BRIEF REPORT

Variability in Kawasaki Disease Practice Patterns: A Survey of Hospitalists at Pediatric Hospital Medicine 2017

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ABSTRACT

OBJECTIVE: To explore practice variations in the care of patients with Kawasaki disease (KD) among pediatric hospitalist physicians (PHPs).

METHODS: A 13-item questionnaire was developed by a multi-institutional group of KD experts. The survey was administered via live-audience polling by using smartphone technology during a KD plenary session at the 2017 Pediatric Hospital Medicine National Meeting, and simple descriptive statistics were calculated.

RESULTS: Of the 297 session attendees, 90% responded to at least 1 survey question. Approximately three-quarters of respondents identified as PHPs practicing in the United States. The reported length of inpatient monitoring after initial intravenous immunoglobulin (IVIG) therapy demonstrated a wide time distribution (30% 24 hours, 36% 36 hours, and 31% 48 hours). Similarly, PHP identification of the treatment failure interval, indicated by recrudescent fever after IVIG, demonstrated a broad distribution (56% 24 hours, 27% 36 hours, and 16% 48 hours). Furthermore, there was variation in routine consultation with non-PHP subspecialists. In contrast, PHPs reported little variation in their choice of initial and refractory treatment of patients with KD.

CONCLUSIONS: In a convenience sample at a national hospitalist meeting, there was variation in reported KD practice patterns, including observation time after initial treatment, time when the recurrence of fever after initial therapy was indicative of nonresponse to IVIG, and routine consultation of non-PHP subspecialists. These results may guide future study of KD practice patterns and inform efforts to improve evidence-based practices in the care of patients with KD.

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Kawasaki disease (KD), a small- and medium-vessel vasculitis, is the most common etiology of acquired heart disease in children in the developed world.[1] Incidence of KD in the continental US is estimated at 25 per 100 000 children <5 years of age, resulting in nearly 6000 hospitalizations per year.[2,3] Current trends suggest that pediatric hospitalist physicians (PHPs) care for many children with KD.[4,5] The American Heart Association (AHA) updated its diagnostic and treatment guidelines for KD in 2017.[1] Yet, many practical questions related to the inpatient management of patients with KD remain. To explore these questions and identify opportunities for improving evidence-based practice, we surveyed PHPs regarding their practice patterns in caring for patients with KD.

METHODS

Study Design and Setting

We conducted a cross-sectional, convenience-sample, live-audience survey of attendees at a plenary session at the 2017 Pediatric Hospital Medicine National Meeting. The survey was administered during a session entitled, "Kawasaki Disease Reconsidered: New AHA Guidelines." Participating audience members selected their responses from a smartphone application developed by CrowdCompass. There were no exclusions to survey participation. The audience was informed that the survey was approved by the Baylor College of Medicine Institutional Review Board, the survey was optional and anonymous, and that participation in the survey implied consent.

Survey Development and Administration

A 13-item survey (Supplemental Information) was created by a group of 5 KD experts from 3 institutions and then reviewed and edited by an expert in survey design (M.E.M.R.). To improve item and format clarity, the survey was piloted with a group of 12 PHPs familiar with the care of patients with KD. During survey administration, question and answer choices were projected on screens and available individually on the smartphone application. Presenters stated that all items apply only to patients with KD who were >1 year of age, read each question and answer choice aloud, and allowed 30 seconds for each response. Items were batched into groups of 3 to 4 and administered before the related content section.

Survey Analysis

Individual responses were exported to Microsoft Excel, deidentified, and then analyzed by using simple descriptive statistics with SAS version 9.4 (SAS Institute, Inc, Cary, NC).

Study Population

Hand clickers were used to count attendance 5 times during the 75-minute session by 2 study assistants; the median count was 298 attendees (range 289–304). Of these, 90% ($n = 269$) responded to at least 1 question. The number of responses for additional questions ranged from 180 (67%) to 204 (76%). The analysis was conducted from the participants self-identifying as US-based PHPs. Analysis excluded those who identified as trainees (medical students and residents; $n = 20$), "other" providers (eg, outpatient pediatricians, non-PHP subspecialty pediatricians, or advanced practice providers; $n = 9$), or non–US-based providers ($n = 3$) and those who did not identify their primary clinical role ($n = 31$).

RESULTS

The respondents' primary clinical role, primary practice location, and primary practice setting are presented in Fig 1. Regarding comfort in managing KD, most surveyed PHPs were somewhat to very comfortable independently managing classic KD (95%) and independently diagnosing incomplete KD (82%). However, only 51% of PHPs were somewhat to very comfortable independently managing KD complicated by mild coronary artery dilation (no aneurysms) diagnosed before day 10 of fever.

Only approximately one-quarter (27%) of PHP respondents reported routinely managing classic, uncomplicated KD independently, whereas most typically request consultation (37% cardiology, 16% infectious disease [ID], 15% cardiology and ID, 4% cardiology and rheumatology, <1% rheumatology alone, and <1% other). PHP respondents reported which service (or services) routinely manage patients with uncomplicated KD postdischarge: 77% cardiology alone, 9% cardiology and ID, 8% ID alone, 5% primary care physician alone, and 1% rheumatology.

Regarding the inpatient observation of patients with KD and postinitial intravenous immunoglobulin (IVIG) therapy, 30% of PHP respondents observe for 24 hours before discharge, 36% observe for 36 hours, and 31% observe for 48 hours (Fig 2). When asked how many hours after the completion of IVIG that recrudescent fever indicates a nonresponse to IVIG, only 27% were aligned with AHA guidelines and reported 36 hours, whereas 56% reported 24 hours, and 16% reported 48 hours (Fig 3).

In patients with classic KD and a normal echocardiogram result, most (87%) sampled PHPs treat initially with IVIG and high-dose aspirin (80–100 mg/kg per day), whereas 8% use IVIG and medium-dose aspirin (30–50 mg/kg per day), 4% use IVIG and low-dose aspirin (3–5 mg/kg per day), and <1% use IVIG alone. When presented with a patient with classic KD and coronary artery dilation (no aneurysm) on initial echocardiogram, in addition to giving aspirin, most surveyed PHPs (93%) reported IVIG as the initial treatment, whereas few (4%) reported giving IVIG and corticosteroids. Most (96%) surveyed PHPs caring for patients with classic KD without coronary artery changes who demonstrate treatment failure to the initial dose of IVIG (ie, recrudescent fever) reported that the next step is repeating IVIG.

DISCUSSION

To our knowledge, our survey is the first to assess PHP inpatient management of children with KD. A previous Internet-based survey of PHPs published by Lowry et al[6] demonstrated practice variation in postdischarge care and timing of echocardiogram monitoring in patients with KD. Our study identified considerable variation in respondent practice regarding

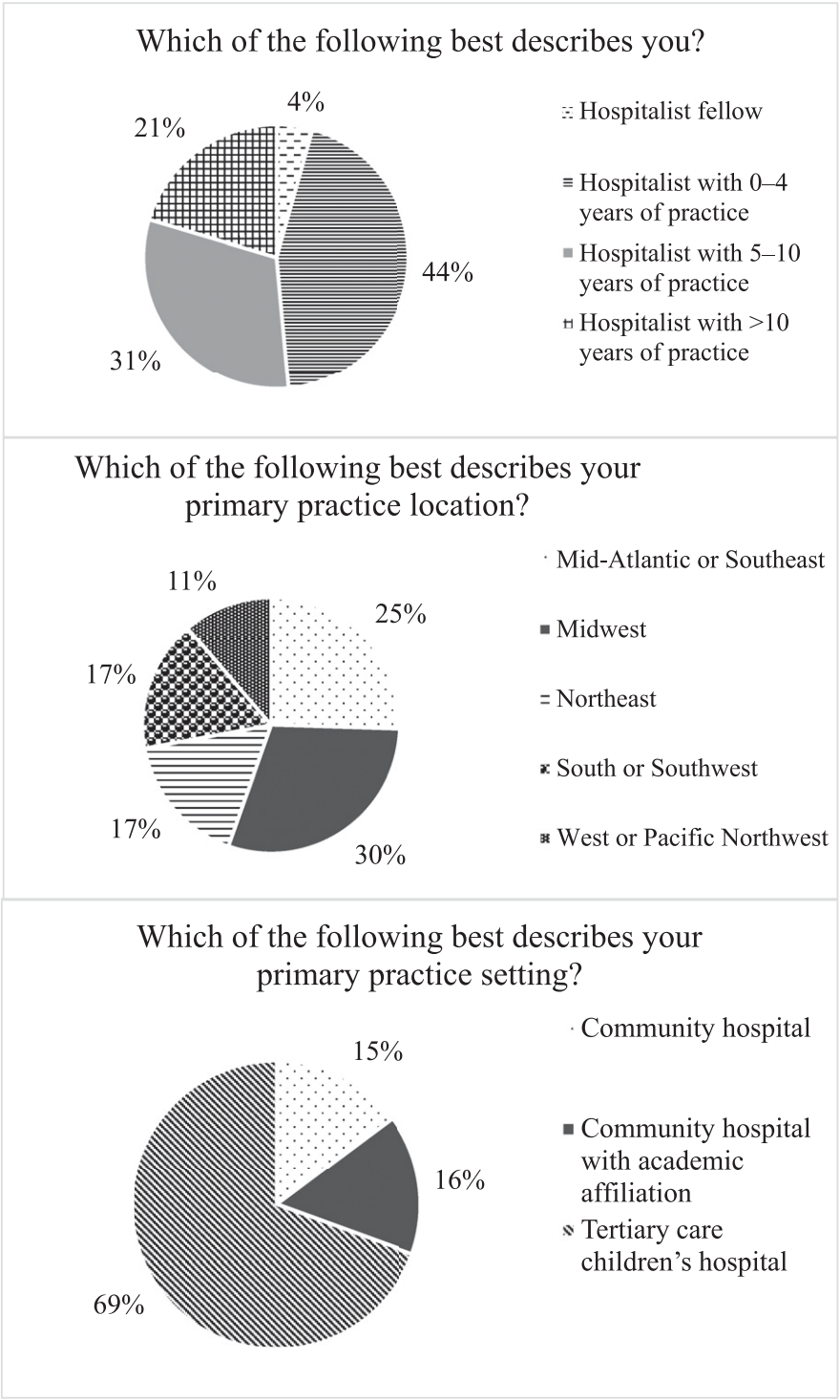

FIGURE 1 Demographics.

the duration of inpatient observation after initial IVIG infusion. Given the relatively short length of hospital stay of most patients with KD, variation of 12 to 24 hours among providers is substantial. Similarly, PHPs varied in identifying the hours to nonresponse to IVIG (ie, recrudescent fever). The AHA guidelines state, "It is reasonable to administer a second dose of IVIG (2 g/kg) to patients with persistent or recrudescent fever at least 36 hours after the end of the first IVIG infusion."[1] In contrast, most sampled PHPs (56%) prematurely identified fever at 24 hours to indicate treatment failure. A diagnosis of IVIG-refractory KD has been shown to be associated with a longer length of stay, repeat or adjunctive therapies,[7] presumably greater risks for treatment-related complications, and increased costs. These practice variations have key implications for possible misdiagnosis of patients experiencing treatment failure, overtreatment, and overuse of a limited and costly therapy.

Despite high comfort levels diagnosing and managing KD, only 27% of PHPs reported routinely caring for patients with KD independently, without consulting a non-PHP subspecialist. Institution traditions, limited regional availability of subspecialists, and the additional costs of consultation may add to practice variation.

On the other hand, all questions regarding treatment demonstrate little variation among sampled PHPs. A majority of PHPs reported using IVIG and high-dose aspirin as initial treatment of classic KD. AHA guidelines state that it is reasonable to administer high- or moderate-dose aspirin to patients with KD in the acute phase; however, there is no evidence to show that aspirin reduces the risk of coronary artery aneurysms.[1] In fact, emerging evidence suggests that low-dose aspirin may be noninferior to moderate- or high-dose aspirin for the prevention of coronary artery abnormalities when used in conjunction with IVIG.[8]

LIMITATIONS

This study is limited in several ways. Principally, the surveyed population represents a convenience sample of PHPs and may not be representative of national practice patterns. A majority of survey participants reported practicing at tertiary care centers, likely overrepresenting this group of PHPs. Participants reported practicing in a broad geographic distribution, and many PHPs (44%) had few (0–4) years of experience. The survey administration itself, during a plenary session at a national meeting, may also introduce bias.

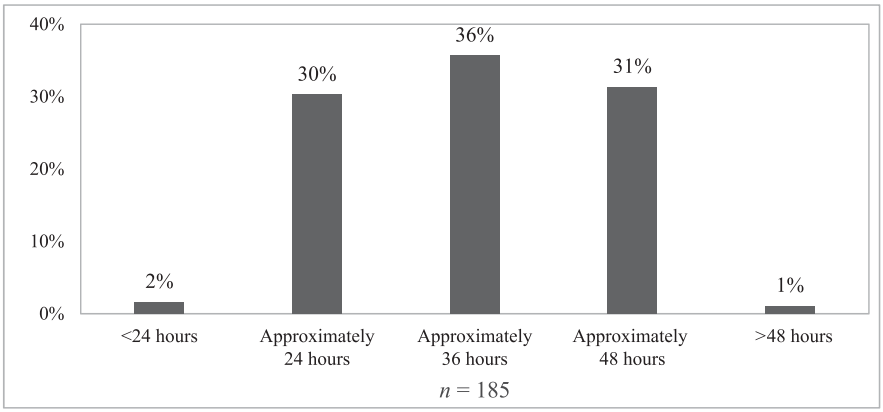

FIGURE 2 Responses to the question, "In a patient with classic KD and no complications who receives IVIG, how long do you typically observe after completion of IVIG before discharge?"

Another limitation is that the survey relied on self-report without corroboration of the respondents' responses. There is the possibility of social desirability bias because aggregate responses were displayed in bar graph format shortly after each question period ended. We postulate, however, that live-audience polling by using personal devices may mitigate this risk.

Finally, the technology used for survey distribution and response collection limited the number of survey questions, the length of the question prompts, and the number of answer choices. The technology did not seem to be a barrier to survey participation because 90% of attendees replied to at least 1 question. We noted a relatively large number of attendees ($n = 31$) did not respond to the item identifying the primary clinical role (question 1), and we postulate that some respondents joined the session late or needed more time to log in or activate the software.

CONCLUSIONS

Our survey was successfully administered to a convenience sample of PHPs at a national conference. The results demonstrate key variation in several areas of KD management. Principally, there were variations in the time intervals both for observing patients with KD in the hospital after initial therapy (to monitor for recrudescent fever) and when the recurrence of fever after initial therapy was thought to indicate nonresponse to IVIG. There was also variation in the routine involvement of non-PHP subspecialists in patients with uncomplicated KD. The survey results generate important questions regarding the management of KD by PHPs, may direct future efforts to assess practice patterns, and raise opportunities for improvements in evidence-based management of patients with KD.

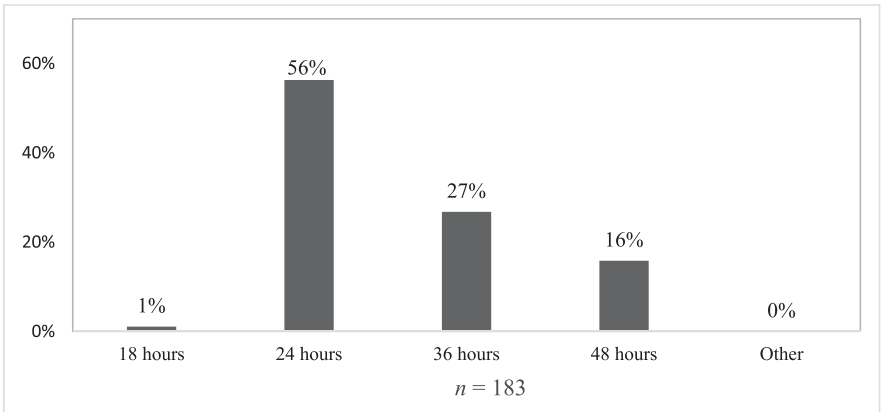

FIGURE 3 Responses to the question, "In a patient with classic KD and no complications who received IVIG, which of the following most closely approximates the number of hours after the completion of IVIG when you would consider fever (>38ºC) to indicate nonresponse to IVIG?"

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