original reports abstract

Pediatric Solid Tumor Care and Multidisciplinary Tumor Boards in Low- and Middle-Income Countries in Southeast Asia

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PURPOSE Pediatric solid tumors require coordinated multidisciplinary specialist care. However, expertise and resources to conduct multidisciplinary tumor boards (MDTBs) are lacking in low- and middle-income countries (LMICs). We aimed to profile the landscape of pediatric solid tumor care and practices and perceptions on MDTBs among pediatric solid tumor units (PSTUs) in Southeast Asian LMICs.

METHODS Using online surveys, availability of specialty manpower and MDTBs among PSTUs was first determined. From the subset of PSTUs with MDTBs, one pediatric surgeon and one pediatric oncologist from each center were queried using 5-point Likert scale questions adapted from published questionnaires.

RESULTS In 37 (80.4%) of 46 identified PSTUs, availability of pediatric-trained specialists was as follows: oncologists, 94.6%; surgeons, 91.9%; radiologists, 54.1%; pathologists, 40.5%; radiation oncologists, 29.7%; nuclear medicine physicians, 13.5%; and nurses, 81.1%. Availability of pediatric-trained surgeons, radiologists, and pathologists was significantly associated with the existence of MDTBs (P = .037, .005, and .022, respectively). Among 43 (89.6%) of 48 respondents from 24 PSTUs with MDTBs, 90.5% of oncologists reported $>$ 50% oncology-dedicated workload versus 22.7% of surgeons. Views on benefits and barriers did not significantly differ between oncologists and surgeons. The majority agreed that MDTBs helped to improve accuracy of treatment recommendations and team competence. Complex cases, insufficient radiology and pathology preparation, and need for supplementary investigations were the top barriers.

CONCLUSION This first known profile of pediatric solid tumor care in Southeast Asia found that availability of pediatric-trained subspecialists was a significant prerequisite for pediatric MDTBs in this region. Most PSTUs lacked pediatric-trained pathologists and radiologists. Correspondingly, gaps in radiographic and pathologic diagnoses were the most common limitations for MDTBs. Greater emphasis on holistic multidisciplinary subspecialty development is needed to advance pediatric solid tumor care in Southeast Asia.

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INTRODUCTION

Although Southeast Asia has been the scene of substantial pediatric cancer initiatives in recent years,[1-4] the profile of pediatric cancer care resources in the region has not been well studied. With a total population of 668 million, the region is home to 8.5% of the global childhood population age $\leq$ 14 years, with approximately 16,000 new cases of childhood cancer annually and the third highest rate of childhood cancer mortality worldwide, after Western and North Africa.[5-7] Nine of the 11 countries that comprise the region are low- and middle-income countries (LMICs),[8] and significant gaps in clinical resources have been described, particularly with respect to the care of solid and brain tumors.[9-16]

Solid tumor management requires the coordinated effort of teams of multiple medical specialties and varied infrastructural resources that range from surgical and radiation facilities to laboratory and pathology services.[17] Of note, while availability of each of these elements may vary between centers, this does not preclude delivery of effective curative treatment of pediatric tumors when available resources can be appropriately channeled.[18,19] This underscores the importance of the multidisciplinary tumor board (MDTB) as a critical element for advancing pediatric solid tumor care and one that remains relevant even in LMICs.[20-22] However, organizing MDTBs can be an organizational burden and amounts to extra workload for the involved personnel,[23,24] especially in centers with already limited resources.

From a pilot survey of pediatric surgeons in Southeast Asia, we found that not all centers in the region that care for patients with childhood tumors had pediatric

ASSOCIATED CONTENT

Appendix

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

Do pediatric solid tumor units (PSTUs) in Southeast Asian low- and middle-income countries have the required specialties to care for pediatric solid tumors and organize multidisciplinary tumor boards (MDTBs)?

Knowledge Generated

Most Southeast Asian PSTUs had pediatric-trained oncologists (94.6%) and surgeons (91.9%); however, dedicated oncology workload was low among surgeons, and other key subspecialties were lacking. The availability of pediatric surgeons, pathologists, and radiologists was significantly associated with the existence of MDTBs, which were present in only 65% of PSTUs in the study.

Relevance

Recent international collaborations have contributed to the current state of pediatric solid tumor care in Southeast Asia, but regional initiatives to equip the required multidisciplinary workforce are still much needed, particularly for pediatric-trained oncology surgeons, pathologists, and radiologists.

MDTBs, and in centers that had them, pediatric oncologists and surgeons were the two specialists who were most involved in these meetings. Hence, to profile the current landscape of pediatric solid tumor care in the region, we conducted a cross-sectional survey to profile MDTBs from pediatric oncology centers in LMICs around Southeast Asia and to study perceptions on benefits and barriers for MDTBs among pediatric surgeons and pediatric oncologists.

METHODS

Definitions and Participants

We defined pediatric solid tumor units (PSTUs) as institutional departments that care for pediatric solid tumors, with at least one pediatric oncologist or one pediatric surgeon who are either in-house or employed in a part-time capacity. MDTBs were defined as any formal meeting attended by at least pediatric oncologists and pediatric surgeons, together with one more related subspecialty (pediatric-trained or general radiologists, radiation oncologists, pathologists, nuclear medicine physicians, and nurses).

Potential PSTUs and participants who fulfilled the inclusion criteria were identified through membership records of regional pediatric oncology and pediatric surgery associations and key regional scientific meetings, particularly the St Jude-VIVA Forum in Pediatric Oncology and ASEAN Society of Pediatric Surgeons. This research study (SHS/CIRB/2020/2020) was granted an institutional review board waiver.

For the first part of the study, we included all PSTUs from Southeast Asian LMICs with at least one respondent (either pediatric oncologist or pediatric surgeon) to profile the available specialties and MDTBs at each PSTU. Exclusion criteria were refusal to participate or nonresponse and incomplete or delayed responses beyond the study period. For the survey in the second part of the study, only PSTUs with MDTBs were involved.

Development and Conduct of Survey

From the 46 Southeast Asian PSTUs, centers with MDTBs were shortlisted for the full survey. From this subset of PSTUs with MDTBs, one pediatric surgeon and one pediatric oncologist from each center were contacted through e-mail to complete the survey using an online electronic form or a manual form. Automatic online language translation was used in the former to assist respondents with difficulty with the English language. After the 2 weeks given for response, a second oncologist or surgeon from the PSTU was contacted, and if this failed, a null response was recorded.

Survey questions were adapted from published surveys on MDTB organization and dynamics[23-25] and drafted in English. The survey was composed of three main parts. First, to profile the respondents, they were asked about their type of specialty, years of practice, and estimated oncology workload. Next, to profile the center's MDTB, respondents were queried about the frequency, attendance of MDTB members, and available resources. Finally, respondents' views on MDTBs were surveyed using a 5-point Likert scale.

Statistical Analysis

Data analysis was performed using SPSS version 19 software (IBM Corporation, Armonk, NY). Descriptive data were expressed as mean ± standard deviation unless otherwise stated. One-way analysis of variance was used for analysis of normally distributed variables. Kruskal-Wallis test was used for non-normally distributed data. Categorical data were analyzed using χ^2 or Fisher's exact test. $P < .05$ was considered statistically significant. Likert scale scores were summarized as ordinal approximations of a continuous measure.[26,27]

RESULTS

Nine of 11 Southeast Asian countries were categorized as LMICs, representing 662,332,000 (99.1%) of 668,620,000

of the total estimated population of Southeast Asia, of which 167,429,000 (25.0%) were age ≤ 14 years[28] (Table 1).

Profile of PSTUs in Southeast Asia

We identified 46 PSTUs across nine Southeast Asian LMICs. Availability of MDTBs and specialty expertise could be established in 37 PSTUs (80.4%) and are shown in Figure 1A. Among them, 24 PSTUs (52.2%) in six countries declared that they had regular MDTBs; PSTUs from Cambodia, Laos, and Timor-Leste either did not have MDTBs or could not be contacted.

Availability of Subspecialty Expertise in PSTUs

The availability of pediatric-trained specialties in PSTUs was as follows: oncologists, 94.6%; surgeons, 91.9%; radiologists, 54.1%; pathologists, 40.5%; radiation oncologists, 29.7%; nuclear medicine physicians, 13.5%; and nurses, 81.1% (Fig 1B; Appendix Table A1). Only four of 46 PSTUs had pediatric-trained expertise in all six key subspecialties, with the rest supported mostly by general specialists. Availability of pediatric-trained surgeons, radiologists, and pathologists was significantly associated with the existence of MDTBs (P = .037, .005, .022, respectively; Table 2).

Profile of Respondents

Among the pairs of pediatric oncologists and pediatric surgeons contacted at each of the 24 PSTUs with MDTBs, 43 individuals (89.6%) responded to the survey (21 pediatric oncologists and 22 pediatric surgeons). All respondents were pediatric trained. The oncology-dedicated workload was reported to be > 50% in 90.5% of the oncologists versus only 22.7% among surgeons. Most respondents had > 10 years of practice experience (oncologists, 61.9%; surgeons, 77.3%; Appendix Fig A1; Appendix Table A2).

Profile of MDTBs Among PSTUs in Southeast Asia

Among the 24 PSTUs with MDTBs, oncologists, surgeons, and radiologists were the most consistent attendees (Fig 2A). PSTUs most commonly conducted MDTBs once a month (11 PSTUs; 45.8%; Fig 2A). The resources most commonly unavailable were facilities to view pathology slides before the meeting and to project them during the meeting (Fig 2B). Of note, 16 respondents (37.2%) reported that either there was no allocated time limit for the meeting or they were unsure whether this was defined for their MDTB; 13 (30.2%) reported that either there was no designated MDTB coordinator or they were unsure (Fig 2B).

Views on MDTB-Related Issues

Likert scale responses to 28 (93.3%) of 30 questions did not differ between oncologist- and surgeon-respondents (P > .05). Significantly different responses were noted to two questions on patients who should be discussed at MDTBs (ie, all new pediatric cancer patients should be discussed in detail, and patient preferences and social circumstances should always be commented on; P = .015 and .009, respectively). Details of responses are shown in Figure 3 and listed in Appendix Table A3.

DISCUSSION

Southeast Asia is home to approximately 168 million children age < 14 years, which constitutes one fourth of the region's total population. At an estimated incidence of 92 cases per million, the region sees an estimated 16,000 new cases of childhood cancer per annum, a disproportionate 9.6% of the global pediatric cancer burden.[29] Childhood cancer care and control programs in the region are still lacking; however, substantial progress has been made in recent years, particularly through development of cooperative group structures.[29] In this first known regional profile of pediatric cancer care in Southeast Asia, we found that most countries have developed childhood cancer referral centers (Fig 1A), the majority of which are staffed by at least a dedicated pediatric-trained oncologist (Fig 1B). This is a tangible result of directed efforts in the field of pediatric oncology in Southeast Asia that involves bodies and initiatives such as International Society of Pediatric Oncology (SIOP), St Jude Global, WHO Global Initiative for Childhood Cancer, VIVA Foundation for Children with Cancer, Southeast Asia Pediatric Hematology Oncology, and Asian Children's Care League.[29] Such initiatives have included establishment of national pediatric cancer programs, education and training of the pediatric cancer health care workforce, and development of adapted therapy treatment protocols. This demonstrates the impact of international partnerships in advocating for increased attention toward childhood cancer care as a global health priority.[30]

Pediatric solid tumor care is typically centered in referral centers and depends on the level of individual subspecialty capabilities and their coordination within multidisciplinary teams.[17] Presenting symptoms of pediatric solid tumors are more easily recognized than leukemias and brain tumors[31-33]; however, their diversity of histologic types and anatomic locations pose additional challenges to their successful management. Pediatric oncologists, the usual leaders of multidisciplinary solid tumor teams, need to collaborate with surgeons, radiologists, pathologists, radiation oncologists, nuclear medicine physicians, and nurses. Although we found that only four of 46 PSTUs had pediatric-trained expertise in all six key subspecialities, 24 PSTUs could still organize regular MDTBs.

Pediatric surgeons were available in 91% of the PSTUs studied, the next most prevalent group of specialists after pediatric oncologists. Surgeons play an important role particularly in aspects of local control as well as venous access for chemotherapy. Of note, our survey found that the oncology-dedicated workload among pediatric surgeons was much lower than pediatric

TABLE 1. Identified PSTUs and Availability of MDTBs Compared Against Current Estimated Population and GNI for Nine LMICs in Southeast Asia

		MDTB Status, No.			National Socioeconomic Metrics			
Country	Identified PSTUs, No.	Available	Not Available	Unknown	Total No. Estimated Population (2020)[28]	Total No. Estimated Population Age 0-14 Years, (2020)[28]	Total No. Estimated Population, 0-19 Years, (2020)[28]	GNI Per Capita, US $ (2018)[43]
Cambodia	4	0	4	0	16,719	5,170	6,631	1,390
Indonesia	8	6	1	1	273,524	70,941	94,259	3,840
Laos	1	0	0	1	7,276	2,324	3,033	2,450
Malaysia	8	4	3	1	32,366	7,589	10,259	10,590
Myanmar	3	1	2	0	54,410	13,867	18,938	1,310
Philippines	8	3	1	4	109,581	32,921	43,384	3,830
Thailand	7	6	1	0	69,800	11,554	15,932	6,610
Timor-Leste	1	0	0	1	1,318	486	639	1,820
Vietnam	6	4	1	1	97,339	22,577	29,078	2,360
Total	46	24	13	9	662,332	167,429	222,152	

Abbreviations: GNI, gross national income; MDTB, multidisciplinary tumor board; PSTU, pediatric solid tumor unit.

oncologists (22.7% *v*90.5%). Correspondingly, most were general pediatric surgeons without oncology-specific training. This reflects a very small number of centers in the region capable of providing level 3 surgical expertise with dedicated pediatric oncology surgeons.[17] Furthermore, expert groups have identified that pediatric surgery is a less recognized priority in global health, with less-established efforts to date that have focused on development of the specialty in LMICs.[34-36] Existing collaborations with regional and international pediatric cancer centers to provide online learning platforms and scholarships for fellowship training help to bolster numbers of oncology-trained pediatric surgeons. However, in reality, overall surgical manpower shortage in LMIC hospitals may still practically limit the development of dedicated surgical oncology practices in the region.

Radiologists and pathologists play a significant role in diagnostic planning and recommendations. Only half of the PSTUs were staffed with pediatric-trained radiologists and pathologists. The availability of these specialists in PSTUs was significantly associated with increased incidence of pediatric MDTBs. Correspondingly, the most acute gaps in multidisciplinary solid tumor care in this region were identified to be in the areas of radiographic and pathologic diagnostic support (Fig 3D). The numbers of radiation oncologists and nuclear medicine physicians were even lower, particularly when considering pediatric-trained numbers. This highlights the manpower challenges faced by PSTUs in addition to issues of availability of essential chemotherapy, surgery, and basic diagnostic modalities.

Effective MDTBs require members' commitment to meet regularly as part of their recognized clinical duties, prepare and present required information, and openly deliberate treatment recommendations in an evidence-based manner.[23] In limited resource settings, especially in LMICs, organizing MDTBs can be an organizational burden and amounts to extra workload for involved personnel.[23,24] Half of the respondents reported that lack of time and too much workload to attend the meeting regularly were among the main barriers they faced personally. Of note, we observed that most MDTBs shared common views on ideal goals and factors for success and that oncologist and surgeon opinions did not differ significantly, particularly on workflow-related matters such as prioritization of cases for discussion and tangible benefits for PSTU teams. Surgeons and oncologists differed in their views on matters to prioritize for discussion, likely reflecting the inherent differences in personality and temperament between the specialties. Most MDTBs had the necessary infrastructure, such as meeting venues and access to radiology images before and during the meeting. Organizational challenges also seemed to be a common problem. Despite most respondents who ranked the need for clear guidelines and premeeting agendas highly, only approximately 70% reported having a designated coordinator and circulation of premeeting agendas and patient lists. This points to an underlying lack of support systems among pediatric cancer units (PCUs) in Southeast Asia, a gap that likely also accounts for the observed lack of registry data from centers in this region.[31,33,37]

Delivery of care for pediatric oncology patients is also affected by social, economic, and cultural factors. While the formation of an MDTB is a first essential step for PSTUs to ensure correct diagnoses and proper treatment recommendations, obstacles to childhood cancer care faced by LMICs extend beyond this. Globally, there are significant gaps in the distribution of financial resources for pediatric cancer care: Expenditure in LMICs amounts to only 6.2% of global spending, yet LMICs care for a disproportionate two

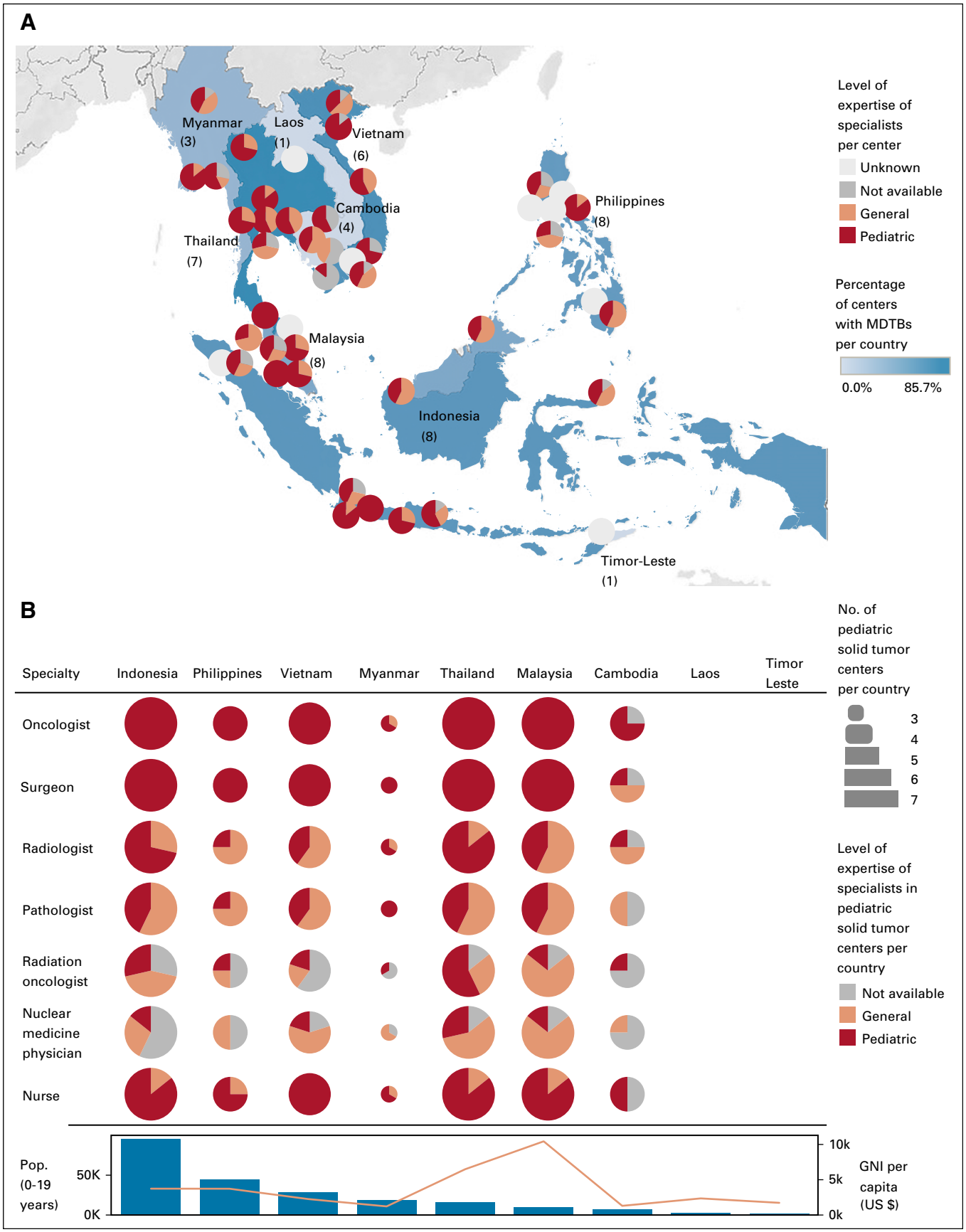

TABLE 2. Association of Availability of Pediatric-Trained Specialties With Availability of an MDTB

Specialty	MDTB Status, No.		χ^2	*P*
	Available	Not Available		
Oncologist			3.903	.117*
Pediatric trained	24	11		
General/none	0	2		
Surgeon			6.027	.037*
Pediatric trained	24	10		
General/none	0	3		
Radiologist			7.744	.005
Pediatric trained	17	3		
General/none	7	10		
Pathologist			5.261	.022
Pediatric trained	13	2		
General/none	11	11		
Radiation oncologist			4.659	.057*
Pediatric trained	10	1		
General/none	14	12		
Nuclear medicine physician			3.132	.140*
Pediatric trained	5	0		
General/none	19	13		
Nurse			4.990	.072*
Pediatric trained	22	8		
General/none	2	5		
Total	24	13		

Abbreviation: MDTB, multidisciplinary tumor board.
*Fisher's exact test (two sided).

thirds of patients with childhood cancer worldwide.[29] A Lancet Oncology Commission study found that Asian countries received only 1% of the total US $2 billion of active global public and philanthropic funding for childhood cancer from 2008 to 2016, with Southeast Asian countries in particular receiving significantly less from international grants.[38] Furthermore, our data demonstrate how imbalanced resource distribution in Southeast Asia affects childhood cancer care in highly populous and lower-income countries. Southeast Asian LMICs with a higher gross national income (GNI) per capita had more pediatric solid tumor MDTBs, particularly Malaysia and Thailand, with the two highest GNIs per capita (Fig 1). In addition, MDTB frequency did not correspond with the size of national pediatric populations: Indonesia, Philippines, and Myanmar have 70% of the children age < 14 years in Southeast Asia but only 40% of the MDTBs. All three countries have a GNI per capita less than US $4,000. Furthermore, the diversity of ethnicity, language, religion, and culture in Southeast Asia adds to the challenge of health equity. Availability of essential medicines; abandonment; and local sociocultural nuances, such as use of traditional medicines, are yet more challenges, all of which are understudied in the Southeast Asian region.[39,40]

This study was limited by the scope of coverage of PSTUs in Southeast Asian countries, with some being inadvertently missed and some not responding to the survey. Nevertheless, the 80.4% (37 of 46) of PSTUs profiled represent at least each of the main national referral centers in the region, most fulfilling criteria as level 2 PCUs according to the SIOP Pediatric Oncology in Developing Countries framework.[17] It can be reasonably expected that centers not covered by this study would be PSTUs with level 1 facilities, especially from countries with a lower GNI, such as Cambodia, Laos, and Timor-Leste, and more populous and geographically larger countries, such as Indonesia and Philippines. Judging by the median number of MDTBs per 1,000 population, we estimate that approximately 10-20 more PSTUs in the region may have been overlooked, especially among the latter countries, which account for 62% of the region's population age < 14 years but only 34.8% (16 of 46) of the PSTUs identified. This study may also overrepresent the pediatric solid tumor capabilities of the region. Because of the heterogeneity of training models in various countries, no specific definitions were imposed to differentiate between pediatric-trained and general specialists, and this was left to the individual respondent's interpretation. In cases of discrepant responses between oncologists and surgeons, the higher level of expertise was taken to represent the center, given the liberal definition applied. Even then, most PSTUs lacked pediatric-trained pathologists and radiologists as well as radiation oncologists and nuclear medicine physicians. These numbers would be expected to be even lower in level 1 PCUs, which were not covered in this study. Of note, other surgical subspecialties involved, such as ophthalmologists and orthopedic surgeons, were not profiled in this survey. Because the study may also be confounded by response bias, particularly from pressure of sociocultural desirability, the first author (himself from an LMIC center) contacted the study participants and conducted the survey.

FIG 1. Distribution of the multidisciplinary workforce caring for pediatric solid tumors in Southeast Asia. (A) Geographical locations of pediatric care units in Southeast Asia with indication of level of expertise available for seven key roles (oncologists, surgeons, radiologists, pathologists, radiation oncologists, nuclear medicine physicians, and nurses) in each center. Number of centers per country are indicated in parentheses, and percentage of centers per country with multidisciplinary tumor boards (MDTBs) are indicated by color scale. (B) Total number of personnel and proportion of corresponding levels of expertise for seven key roles for nine Southeast Asian countries, ranked by size of national population aged ≤ 19 years.[28] GNI, gross national income; Pop., population.

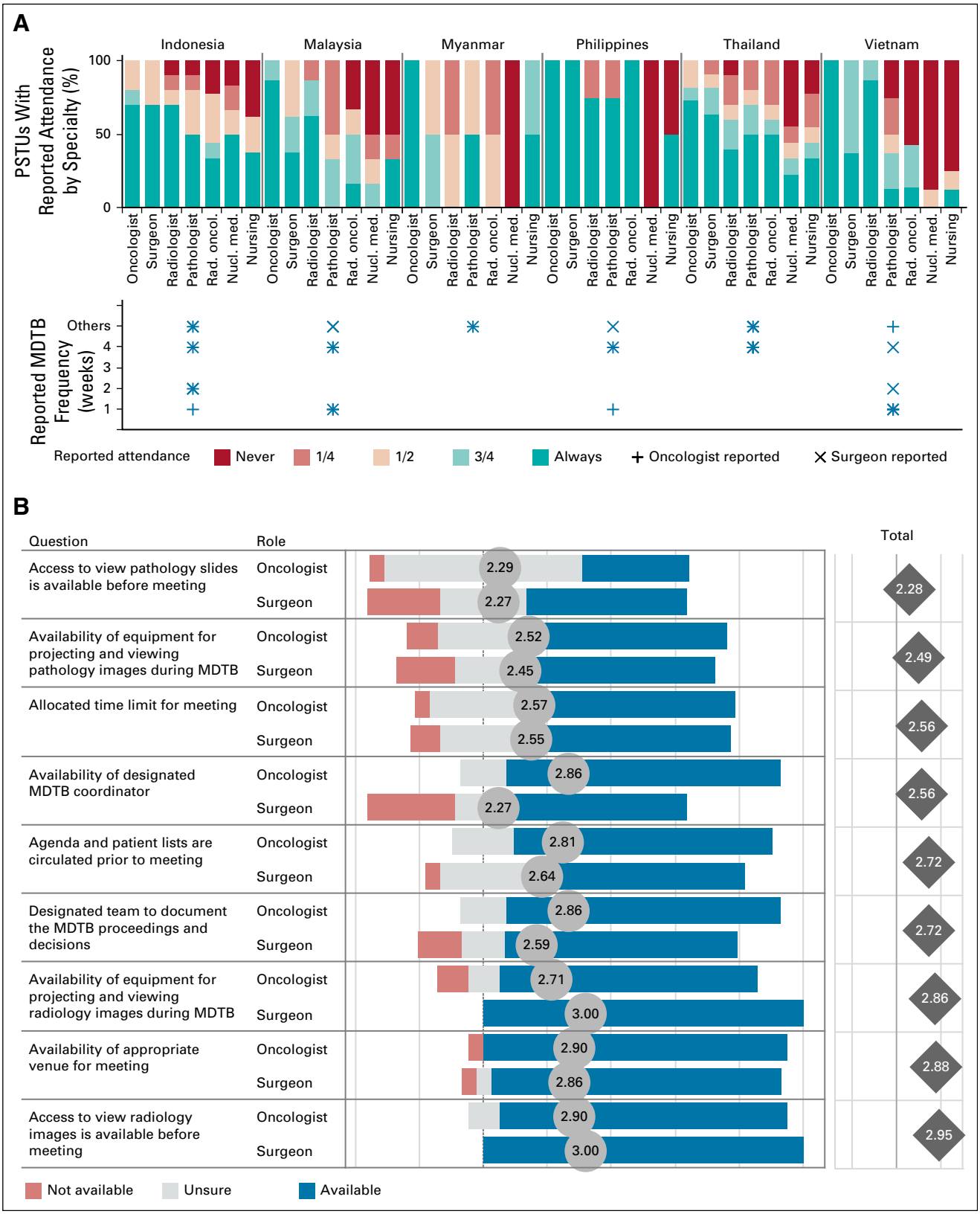

FIG 2. Profile of pediatric multidisciplinary tumor boards (MDTBs) in Southeast Asia. (A) Reported average attendance of seven key roles (oncologists, surgeons, radiologists, pathologists, radiation oncologists [Rad. oncol.], nuclear medicine physicians [Nucl. med.], and nurses) at MDTBs and reported frequency of MDTB meetings in 24 centers in six Southeast Asian countries. (B) Availability of MDTB resources as reported by oncologists and surgeons. PSTU, pediatric solid tumor unit.

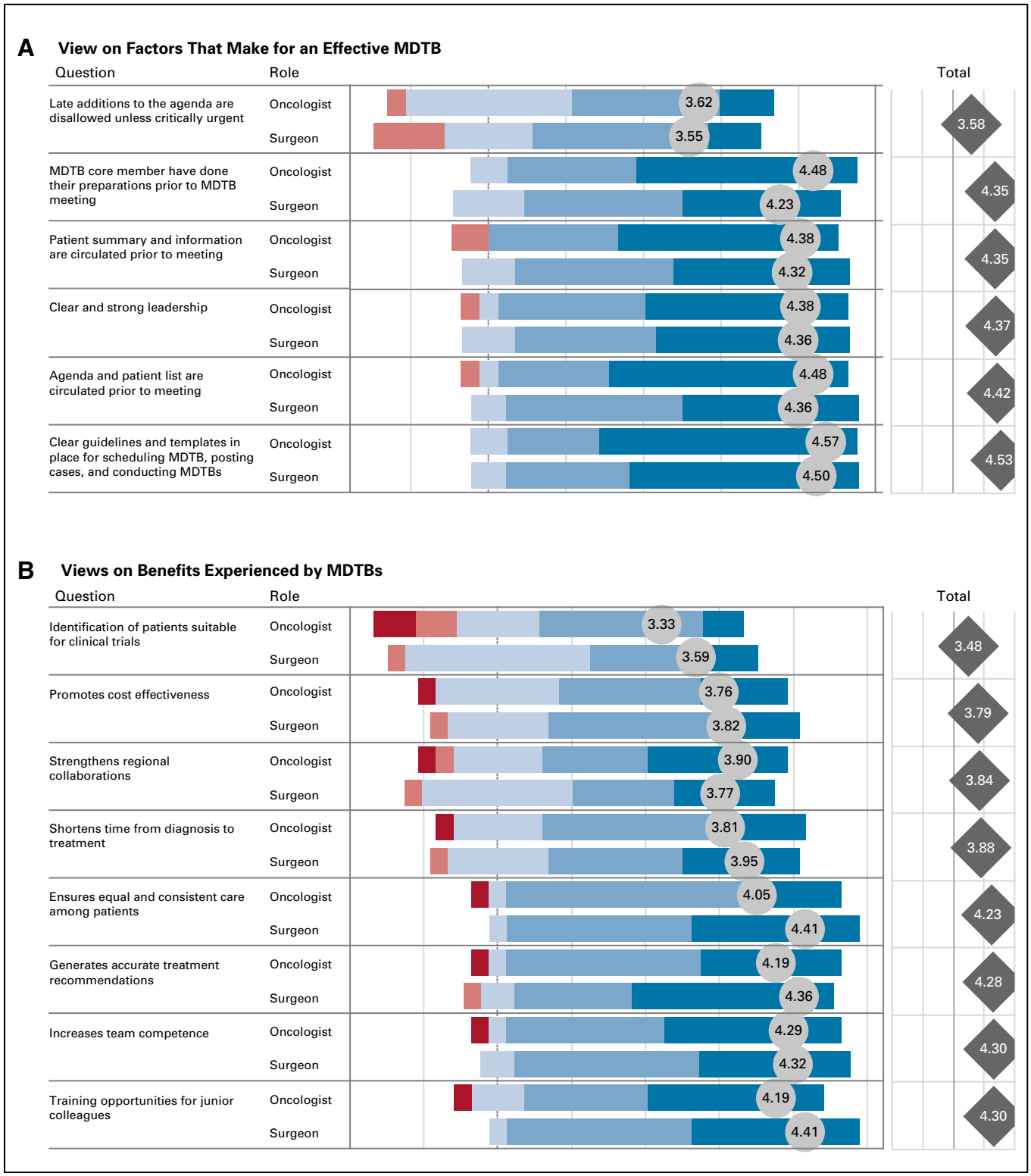

FIG 3. Views on pediatric multidisciplinary tumor boards (MDTBs). Views of oncologists and surgeons from six Southeast Asian countries toward (A) factors that make for effective MDTBs, (B) benefits experienced by MDTBs, (C) patients being discussed at MDTBs, and (D) barriers faced by MDTBs in their centers.

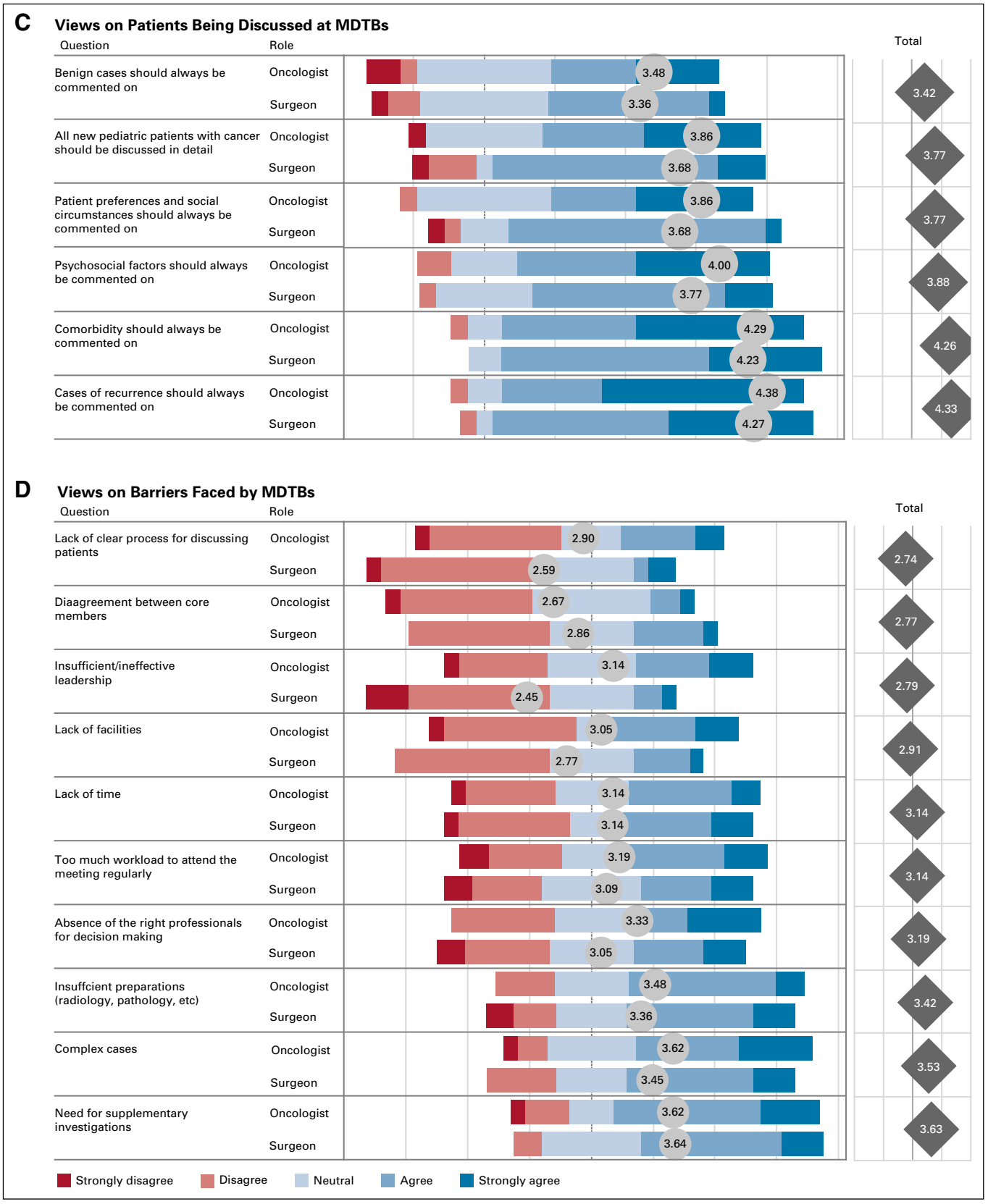

FIG 3. (Continued)

To our knowledge, this is the first reported overview of pediatric solid tumor care in Southeast Asian LMICs. Lessons from this study may also be applicable to other LMIC regions. From our findings, we propose several recommendations to further pediatric solid tumor care in LMIC PSTUs facing similar resource limitations. First is the development of multidisciplinary teams. LMIC PSTU teams may benefit from intentional exposure and modeling from established PSTUs. Adapted systematic recommendations could be proposed to guide team development and constitution and MDTB execution, including best practices for premeeting preparation, documentation of proceedings, and self-auditing.[41,42]

A second recommendation is optimization of local MDTB administration. PSTUs may benefit from improved organization of MDTB meetings. Increased involvement of nonclinical staff or nurses may help to overcome workload and time limitations faced by clinicians. Recognizing MDTBs as a professional activity with incentives for attendance, such as points for continuous professional development, may further increase participation.

A final recommendation is expansion and ongoing support for regional training resources. Pediatric oncology training programs and collaborations in Southeast Asia that have come about as a result of recent nongovernmental organization support should be continued and widened to include and develop more specialties, especially pediatric surgery, radiology, and pathology, with enhanced support from governmental bodies and international charities.

In conclusion, this cross-sectional survey highlighted the current availability of essential specialty expertise and MDTB structures in most PSTUs in Southeast Asian countries. Recent regional initiatives and collaborations have been a clear contributor to these developments. However, the lack of pediatric-trained subspecialists, particularly dedicated pediatric oncology surgeon and pediatric-trained pathologists and radiologists, remains a gap in the workforce required for capable multidisciplinary care of solid tumors. An extended spectrum of training programs is needed to focus on these subspecialties as well.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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APPENDIX

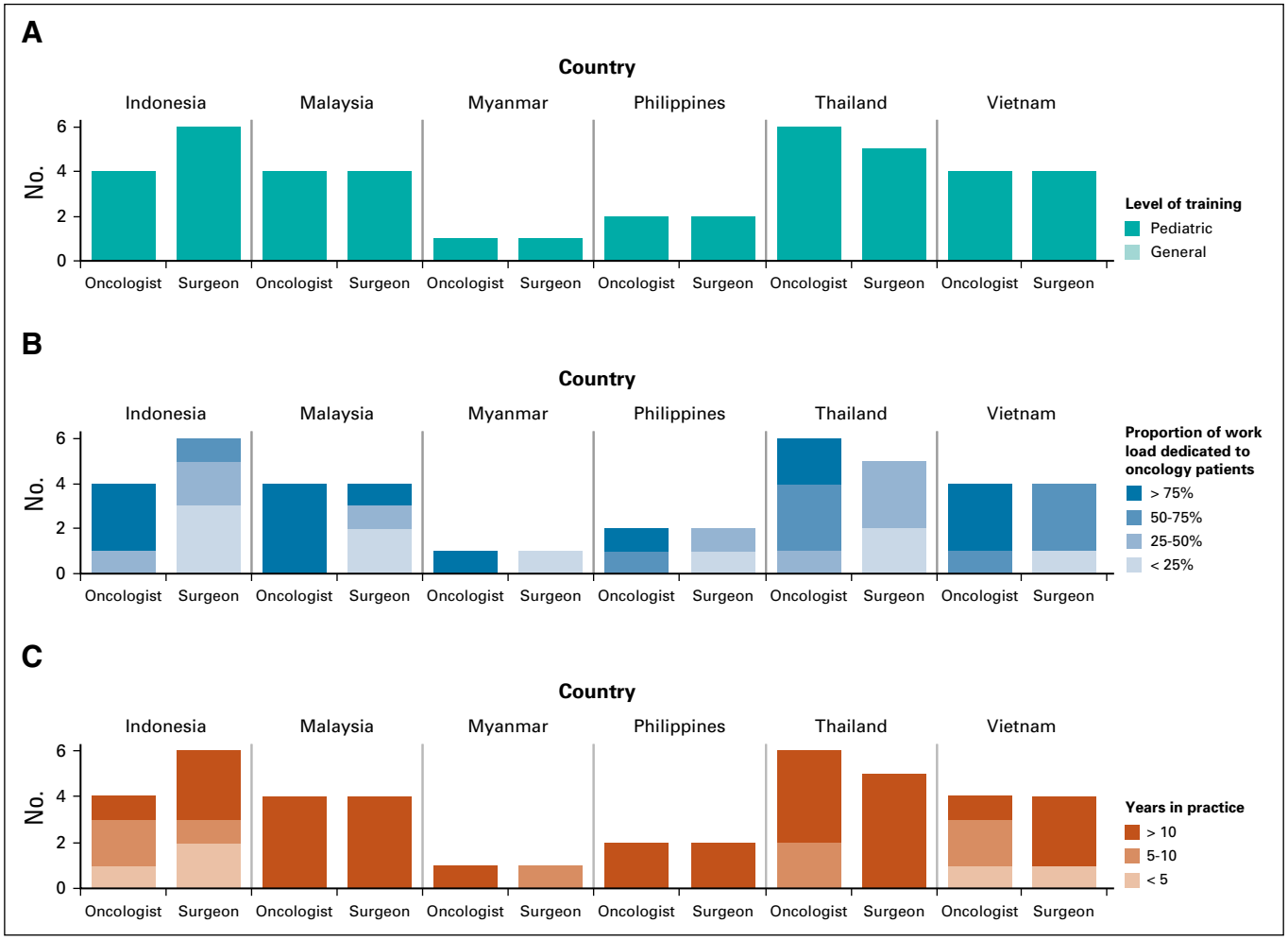

FIG A1. Profile of respondents (21 pediatric oncologists and 22 pediatric surgeons) and their (A) level of training, (B) proportion of workload dedicated to oncology patients, and (C) years in practice.

TABLE A1. Level of Expertise of Multidisciplinary Solid Tumor Workforce in Southeast Asian Countries

	Centers, No.							
Specialty and Level of Expertise	**Cambodia**	**Indonesia**	**Malaysia**	**Myanmar**	**Philippines**	**Thailand**	**Vietnam**	**Total**
Oncologist								
Pediatric trained	3	7	7	2	4	7	5	35
General specialist				1				1
None	1							1
Subtotal	3	7	7	3	4	7	5	36
Surgeon								
Pediatric trained	1	7	7	3	4	7	5	34
General specialist	2							2
None	1							1
Subtotal	3	7	7	3	4	7	5	36
Radiologist								
Pediatric trained	1	5	3	2	1	6	2	20
General specialist	2	2	4	1	3	1	3	16
None	1							1
Subtotal	3	7	7	3	4	7	5	36
Pathologist								
Pediatric trained		3	3	3	1	3	2	15
General specialist	2	4	4		3	4	3	20
None	2							2
Subtotal	2	7	7	3	4	7	5	35
Radiation oncologist								
Pediatric trained	1	2	1	1	1	4	1	11
General specialist		3	5		1	2	1	12
None	3	2	1	2	2	1	3	14
Subtotal	1	7	7	1	4	7	5	23
Nuclear medicine physician								
Pediatric trained		1	1			2	1	5
General specialist	1	2	5	2	2	4	3	19
None	3	4	1	1	2	1	1	13
Subtotal	1	7	7	2	4	7	5	24
Nurse								
Pediatric trained	2	6	6	2	3	6	5	30
General specialist		1	1	1	1	1		5
None	2							2
Subtotal	2	7	7	3	4	7	5	35
Total	15	49	49	18	28	49	35	225

TABLE A2. Characteristics of Survey Respondents (Pediatric Oncologists and Surgeons) From Southeast Asian Centers With Pediatric Solid Tumor Multidisciplinary Tumor Boards

	Respondents, No.						
Variable	**Indonesia**	**Malaysia**	**Myanmar**	**Philippines**	**Thailand**	**Vietnam**	**Total**
Level of training							
Oncologist							
General							0
Pediatric	4	4	1	2	6	4	21
Subtotal	4	4	1	2	6	4	21
Surgeon							
General							0
Pediatric	6	4	1	2	5	4	22
Subtotal	6	4	1	2	5	4	22
Total	10	8	2	4	11	8	43
Oncology-specific workload							
Oncologist							
< 25%							0
25%-50%	1				1		2
50%-75%				1	3	1	5
> 75%	3	4	1	1	2	3	14
Subtotal	4	4	1	2	6	4	21
Surgeon							
< 25%	3	2	1	1	2	1	10
25%-50%	2	1		1	3		7
50%-75%	1					3	4
> 75%		1					1
Subtotal	6	4	1	2	5	4	22
Total	10	8	2	4	11	8	43
Years of work experience							
Oncologist							
< 5	1					1	2
5-10	2				2	2	6
> 10	1	4	1	2	4	1	13
Subtotal	4	4	1	2	6	4	21
Surgeon							
< 5	2					1	3
5-10	1		1				2
> 10	3	4		2	5	3	17
Subtotal	6	4	1	2	5	4	22
Total	10	8	2	4	11	8	43

TABLE A3. Likert Scale Responses Among Respondents

Question and Respondents	Likert Scale					*df*	*P*
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Views on factors that make for an effective MDTB							
Clear guidelines and templates in place for scheduling MDTBs, posting cases, and conducting MDTBs						2	.841
Oncologist	0	0	2	5	14		
Surgeon	0	0	2	7	13		
Agenda and patient list are circulated prior to meeting						3	.440
Oncologist	0	1	1	6	13		
Surgeon	0	0	2	10	10		
Patient summary and information are circulated prior to meeting						3	.144
Oncologist	0	2	0	7	12		
Surgeon	0	0	3	9	10		
Clear and strong leadership						3	.577
Oncologist	0	1	1	8	11		
Surgeon	0	0	3	8	11		
MDTB core members have done their preparations prior to MDTB meeting						2	.516
Oncologist	0	0	2	7	12		
Surgeon	0	0	4	9	9		
Late additions to the agenda are disallowed unless critically urgent						3	.370
Oncologist	0	1	9	8	3		
Surgeon	0	4	5	10	3		
Views on benefits experienced by MDTBs							
Shortens time from diagnosis to treatment						4	.499
Oncologist	1	0	5	11	4		
Surgeon	0	1	6	8	7		
Generates accurate treatment recommendations						4	.406
Oncologist	1	0	1	11	8		
Surgeon	0	1	2	7	12		
Ensures equal and consistent care among patients						3	.391
Oncologist	1	0	1	14	5		
Surgeon	0	0	1	11	10		
Increases team competence						3	.668
Oncologist	1	0	1	9	10		
Surgeon	0	0	2	11	9		
Training opportunities for junior colleagues						3	.413
Oncologist	1	0	3	7	10		
Surgeon	0	0	1	11	10		
Strengthens regional collaborations						5	.661
Oncologist	1	1	5	6	8		
Surgeon	0	1	9	6	6		
Identification of patients suitable for clinical trials						5	.090
Oncologist	2	2	4	8	2		
Surgeon	0	1	11	6	4		

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TABLE A3. Likert Scale Responses Among Respondents (Continued)

Question and Respondents	Likert Scale					*df*	*P*
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Promotes cost effectiveness						4	.620
Oncologist	1	0	7	8	5		
Surgeon	0	1	6	11	4		
Views on patients being discussed at MDTBs							
All new pediatric patients with cancer should be discussed in detail						4	.015
Oncologist	1	0	7	6	7		
Surgeon	1	3	1	14	3		
Benign cases should always be commented on						4	.289
Oncologist	2	1	8	5	5		
Surgeon	1	2	8	10	1		
Cases of recurrence should always be commented on						3	.530
Oncologist	0	1	2	6	12		
Surgeon	0	1	1	11	9		
Comorbidity should always be commented on						3	.441
Oncologist	0	1	2	8	10		
Surgeon	0	0	2	13	7		
Psychosocial factors should always be commented on						3	.231
Oncologist	0	2	4	7	8		
Surgeon	0	1	6	12	3		
Patient preferences and social circumstances should always be commented on						4	.009
Oncologist	0	1	8	5	7		
Surgeon	1	1	3	16	1		
Views on barriers faced by MDTBs							
Insufficient preparations (radiology, pathology, etc)						4	.667
Oncologist	0	4	5	10	2		
Surgeon	2	3	5	9	3		
Absence of the right professionals for decision making						4	.599
Oncologist	0	7	5	4	5		
Surgeon	2	6	6	5	3		
Disagreement between core members						4	.626
Oncologist	1	9	8	2	1		
Surgeon	0	10	8	5	1		
Complex cases						4	.540
Oncologist	1	2	6	7	5		
Surgeon	0	5	5	9	3		
Needs for supplementary investigations						4	.571
Oncologist	1	3	3	10	4		
Surgeon	0	2	7	10	3		
Insufficient/ineffective leadership						4	.371
Oncologist	1	6	6	5	3		
Surgeon	3	10	6	2	1		
Lack of time						4	.915

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TABLE A3. Likert Scale Responses Among Respondents (Continued)

Question and Respondents	Likert Scale					*df*	*P*
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
Oncologist	1	6	5	7	2		
Surgeon	1	8	3	7	3		
Lack of facilities						4	.333
Oncologist	1	9	2	6	3		
Surgeon	0	11	6	4	1		
Lack of clear process for discussing patients						4	.482
Oncologist	1	9	4	5	2		
Surgeon	1	12	6	1	2		
Too much workload to attend the meeting regularly						4	.890
Oncologist	2	5	4	7	3		
Surgeon	2	5	7	5	3		

Abbreviation: MDTB, multidisciplinary tumor board.