

Original Article

The landscape of inter-institutional and multinational collaborations in Kawasaki disease

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ABSTRACT

Objectives: Integrated research potentiates evidence-based knowledge, particularly for uncommon diseases such as Kawasaki disease (KD). The 14th International Kawasaki Disease Symposium focussed on "Fostering global collaborations to solve KD," circulated a 23-question survey highlighting existing collaborations.

Methods: Information was collected from KD collaborative groups. One or more of the following characteristics defined a collaborative effort: recurrent clinical trials collaborations; international, national, or inter-state research; multi-institutional research; national, government-funded or government-appointed research; epidemiology group; focus group on KD practice and science or other health organization chapters.

Results: Responses from 21 groups were limited to a single country (67%). The groups had formed between 1991 and 2022. The multi-institutional groups included a median of 1 to 20 countries composed of 2–150 institutions. The groups included 10–20 active members (38%), 20–50 members (38%), 50–100 (14%), or more than 100 members (10%). A majority (67%) of collaborations produced 2–11 peer-reviewed publications. Groups operated under a centralized governance structure (62%), with a steering committee (92%), bylaws (23%), membership fees (8%), or another structure (8%). Only 33% had a written mission statement. While 48% had no formal funding sources, the remainder were funded by granting agencies (29%), governmental funding (24%), private donations and fundraising drives (19%), industry support (10%), and other sources (5%).

Conclusions: The majority of polled collaborative KD groups are multicenter and national. Despite the lack of funding, most groups demonstrate successful collaborations that result in peer-reviewed publications. There is a need for advocacy to support funding for these important collaborative groups.

Keywords: *Kawasaki disease; Multinational collaboration; Inter-institutional research; International research networks; Collaborative science; Paediatric cardiology; Research consortia.*

INTRODUCTION

Kawasaki disease (KD) is a systemic vasculitis with an unknown underlying cause. Despite being considered rare, KD is the leading cause of acquired heart disease in children with an increasing incidence in many regions of the globe (1,2). Increased awareness has led to more frequent reporting of KD in low and middle-income countries (3–5), surpassing rheumatic heart disease (2,5). The consequences of missed or delayed diagnosis include coronary artery aneurysms (CAA), which can lead to coronary artery stenosis, myocardial infarction, and death (6,7). Although timely diagnosis and prompt management significantly decrease morbidity and mortality in children with KD, many questions remain unanswered about the disease.

KD research is evolving, active, and prolific (8,9). Though it remains under the orphan disease category, KD is much more frequently encountered than the typical rare diseases (10,11). KD is described on all continents, with varying frequencies. Asian countries report the highest rates (12). Rates have been increasing, particularly in China and India (2,5). Whether this reflects a true rise in cases or increased awareness of the disease remains unclear, and nationwide data and studies are needed to clarify this (2,5). In contrast, rates appear stable and have plateaued in the United States, Canada, Australia, and Europe (2,5,12). Among European countries, Ireland and Italy report the highest incidence (4,13). In Australia and New Zealand, in contrast, it is unclear whether the rates will continue to rise or have plateaued (5). Information is scarce for countries in Africa,

Latin America & the Caribbean, and Middle East (12). Regional epidemiological studies are currently being conducted in Latin America, which will help raise awareness and improve understanding of the burden of KD in the region (4,5,12,14). Most data from the Middle East come from limited series, primarily from Turkey and Iran. The lack of census data for children under five years old further restricts available information (4). The yearly limited number of cases represents a statistical power burden when studies are limited to single centres. Advancements in KD science were made possible through increasing collaborations among researchers in Japan, Latin America, Middle East, North America, Spain, and Southeast Asia (15–17). Since the first description of KD in 1967 by the late Dr. Tomisaku Kawasaki, there have been significant advances in the diagnosis, treatment, and management of patients with KD. Nonetheless, the etiology of the disease remains a mystery (18). It is without a doubt that collaborative efforts are key in the search to solve KD. But what is the status of research collaboration? What are the boundaries of those collaborations? The 14th International Kawasaki Disease Symposium (IKDS-2024) was focussed on “Fostering global collaborations to solve KD” (8). In preparation for the IKDS-2024 in Montreal (August 2024), we surveyed collaborative groups that focussed on KD. The purpose of this survey was to understand current efforts in the field, assess the extent of collaborations, and highlight the various initiatives around the globe.

METHODS

An online data collection survey with 23 structured questions using Forms Office Microsoft® was conducted among existing known KD working groups worldwide. One or more of the following characteristics defined a collaborative group: (i) recurrent collaboration in clinical trials; (ii) international, national, or inter-state research with programmed and recurrent works and plans; (iii) multi-institutional research, not necessarily dispersed over a large geographical area; (iv) national, government-funded or government-appointed research; (v) epidemiology group or; (vi) focus group interested in KD practice and science or other health organization chapters. Basic information was collected from KD-focused groups whether dedicated to science, clinical care or advocacy that were interested in sharing their experience and information voluntarily. The survey questions addressed the year of inception, the number of countries, institutions, and members involved in the group, the main study focus, the type of projects performed, the presence of centralized governance, a mission statement, sources of funding, and research productivity (Supplementary Appendix A). Respondents could also provide further comments at the end of the survey and suggest other existing collaborative groups of which they were aware. Two of the groups were referred by respondents. The survey was conducted from June 6, 2023 to August 10, 2024. The survey was not anonymous or blinded. Representatives provided permission on behalf of their associated collaborative initiative by responding to the survey. The survey was distributed by email to a total of 26 collaborative groups. Various email reminders were sent to optimize responsiveness. The data collected were described as

means for continuous variables, median [range] or frequencies for dichotomous and categorical variables.

To examine global research collaboration on Kawasaki Disease, a bibliometric analysis was conducted with the free version of Dimensions AI™ (Digital Science & Research Solutions Inc., London, UK), in title and abstract, with following search strategy: “Kawasaki” OR “Mucocutaneous Lymph Node Syndrome” OR “Mucocutaneous Lymph Node Disease” OR “Mucocutaneous LymphNode Syndrome” OR “Mucocutaneous LymphNode Disease” “Viral Mucocutaneous Lymphadenopathy”. The overview function of Dimensions AI™ was used to generate publication trends from 1990 to 2024.

For the analysis of network co-authorship, the function RESEARCHERS Network was applied to up to 100 researchers, without limits, using the version of VOS viewer© (Centre for Science and Technology Studies, Leiden University, The Netherlands) integrated in Dimension AI™. No language limits were set. This analysis was conducted for every five years intervals between 1990 and 2024 to produce collaboration patterns visualization, with the number of collaboration’s clusters and of co-authorship links, for each time intervals.

RESULTS

From 26 initial contacts, 21 groups (81%) responded to the survey (Table 1). The year of inception spanned between 1991

Table 1. Reported collaborative groups

Name of the KD collaboration group
Kawasaki Disease Comparative Effectiveness (KIDCARE) trial
International Kawasaki Disease Registry (IKDR)
Asia Pacific Kawasaki Disease Association (APKDA)
National network for the study of Kawasaki disease in Spain (KAWA-RACE)
Kawasaki disease Arab Initiative (KawArabi)
Kawasaki disease Sweden (SwedKD)
A Nationwide Survey of Epidemiology of KD in South Korea under the guidance of the Korean Society of Kawasaki Disease
Pacific Northwest Kawasaki Disease Consortium
Kawasaki Study Group
Red de Enfermedad de Kawasaki en América Latina (REKAMLATINA)
Juvenile Inflammatory Rheumatism (JIR) Cohort
SOCIETI, the UK Foundation for Kawasaki Disease
Corroborated Surveillance by 4 Associations Working for Pediatric Critical Medicine (JMK survey)
Indian Society of Kawasaki Disease
Registro regionale della Malattia di Kawasaki Emilia Romagna
Japan Kawasaki Disease Genome Consortium (JKDGC)
Japan Agency for Medical Research and Development (AMED) Study Group
Cape Town Kawasaki Group
COVASAKI network
Cardiac Catheterization in Kawasaki Disease registry (CCinKD registry)
Australia (Federal government funded surveillance)



Figure 1. Geographic distribution of collaborative groups by Country/Region. Map shown in Mercator projection. While this preserves angles and directions, it distorts area, making high-latitude regions appear larger than they are in reality.

and 2022. Most groups were limited to a single country (67%) and the multi-institutional groups included a median of 1 [range 1–20, average 4] country. The various regions involved in a collaboration are listed in [Supplementary Appendix B Table 3](#). There were five regional groups [Asia Pacific Kawasaki Disease Association (APKDA), Cardiac Catheterization in Kawasaki Disease (CCinKD) registry, Juvenile Inflammatory Rheumatism (JIR) cohort, Kawasaki disease Arab Initiative (KawArabi), *Red de Enfermedad de Kawasaki en América Latina* (REKAMLATINA)] and one group with global scope [International Kawasaki Disease Registry (IKDR)]; depicted in [Figure 1](#). The number of institutions actively participating in a given collaboration was a median of 19 [2–150]. The collaborative groups included 10–20 active members for 38%, 20–50 members for 38%, 50–100 for 14%, and more than 100 active members for 10%. A 67% majority of collaborations had produced a median of 3 [2–11] peer-reviewed publications at the time of the survey. The majority operated under a centralized governance structure (62%). Within this structure, 92% had a steering committee, 23% had bylaws, 8% had membership fees, and 8% used another type of structure. Only 33% of the collaborative groups had a written mission statement ([Table 2](#)). The main research focus of the collaborations included clinical cardiology (62%), epidemiology/population science (48%), general clinical (38%), rheumatology/immunology clinical (33%), human genetics (19%), big data/computational science (14%), social issues/patient advocacy (10%), or other topics (5%) ([Figure 2](#)). Diverse methods of research were used and reported as retrospective (67%), prospective/observational (57%), survey/poll (48%), cross-sectional (43%), clinical trial (14%), meta-analysis (5%), or other methods (24%) ([Figure 2](#)). Nearly half (48%) of the collaborative research programs had no formal funding sources, with each centre supporting their effort

(Figure 3). The remainder, however, were supported by granting agencies (29%), governmental funds (24%), private donations and fundraising drives (19%), industry support (10%), or other sources (5%) (Figure 3).

The bibliometric analyses of global KD research trends highlight the evolution of these collaborations over the past 35 years (Figure 4). A network co-authorship analysis of publications demonstrates a steady increase in multi-institutional and international research partnerships, with notable growth in recent years. However, despite an overall increase in co-authorship links, the proportion of inter-institutional collaborative studies remains rather steady between 15% and 22%.

DISCUSSION

Research collaborations enable scientific progress and the sharing of expertise (19–21). Collaborations expand the possibilities in terms of findings and breakthroughs with access to larger data samples beyond what a single team could achieve alone. With the development of communication tools such as social media and remote online conferencing, it has become easier to network and share scientific information, especially during and following the COVID-19 pandemic (22,23). Research projects involving more than one institution, discipline, or country, have evolved rapidly in the last few years (24).

The majority of collaborations (15/21, 71%) were established prior to 2020, with the earliest one initiated 33 years ago. The earliest collaborative groups involved single-country initiatives such as South Korea, Italy, Japan, and the Netherlands. Subsequently international collaborations began to emerge (e.g., IKDR, REKAMLATINA) around 10 years ago up to when the pandemic featured 6 new collaborations. Notably, a third of these groups have sustained their research activities for over 10 years,

Table 2. Reported Mission Statement by collaborative groups

Collaborative group/Mission Statement
Japan Kawasaki Disease Genome Consortium (JKDGC)
Japan Kawasaki Disease Genome Consortium is an effort to promote research on the relationship between Kawasaki disease and genes from various perspectives. The cause of Kawasaki disease is still unknown, but various characteristics have been found. Boys are 1.4 times more likely to develop the disease than girls. The disease is more common among Asian races, especially among Japanese. If a parent or sibling has had Kawasaki disease, they are several times more likely to have the disease than if they have never had the disease. These various characteristics led us to believe that “minor genetic differences” may be involved in the susceptibility to Kawasaki disease. Therefore, we will conduct detailed genetic analyses of patients who have had Kawasaki disease to determine how genetics is related to susceptibility to Kawasaki disease and response to treatment. We believe that this effort may help us identify the causes of Kawasaki disease and make treatment more appropriate.
SOCIETI, the UK Foundation for Kawasaki Disease
Our ambition is that EVERY parent, EVERY doctor—and EVERYONE knows Kawasaki Disease.
Indian Society of Kawasaki Disease
The Indian Society of Kawasaki Disease is a not-for-profit organization to take care of children with Kawasaki Disease in India. It seeks to provide information, help, and support to parents of children with KD. We strive to increase awareness about KD amongst pediatricians, internists, and cardiologists in India.
Japan Agency for Medical Research and Development (AMED) Study Group
Elucidation of Clinical Issues related to adult KD patients
COVASAKI network
A collaborative and strict clinical and research network regarding Kawasaki Syndrome in our Italian region
Kawasaki disease Arab Initiative (KawArabi)
Kawarabi is a consortium dedicated to the advancement of the science and clinical care of patients with Kawasaki disease and Kawasaki disease like illness in the Arab region.
Corroborated Surveillance by 4 Associations Working for Pediatric Critical Medicine (JMK survey)
The Japanese Society of Pediatrics, the Japanese Society of Intensive Care Medicine, the Kawasaki Society, and the Japanese Society of Pediatric Cardiology have decided to jointly conduct a nationwide survey of severe paediatric COVID-19 registries and paediatric multisystem inflammatory syndrome (MIS-C) in four medical academic societies. The survey aims to conduct a systematic and comprehensive survey of this phenomenon and related diseases in Japan. By clarifying the actual status of these diseases, we expect to stratify patients, develop treatment methods, and improve prognosis. We appreciate your understanding and cooperation in this survey. Since the results will be important epidemiological information both domestically and internationally, we will promptly disclose the latest information on our website.

despite the paucity of dedicated funding in most situations. Overall, and despite increase in collaboration, the steadiness in proportion of interactions between institution compared to the total published manuscripts suggests that richer collaboration networks could be promoted and foreseen.

Extent of collaboration

The survey informed us of the extent of the collaboration within the different existing groups, as well as the evident interconnected collaboration between the groups and their members. The number of active members was mainly found to be fewer than 50, however above 50 in almost a quarter (24%) of the groups. The survey did not inquire on the roles of the members, but we suspect that these figures account for Principal Investigators (PIs) and possible additional key co-investigators in general. It is complex to organize a collaborative research program within the same country since extensive coordination efforts are already required to uphold multi-institutional collaborations (25). It is therefore not surprising that two-thirds of the groups (67%) involved a single country. Nevertheless, six groups were found to have a multinational composition. Among them, five were regional (e.g., APKDA, CCinKD registry, JIR cohort, KawArabi, REKAMLATINA) while one was global (IKDR).

Despite the trend for international collaborations, one must acknowledge the importance of national collaborations, which must not be underestimated. National collaborations embody values, such as assessing national healthcare performance towards an orphan disease like KD. The Japan KD Nationwide surveys, for instance, provide treasured epidemiological standards that are not necessarily available in other nations (26). The Nordic (Finland, Norway, and Sweden) national medical records accessibility, or the national Dutch Paediatric Surveillance Unit for instance, are examples of data accessibility for epidemiological researcher on a large scale. Accessibility to patient data reduces expense, effort, and time while using other resources for data analysis and computing statistics (27,28). In the opposite, there is another layer of potentially greater value in international collaborations. Nevertheless, one mode of collaboration does not preclude the other, as both perspectives are complementary.

Regional collaborations play a crucial role in advancing our understanding of KD. Regionally focused initiatives enable the study of region-specific epidemiology, genetic predispositions, and healthcare challenges. These collaborations provide critical insights into disease presentation, delayed diagnosis, and treatment response within particular geographic areas. For example, the KawArabi initiative has highlighted disparities in KD management across Arab countries, revealing significant variations in IVIG availability, awareness levels, and healthcare accessibility, particularly in rural areas, and being major barriers to optimal outcomes (15,29–31). These factors likely contribute to the higher prevalence of giant coronary aneurysms in the region compared to global estimates (31). Similarly, regional initiatives like REKAMLATINA have provided unique insights into KD epidemiology in Latin America, contributing to a more tailored understanding of disease burden and management strategies in that region (14). As for European patients, the CCinKD registry has provided valuable insights into CAA morphology demonstrating the importance of regionally adapted long-term

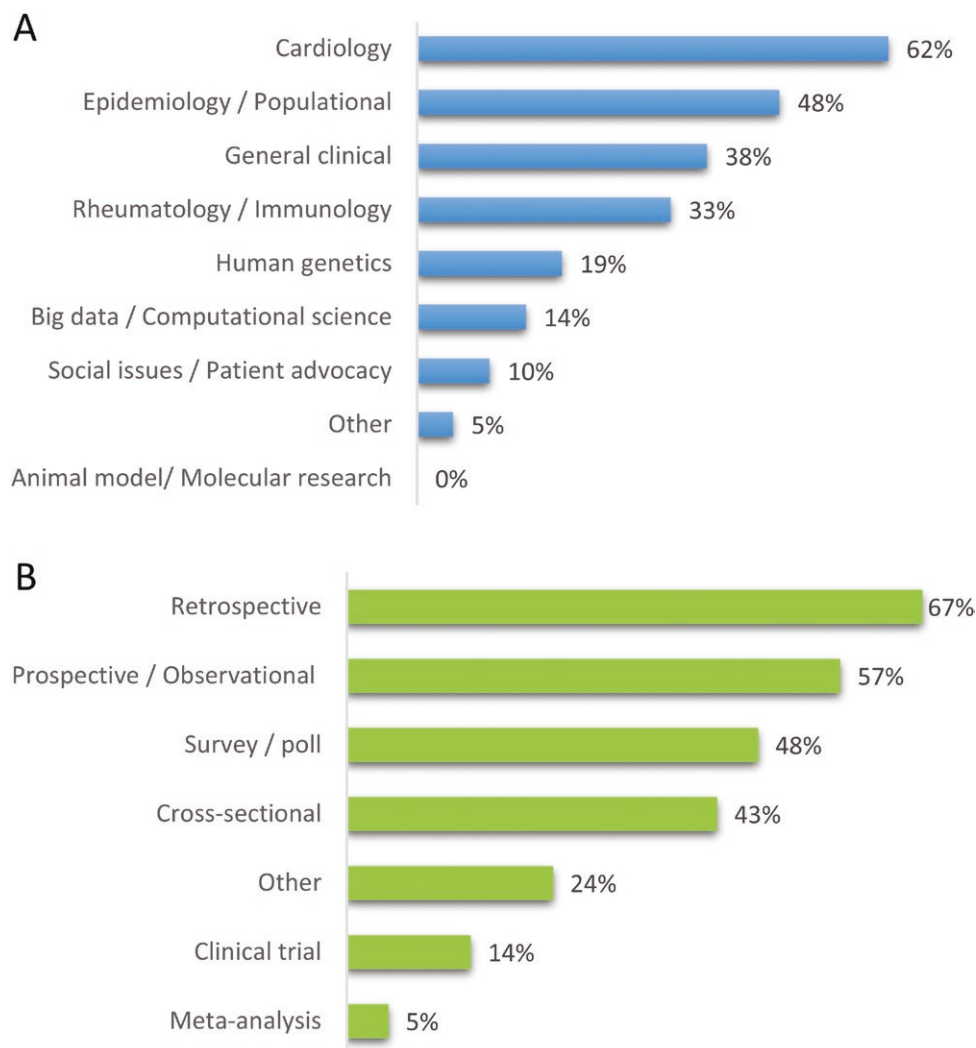


Figure 2. Research Focus and Project Types of KD Collaborative Groups. (A) illustrates the main study focus, with cardiology being the predominant area (62%), followed by epidemiology /population studies (48%) and general clinical research (38%). (B) presents the most common project types conducted by these groups, highlighting retrospective studies (67%) and prospective/observational studies (57%) as the leading methodologies.

monitoring strategies (32). On that front, a recent international survey identified significant practice variations in the management of giant CAA further emphasizing the need for international collaborative efforts to generate robust data and adopt a harmonized approach (33).

The diversity within these groups fosters the introduction of new ideas and enhances creativity. It also enables the team to address complex problems from different perspectives, drawing on the diverse backgrounds and disciplines of its members. Including young researchers with relevant skills is also critical in ensuring the long-term success of collaborations (24,34). Bearing in mind, that these early career investigators will need guidance from senior PIs and financial support to fully participate.

Clinical research has greatly evolved over the years, increasing in complexity alongside the growing burden of regulatory requirements (35,36). Running and maintaining a research collaboration undoubtedly offers numerous benefits but also comes with several challenges, such as securing funding to run

the collaboration structure, as well as additional funds to conduct the study protocols. Dedicated time, contractual burdens, language and cultural differences, data management, and staffing or retention problems are other factors adding to the complexity of sustained collaboration (37–39). As for international research collaboration, it is notably more time-consuming, requiring greater efforts in administration, coordination, and continuous communications—especially when participating sites are dispersed across multiple continents with various time zones and the presence of language barriers. Additionally, discrepancies in legal prerequisites for data-sharing agreements across countries further complicate and delay the process.

Funding

Knowing that half of the groups operate without any incoming funding support, the collaboration must be based on resource reallocation from the researcher's local funding from alternative research activities (Figure 3). For the groups receiving support, access to these funding sources still requires

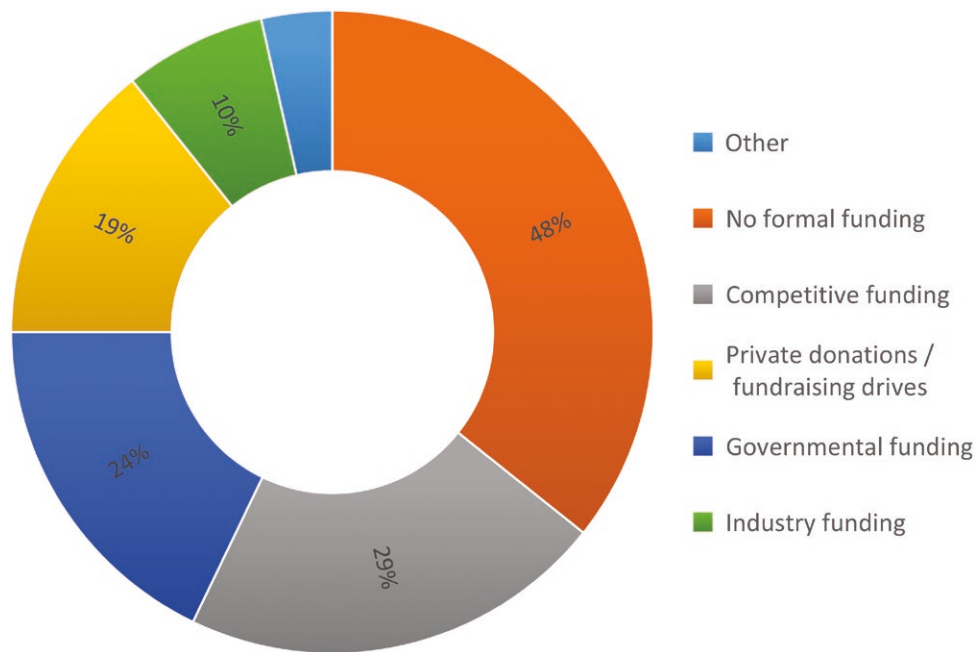


Figure 3. Sources of funding. Majority of the collaborative research programs had no formal funding sources.

a tremendous amount of time and work, including applying for funding and engaging in social networking to maintain donations. The likelihood of new US National Institute of Health NIH grant applications being approved, for example, is below 20% (40), and the success rate for funding applications with the Canadian Institute of Health Research has sharply dropped from 33% in the early 2020s to 15% in the last couple of years (41). Collaborative associations also need to make sure adequate resources (funding, equipment, and facilities) are distributed in support of different teams' contributions. Membership fees were not a popular option according to the survey. Understandably, membership fees may help cover administrative costs and communication logistics among other costs which could be competing with research activities attributable to research protocol implementation, costs of scientific communications and sometimes publication costs (as the trend goes) (42,43). Indeed, publication costs are very high in general and may be prohibitive for researcher's from low-income countries and less well-funded collaborations (44). The trend in per-fee publication and open-access articles has soared during the COVID-19 pandemic as articles became more readily available to download and consult (45). Despite these hurdles, building consortia of interdisciplinary experts has the advantage of fostering innovative projects that could increase the chances of funding opportunities. Grant funding remains difficult to obtain, and some funding institutions do not allow the distribution of funds to international participating institutions (46). Another budgeting challenge arises from differences in the group's funding sources in countries with national health-care systems compared to those with private hospital-based systems. Research activities may be covered by the hospitals in some settings, whereas in others, these same activities cannot be reimbursed by insurance companies (46).

Funding clinical research is already a struggle that many academics face on a daily basis. The surveyed collaborators have

been creative in resorting to non-traditional sources, such as private donors and fundraising events. Such sources may not be the easiest to obtain given the transitional and non-chronicity of the disease in the vast majority of patients (less than 5% of KD patients require lifelong follow-up as opposed to diabetes or leukemia which required a lifespan). Notwithstanding, raising awareness of the disease and lobbying governmental health agencies can only increase the likelihood of securing the needed resources. On the other hand, multicenter and multinational collaborations must also be viewed as an investment with enhanced potential for future funding opportunities, knowing that KD is the most common cause of acquired heart disease in children.

Research focus

The focus of most KD collaborative groups is clinical or epidemiological, with retrospective or observational studies or surveys (Figure 2). Increasing awareness among adult health-care providers is of equal importance, as the long-term follow-up of KD patients is still debated (47). Clinical trials represent a minority of reported activities, likely due to the lack of support for such an effort. Despite the significantly limited funding, the groups managed to publish their research and maintain a stable structure over time.

International collaboration spans beyond research. For example, low- to middle-income countries, short of resources and funding, can benefit from holding teaching events and educational sessions in their local conferences and seminars with focus on KD that could include invited experts from experienced countries. The Kawarabi conference missions (among other groups) are dedicated for the education of primary care physicians while engaging local investigators in KD research (48). The IKDR, while operating from Canada, holds regular Webinars with a wide reach overseas audience, including nations with limited resources (49).

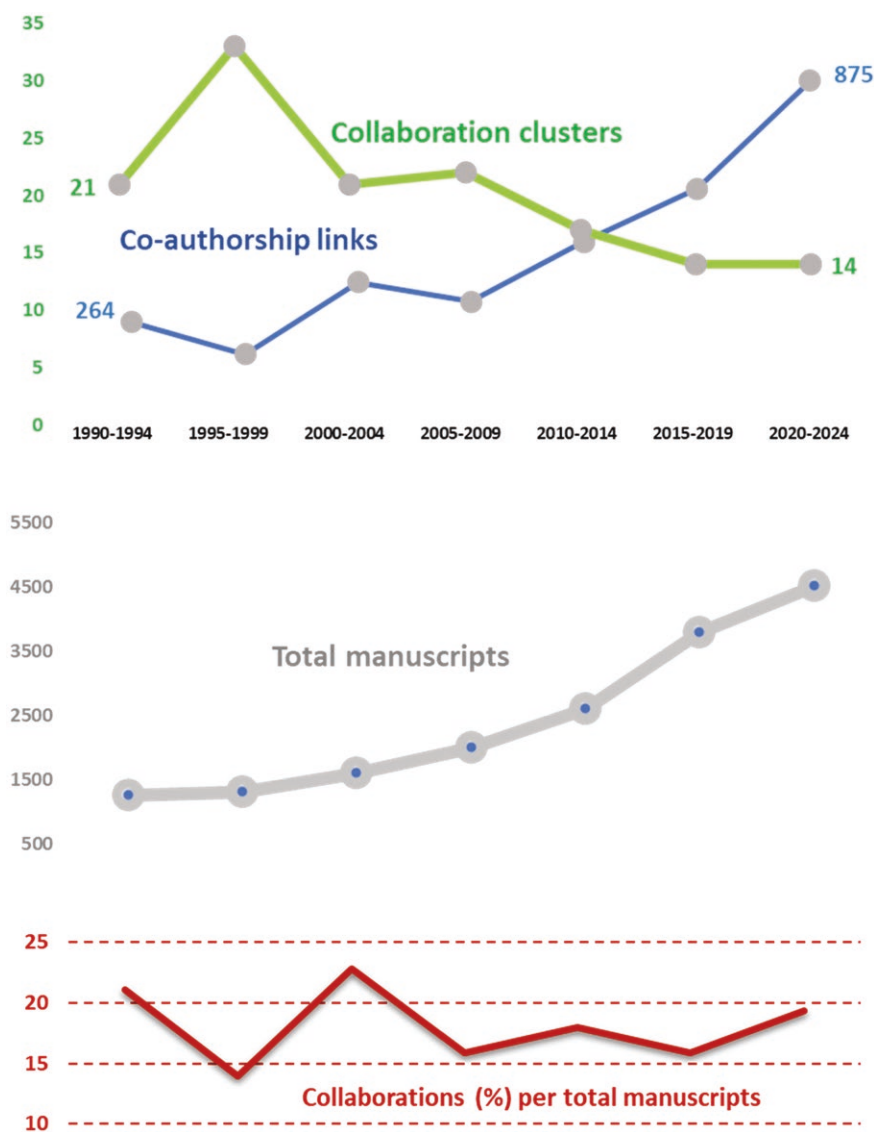


Figure 4. Trends of Global Research Collaboration in KD from 1990–2024. Top panel: increasing inter-institutional co-authorship links (blue) and decreasing collaboration clusters (green) over time. Bottom panel: incremental number of manuscripts per 5-year intervals (grey) with rather steady proportion of collaborative links interaction (red).

Governing structure

Researchers embrace collaboration for various reasons, such as academic advancement, broader visibility, access to funding, mentoring, implementation of advanced methodologies, knowledge sharing, and network expansion (24,50,51). Motivation and interpersonal relationships are essential bonding elements, and trust is critical for the success and sustainability of collaborative initiatives. Trust is more efficient when developed in accordance with specific cultural contexts.

Formal norms, under which the collaboration is managed, such as ratified bylaws, secure the best chances of optimized multicultural team functioning (52), especially in larger groups where roles and leadership are rotational determined democratically, rather than fixed (30). This framework acts as a safety net for sustainable growth, as the effectiveness of a collaboration relies on developing team charters and performance strategies. These strategies became even a greater necessity during the COVID-19 crisis, when geographically distant collaborations and virtual

communications became a necessity (53,54). Notably, only 23% of reported groups operate under predetermined regulations and bylaws, highlighting an opportunity for adopting such frameworks as a useful and actionable change.

Beyond contracts and regulations, building trust is best achieved by emphasizing common relational links and highlighting a common team identity. A mission and vision statement are essential landmarks in any successful venture; they reflect a common objective toward the overarching goal of the organization. Typically, team members from diverse backgrounds tend to interpret the collaboration's goals differently. The ingredients of great teamwork are composed of a *compelling direction* (that energizes, orients, and engages its members towards a common goal), a *strong structure* (with norms that promote positive dynamics and avert derogative behaviour), and a *shared mindset* (to become one cohesive group as opposed to a combination of subgroups) in a *supportive context* (such as the rewarding output of the collaboration and securing the material

resources to succeed in the mission) (53). While this may seem obvious to members, a clear statement defines and solidifies the group's "identity" (55). Interestingly, only 33% of the surveyed groups adopted a mission statement, highlighting another opportunity for these groups (Table 2).

Branding and group identity are also vital elements for creating group unity and showcasing externally the importance of collaboration. Clear and concise internal communication practices are central to successful collaboration. Communications through various forms, such as newsletters, recurrent email updates, calls to action, and virtual meetings, are some frequently adopted methods (46). Social media and brief text messaging platforms have been revealed as customary in the last few years (46,56). However, only six groups (29%) have an active, running website. Naturally, the classic revolving in-person meetings consolidate the group bonding and belonging.

Limitation

The main limitation of this survey is that the results are based solely on the responses of the identified representatives and the survey was shared only with known contacts. Despite asking each respondent to refer any other existing collaborations, there is a possibility that some collaborative groups did not receive the survey. Additionally, some groups who had received the survey did not respond, resulting in an 81% response rate. This means there may be other significant collaborations that were not captured in this survey.

CONCLUSION

The variety of existing collaborative KD initiatives are mainly multicenter and national. Notably, most groups operate without funding, but the majority remain successful in publishing their findings and have an established administrative structure. The survey results emphasize the importance of successful collaborations and encourage to foster new ones. Working together makes KD research rich and diversified, enabling access to larger data samples, accomplishing major scientific advances and improving patient outcomes. The results also suggest the need for advocacy to support funding initiatives specific to KD. Additionally, there is a strong need for a centralized hub to connect and unite all the initiatives around the world. Such a hub would serve as a platform for knowledge exchange, increase visibility for all cooperative groups, and facilitate partnerships, preventing working in silos and enhancing collective impact.

At the 14th International Kawasaki Disease Symposium in Montreal, KD experts gathered to discuss and determine the next steps toward establishing a society that will address these needs. There is broad consensus among researchers that the time is optimal for a global collaboration, with continuous efforts between the triennial symposiums. Moving forward, the groups will meet regularly to set the main objectives to be achieved by the next IKDS in 2027.

SUPPLEMENTARY DATA

Supplementary data are available at *Paediatrics & Child Health* Online.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to report.

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