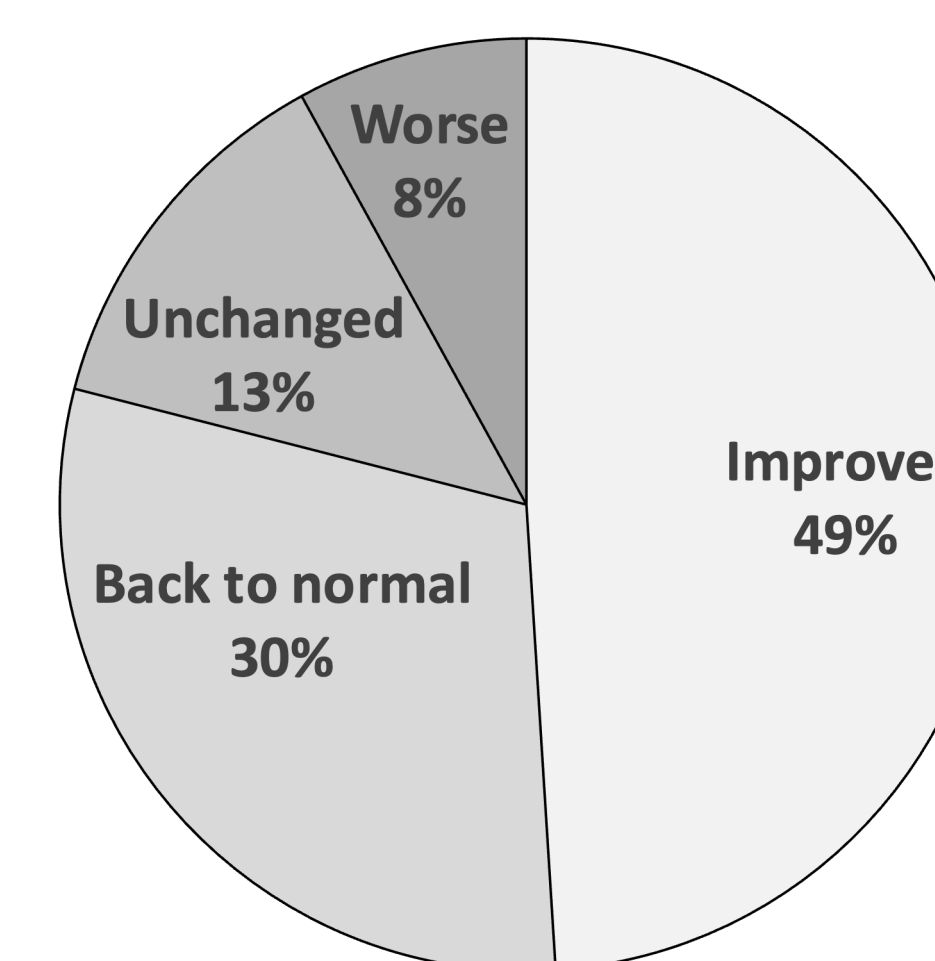
Clinical services (first column) to which PCC patients were referred. Tests were ordered by a PID provider or by another medical provider prior to PCC evaluation. Each column represents an individual patient, and black shading represents a referral made. Totals are shown in the last column. Most patients were referred to at least one subspecialty service, but the number and pattern of referrals varied. Common referrals: Neurology, Cardiology, Pulmonology.

Figure 2



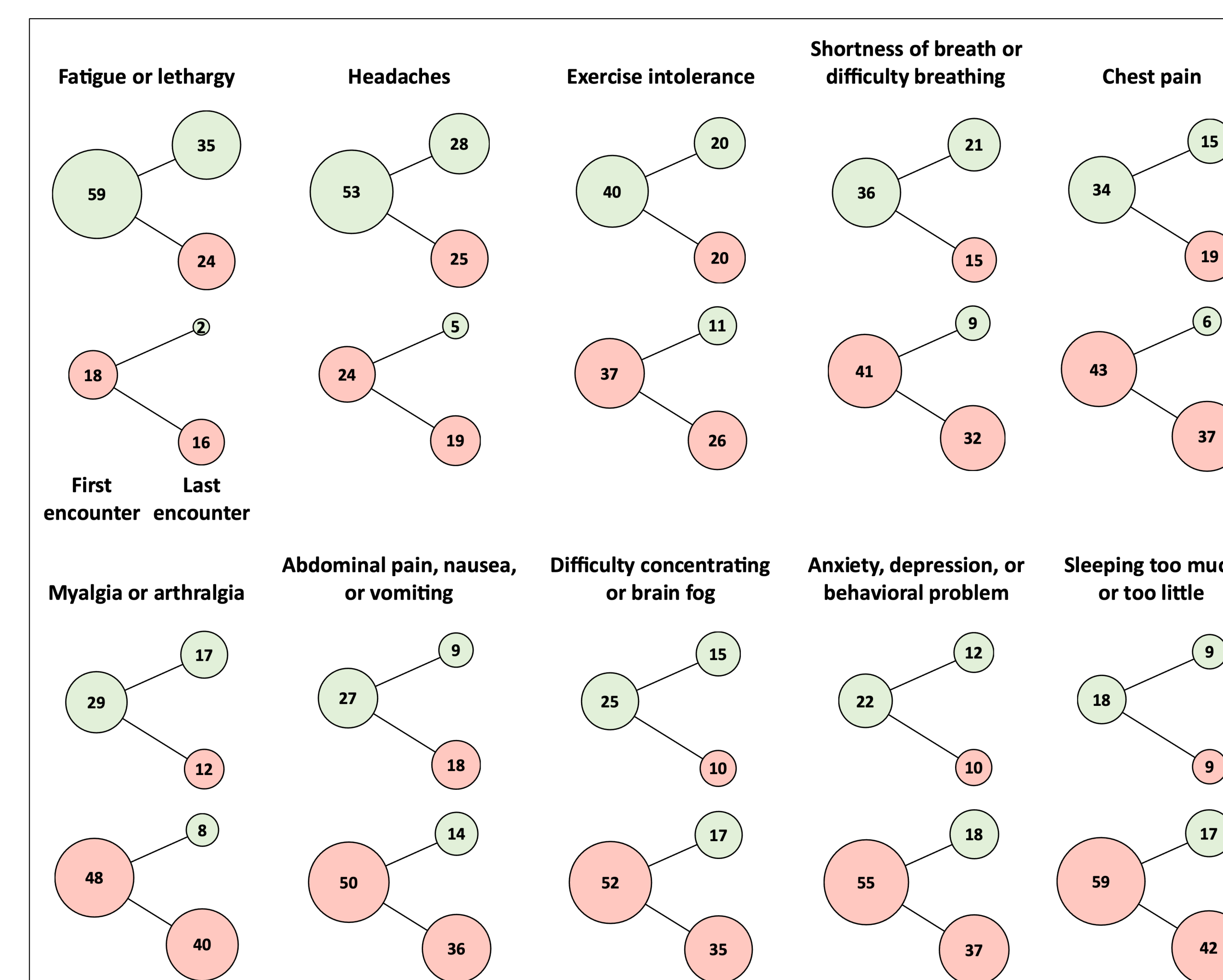
Age of new patients seen in PCC compared to patients seen in the General Pediatric Infectious Diseases Clinic (GPIDC). PCC patients were older than patients seen in GPIDC (median 14 y; IQR 12–16).

Figure 6



Percentage of patients (N=63) reporting the indicated change in their condition between the initial PCC visit and telephone follow-up. Median follow-up time was 6.2 mo (IQR 3.83–10.3).

Figure 5



Trajectory of most common post-COVID symptoms, shown from left to right according to prevalence at first PCC visit

- First column of circles beneath each symptom indicates the number of patients with (green) or without (red) that symptom at initial presentation to PCC; second column of circles represents the number of patients with or without that symptom at the last encounter (either final PCC visit or telephone follow-up)
- The area of the circles is proportionate to the number of patients (number shown)
- N=77 patients with multiple PCC encounters (63 telephone & 14 in-person follow-ups)
- Median time from first PCC visit to last encounter = 5.3 mo (IQR 3–9.95)
- Fatigue or lethargy and headaches were most common and most persistent symptoms
- Few children developed symptoms that weren't present at initial PCC visit
- Symptom prevalence decreased over time, except for difficulty concentrating or brain fog; anxiety, depression, or behavioral problem; and sleeping too much or too little

FINDINGS

Median time from onset of COVID-19 to first PCC visit = 2.6 mo (range 0.7–18.1; IQR 1.5–4.4)

Most patients were adolescents with nonspecific and varied symptoms (Figs. 2 and 6)

PCC and GPIDC patients >10 y were similar with respect to gender (p -value=0.511), race (p -value 0.118), and payer distribution (p -value=0.118)

54% of patients were experiencing moderate to severe disability at the first PCC visit as assessed by a modified functional disability inventory¹⁰

After thorough assessments (Figs. 3 and 4), 56% of patients received a new medical diagnosis in the post-COVID period; the most common new diagnoses were:

- Anxiety/depression/panic attacks (N=19)
- Vasomotor instability/orthostatic intolerance/postural orthostatic tachycardia syndrome/dysautonomia (N=18)
- Migraines (N=17)
- Asthma (N=13)

Most symptoms improved within 6 months (Figs. 5 and 6)

92% percent of responding patients (N=54) reported satisfaction with the PCC

CONCLUSIONS

Children referred for post-COVID unwellness had a wide variety of symptoms; notable new diagnoses were anxiety, vasomotor instability, and migraines

79% of patients were back to normal or improved over a course of about 6 months

This PCC model, where the PID service was responsible for intake, triage and follow-up, was appreciated by the majority of patients and may have contributed to good outcomes

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