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

Mohd Yusran Othman, MBBS, MPaedSurg1,2; Sally Blair, MD, MPH3,4; Shireen A. Nah, MBBS, MS5; Hany Ariffin, MBBS, MPaed, PhD6; Chatchawin Assanasen, MD3,7; Shui Yen Soh, MBBS, MRCPCH8; Anette S. Jacobsen, MBBCh, FAMS1,9; Catherine Lam, MD, MPH10; and Amos H. P. Loh, MBBS, FAMS1,9

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.

JCO Global Oncol 6:1328-1345. © 2020 by American Society of Clinical Oncology

INTRODUCTION

Although Southeast Asia has been the scene of substantial pediatric cancer initiatives in recent years, 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 ≤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. Nine of the 11 countries that comprise the region are low- and middle-income countries (LMICs), and significant gaps in clinical resources have been described, particularly with respect to the care of solid and brain tumors.

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. 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. 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. However, organizing MDTBs can be an organizational burden and amounts to extra workload for the involved personnel, 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...
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.

**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 $\chi^2$ or Fisher’s exact test. $P < .05$ was considered statistically significant. Likert scale scores were summarized as ordinal approximations of a continuous measure.

**RESULTS**

Nine of 11 Southeast Asian countries were categorized as LMICs, representing 662,332,000 (99.1%) of 668,620,000 people.
of the total estimated population of Southeast Asia, of which 167,429,000 (25.0%) were age ≤ 14 years (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. 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 co-operative group structures. 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. 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.  

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. Presenting symptoms of pediatric solid tumors are more easily recognized than leukemias and brain tumors; 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 subspecialties, 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
multidisciplinary solid tumor care in this region.31,33,37 This highlights the manpower challenges faced by PSTUs in addition to issues of availability of essential 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. 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

| 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)¹⁶ |
|---------------|----------------------|-----------|---------------|---------|---------------------------------------|------------------------------------------------|----------------------------------------------|---------------------------------|
| Cambodia      | 4                    | 0         | 4             | 0       | 16,719                                | 5,170                                          | 6,631                                          | 1,390                           |
| Indonesia     | 8                    | 6         | 6             | 0       | 273,524                               | 70,941                                         | 94,259                                         | 3,840                           |
| Laos          | 1                    | 0         | 1             | 0       | 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       | 46                   | 24        | 13            | 9       | 662,332                               | 167,429                                        | 222,152                                        |                                 |

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

Multidisciplinary Pediatric Solid Tumor Care in Southeast Asia
TABLE 2. Association of Availability of Pediatric-Trained Specialties With Availability of an MDTB

| Specialty                  | MDTB Status, No. | \( \chi^2 \) | P     |
|----------------------------|------------------|-------------|------|
| 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).

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. 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 over-represent 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 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. oncl.], 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.
### A View on Factors That Make for an Effective MDTB

| Question                                                                 | Role       | Oncologist | Surgeon | Total |
|--------------------------------------------------------------------------|------------|------------|---------|-------|
| Late additions to the agenda are disallowed unless critically urgent    | Oncologist | 3.62       |         | 3.58  |
|                                                                          | Surgeon    | 3.55       |         |       |
| MDTB core member have done their preparations prior to MDTB meeting     | Oncologist | 4.48       |         | 4.36  |
|                                                                          | Surgeon    | 4.23       |         |       |
| Patient summary and information are circulated prior to meeting         | Oncologist | 4.38       |         | 4.35  |
|                                                                          | Surgeon    | 4.32       |         |       |
| Clear and strong leadership                                             | Oncologist | 4.38       |         | 4.37  |
|                                                                          | Surgeon    | 4.36       |         |       |
| Agenda and patient list are circulated prior to meeting                 | Oncologist | 4.48       |         | 4.42  |
|                                                                          | Surgeon    | 4.36       |         |       |
| Clear guidelines and templates in place for scheduling MDTB, posting    | Oncologist | 4.57       |         | 4.53  |
| cases, and conducting MDTBs                                            | Surgeon    | 4.50       |         |       |

### B Views on Benefits Experienced by MDTBs

| Question                                                                 | Role       | Oncologist | Surgeon | Total |
|--------------------------------------------------------------------------|------------|------------|---------|-------|
| Identification of patients suitable for clinical trials                  | Oncologist | 3.33       |         | 3.48  |
|                                                                          | Surgeon    | 3.59       |         |       |
| Promotes cost effectiveness                                              | Oncologist | 3.76       |         | 3.79  |
|                                                                          | Surgeon    | 3.82       |         |       |
| Strengthens regional collaborations                                       | Oncologist | 3.90       |         | 3.84  |
|                                                                          | Surgeon    | 3.77       |         |       |
| Shortens time from diagnosis to treatment                                | Oncologist | 3.81       |         | 3.88  |
|                                                                          | Surgeon    | 3.96       |         |       |
| Ensures equal and consistent care among patients                         | Oncologist | 4.05       |         | 4.23  |
|                                                                          | Surgeon    | 4.41       |         |       |
| Generates accurate treatment recommendations                              | Oncologist | 4.19       |         | 4.28  |
|                                                                          | Surgeon    | 4.36       |         |       |
| Increases team competence                                                | Oncologist | 4.29       |         | 4.30  |
|                                                                          | Surgeon    | 4.32       |         |       |
| Training opportunities for junior colleagues                             | Oncologist | 4.19       |         | 4.30  |
|                                                                          | Surgeon    | 4.41       |         |       |

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.
### Views on Patients Being Discussed at MDTBs

| Question                                                                 | Role          | Oncologist | Surgeon | Total |
|--------------------------------------------------------------------------|---------------|------------|---------|-------|
| Benign cases should always be commented on                               | Oncologist    | 3.48       | 3.36    | 3.42  |
|                                                                          | Surgeon       | 3.36       | 3.48    | 3.42  |
| All new pediatric patients with cancer should be discussed in detail     | Oncologist    | 3.86       | 3.68    | 3.77  |
|                                                                          | Surgeon       | 3.68       | 3.86    | 3.77  |
| Patient preferences and social circumstances should always be commented on  | Oncologist    | 3.86       | 3.68    | 3.77  |
|                                                                          | Surgeon       | 3.68       | 3.86    | 3.77  |
| Psychosocial factors should always be commented on                       | Oncologist    | 4.00       | 3.77    | 3.88  |
|                                                                          | Surgeon       | 3.77       | 4.00    | 3.88  |
| Comorbidity should always be commented on                                | Oncologist    | 4.29       | 4.23    | 4.26  |
|                                                                          | Surgeon       | 4.23       | 4.29    | 4.26  |
| Cases of recurrence should always be commented on                        | Oncologist    | 4.38       | 4.27    | 4.33  |
|                                                                          | Surgeon       | 4.27       | 4.38    | 4.33  |

### Views on Barriers Faced by MDTBs

| Question                                                                 | Role          | Oncologist | Surgeon | Total |
|--------------------------------------------------------------------------|---------------|------------|---------|-------|
| Lack of clear process for discussing patients                            | Oncologist    | 2.90       | 2.59    | 2.74  |
|                                                                          | Surgeon       | 2.59       | 2.90    | 2.74  |
| Disagreement between core members                                        | Oncologist    | 2.67       | 2.86    | 2.79  |
|                                                                          | Surgeon       | 2.86       | 2.67    | 2.79  |
| Insufficient/ineffective leadership                                       | Oncologist    | 3.14       | 2.45    | 2.79  |
|                                                                          | Surgeon       | 2.45       | 3.14    | 2.79  |
| Lack of facilities                                                       | Oncologist    | 3.06       | 2.77    | 2.91  |
|                                                                          | Surgeon       | 2.77       | 3.06    | 2.91  |
| Lack of time                                                             | Oncologist    | 3.14       | 3.14    | 3.14  |
|                                                                          | Surgeon       | 3.14       | 3.14    | 3.14  |
| Too much workload to attend the meeting regularly                        | Oncologist    | 3.19       | 3.09    | 3.14  |
|                                                                          | Surgeon       | 3.09       | 3.19    | 3.14  |
| Absence of the right professionals for decision making                  | Oncologist    | 3.33       | 3.05    | 3.19  |
|                                                                          | Surgeon       | 3.05       | 3.33    | 3.19  |
| Insufficient preparations (radiology, pathology, etc)                    | Oncologist    | 3.48       | 3.36    | 3.42  |
|                                                                          | Surgeon       | 3.36       | 3.48    | 3.42  |
| Complex cases                                                            | Oncologist    | 3.62       | 3.45    | 3.53  |
|                                                                          | Surgeon       | 3.45       | 3.62    | 3.53  |
| Need for supplementary investigations                                    | Oncologist    | 3.62       | 3.64    | 3.63  |
|                                                                          | Surgeon       | 3.64       | 3.62    | 3.63  |

*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.

AFFILIATIONS
1Department of Pediatric Surgery, KK Women’s and Children’s Hospital, Singapore
2Department of Pediatric Surgery, Hospital Tunku Azizah (Women’s and Children’s Hospital), Kuala Lumpur, Malaysia
3Vietnam Pediatric Hematology Oncology Programme, Ho Chi Minh City, Vietnam
4Division of Pediatric Haematology and Oncology, Department of Pediatrics, National University of Singapore, Singapore
5Division of Pediatric Surgery, Department of Surgery, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
6Department of Pediatrics, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
7Southeast Asia Pediatric Hematology Oncology, Division of Hematology/Oncology Department of Pediatrics, UT Health San Antonio, San Antonio, TX
8Haematology/Oncology Service, Department of Pediatric Subspecialties, KK Women’s and Children’s Hospital, Singapore
9SingHealth-Duke NUS Global Health Institute, Duke NUS Medical School, Singapore
10St Jude Global, St Jude Children’s Research Hospital, Memphis, TN

Preprint version available on Authorea.

CORRESPONDING AUTHOR
Amos H. P. Loh, MBBS, MMed, Department of Pediatric Surgery, KK Women’s and Children’s Hospital, 100 Bukit Timah Rd, Singapore 299899, Singapore; e-mail: amos.loh.h.p@singhealth.com.sg.

PRIOR PRESENTATION
Presented at the 52nd Annual Congress of the International Society of Paediatric Oncology, Ottawa, ON, Canada, October 14-17, 2020.

SUPPORT
Supported by the VIVA Foundation for Children with Cancer (M.Y.O., A.H.P.L., VIVA-KKH Paediatric Brain and Solid Tumour Programme).

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.

AUTHOR CONTRIBUTIONS
Conception and design: Mohd Yusran Othman, Hany Ariffin, Anette S. Jacobsen, Amos H. P. Loh
Administrative support: Sally Blair
Provision of study material or patients: Sally Blair, Shireen A. Nah, Hany Ariffin
Collection and assembly of data: Mohd Yusran Othman, Sally Blair, Shireen A. Nah, Hany Ariffin, Chatchawin Assanasen, Amos H. P. Loh
Data analysis and interpretation: Mohd Yusran Othman, Shireen A. Nah, Hany Ariffin, Chatchawin Assanasen, Shui Yen Soh, Catherine Lam, Amos H. P. Loh
Manuscript writing: All authors
Final approval of manuscript: All authors
Agree to be accountable for all aspects of the work: All authors

AUTHORS’ DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST
The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated unless otherwise noted. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information about ASCO’s conflict of interest policy, please refer to www.asco.org/rwc or ascopubs.org/go/site/misc/authors.html.

Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians (Open Payments).

Chatchawin Assanasen
Speakers’ Bureau: Alexion Pharmaceuticals
Research Funding: Celgene

Catherine Lam

Stock and Other Ownership Interests: PharmaJet (I)
Consulting or Advisory Role: Sanofi (I), Jazz Pharmaceuticals (I), SERVIER (I), BTG (I), Shire (I), EUSA Pharma (I)

No other potential conflicts of interest were reported.
REFERENCES

1. Tan AM, Ca C, Li CF, et al: VIVA-Asia Blood and Marrow Transplantation Groups – A survey of consortium activity over a 12-year period (2000 to 2011). Ann Acad Med Singapore 45:106-109, 2016
2. Ali K, Sutaryo S, Purwanto I, et al: Yogyakarta Pediatric Cancer Registry: An international collaborative project of University Gadjah Mada, University of Saskatchewan, and the Saskatchewan Cancer Agency. Asian Pac J Cancer Prev 11:131-136, 2010
3. Park KD, Hong CR, Choi JY, et al: Foundation of pediatric cancer treatment in Lao People’s Democratic Republic at the Lao-Korea National Children’s Hospital. Pediatr Hematol Oncol 35:268-275, 2018
4. Halbert J, Khaing AA: Overview of global pediatric oncology and hematology in Myanmar. South Asian J Cancer 3:78-82, 2014
5. Bidwell SS, Peterson CC, Demannelis K, et al: Childhood cancer incidence and survival in Thailand: A comprehensive population-based registry analysis, 1990-2011. Pediatr Blood Cancer 66:e27428, 2019
6. Ward ZJ, Yeh JM, Bhakta N, et al: Estimating the total incidence of global childhood cancer: A simulation-based analysis. Lancet Oncol 20:483-493, 2019
7. International Agency for Research on Cancer: GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. https://www.iarc.fr/news-events/latest-world-cancer-statistics-globocan-2012-estimated-cancer-incidence-mortality-and-prevalence-worldwide-in-2012
8. International Agency for Research on Cancer: International Incidence of Childhood Cancer 3: Results, 2017. http://iarc.iarc.fr/results
9. Rajagopal R, Abd-Ghafor S, Ganesan D, et al: Challenges of treating childhood medulloblastoma in a country with limited resources: 20 years of experience at a single tertiary center in Malaysia. J Glob Oncol 3:143-156, 2016
10. Sangkhathat S, Chotsampanchanarern T, Kayasut K, et al: Outcomes of pediatric nephroblastoma in southern Thailand. Asian Pac J Cancer Prev 9:643-647, 2008
11. Fabian ID, Abdallah E, Abdulla SU, et al: Global retinoblastoma presentation and analysis by national income level. JAMA Oncol 6:1-12, 2020
12. Adham M, Stoker SD, Wilderman MA, et al: Current status of cancer care for young patients with nephroblastoma in Jakarta, Indonesia. PLoS One 9:e102353, 2014
13. Wongp V, Jetrisuparb A, Komvialai P, et al: Incidences, trends and long term outcomes of retinoblastoma in three cancer registries, Thailand. Asian Pac J Cancer Prev 16:6899-6902, 2015
14. Seksam P, Wiangnon S, Veerakul G, et al: Outcome of childhood acute lymphoblastic leukemia treated using the Thai national protocols. Asian Pac J Cancer Prev 16:4609-4614, 2015
15. Wongmeent P, Suwanngruangk P, Jetrisuparb A, et al: Trends in survival of childhood cancers in a university hospital, northeast Thailand, 1993-2012. Asian Pac J Cancer Prev 17:3515-3519, 2016
16. Tah PC, Nik Shania A, Poh BK: Nutritional status among pediatric cancer patients: A comparison between hematological malignancies and solid tumors. J Spec Pediatr Nurs 17:301-311, 2012
17. Howard SC, Davidson A, Luna-Fineeman S, et al: A framework to develop adapted treatment regimens to manage pediatric cancer in low- and middle-income countries: The Pediatric Oncology in Developing Countries (PODC) Committee of the International Pediatric Oncology Society (SIOP). Pediatr Blood Cancer 64, 2017 (suppl)
18. Madani A, Zafad S, Harif M, et al: Treatment of Wilms tumor according to SIOP 9 protocol in Casablanca, Morocco. Pediatr Blood Cancer 46:472-475, 2006
19. Pedrosa F, Bonilla M, Liu A, et al: Effect of malnutrition at the time of diagnosis on the survival of children treated for cancer in El Salvador and Northern Brazil. J Pediatr Hematol Oncol 22:502-505, 2000
20. Kreyer J, Ranft A, Timmermann B, et al: Impact of the Interdisciplinary Tumor Board of the Cooperative Ewing Sarcoma Study Group on local therapy and overall survival of Ewing sarcoma patients after induction therapy. Pediatr Blood Cancer 65:e27384, 2018
21. George PE, Fahdil G, Luutu I, et al: Analysis of management decisions and outcomes of a weekly multidisciplinary pediatric tumor board meeting in Uganda. Future Sci OA 5:FS0417, 2019
22. Thenappan A, Halaweish I, Mody RJ, et al: Review at a multidisciplinary tumor board impacts critical management decisions of pediatric patients with cancer. Pediatr Blood Cancer 64:254-258, 2017
23. Rosell L, Alexanderson N, Hagberg O, et al: Benefits, barriers and opinions on multidisciplinary team meetings: A survey in Swedish cancer care. BMC Health Serv Res 18:249, 2018
24. Shulman T, Bain CA, Raikundalia GK, et al: Obstacles to sustaining cancer care multidisciplinary team meetings: An Australian survey. Res Cancer Tumor 2:10-12, 2013
25. Taylor CT, Ramirez AR. Multidisciplinary team members’ views about MDT working: Results from a survey commissioned by the National Cancer Action Team. London, UK: Cancer Research UK Promoting Early Presentation Group, 2009
26. Norman G: Likert scales, levels of measurement and the “laws” of statistics. Adv Health Sci Educ Theory Prac 15:625-632, 2010
27. Sullivan GM, Artino AR Jr: Analyzing and interpreting data from Likert-type scales. J Grad Med Educ 5:541-542, 2013
28. United Nations: World Population Prospects 2019: Data Booklet. https://population.un.org/wpp/Publications/Files/WPP2019_DataBooklet.pdf
29. Rodriguez-Galindo C, Friedrich P, Alcasabas P, et al: Toward the cure of all children with cancer through collaborative efforts: Pediatric oncology as a global challenge. J Clin Oncol 33:3065-3073, 2015
30. Rodriguez-Galindo C, Friedrich P, Morrisey L, et al: Global challenges in pediatric oncology. Curr Opin Pediatr 25:3-15, 2013
31. Howard SC, Metzger ML, Willimas JA, et al: Childhood cancer epidemiology in low-income countries. Cancer 112:461-472, 2008
32. Parkin DM, Stiller CA, Draper GJ, et al: The international incidence of childhood cancer. Int J Cancer 42:511-520, 1988
33. Gelband H, Prabhat J, Sankaranarayanan R, et al (eds): Treating childhood cancer in low- and middle-income countries, in: Disease Control Priorities: Cancer, Volume 3 (ed 3). Washington, DC, International Bank for Reconstruction and Development/The World Bank, 2015, pp 121-146
34. Bicker SW, Rode H: Surgical services for children in developing countries. Bull World Health Organ 80:829-835, 2002

ACKNOWLEDGMENT
We thank all survey participants from Phnom Penh and Siem Reap, Cambodia; Bandung, Jakarta, Medan, Manado, Surabaya, and Yogyakarta, Indonesia; Ipoh, Kota Kinabalu, Kuala Lumpur, Kuching, and Penang, Malaysia; Mandalay, Yangon, and Yankin, Myanmar; Davao City, and Manila, Philippines; Bangkok, Chiang Mai, and Songkla, Thailand; and Hanoi, Ho Chi Minh City, and Hue, Vietnam.
35. Global Initiative for Children’s Surgery: Global Initiative for Children’s Surgery: A model of global collaboration to advance the surgical care of children. World J Surg 43:1416-1425, 2019
36. Goodman LF, St-Louis E, Yousef Y, et al: The Global Initiative for Children’s Surgery: Optimal resources for improving care. Eur J Pediatr Surg 28:51-59, 2018
37. Moore MA, Shin HR, Curado MP, et al: Establishment of an Asian Cancer Registry Network - problems and perspectives. Asian Pac J Cancer Prev 9:815-832, 2008
38. Loucaides EM, Fitchett EJA, Sullivan R, et al: Global public and philanthropic investment in childhood cancer research: Systematic analysis of research funding, 2008-16. Lancet Oncol 20:e672-e684, 2019
39. Hamidah A, Rustam ZA, Tamil AM, et al: Prevalence and parental perceptions of complementary and alternative medicine use by children with cancer in a multi-ethnic Southeast Asian population. Pediatr Blood Cancer 52:70-74, 2009
40. Mostert S, Gunawan S, van Dongen JA, et al: Health-care providers’ perspectives on childhood cancer treatment in Manado, Indonesia. Psychooncology 22:2522-2528, 2013
41. Standards for Pediatric Cancer Centers: Standards for Pediatric Cancer Centers. Pediatrics 134:410-414, 2014
42. Borras JM, Albreht T, Audisio R, et al: Policy statement on multidisciplinary cancer care. Eur J Cancer 50:475-480, 2014
43. The World Bank Group: GNI per Capita, 2019. https://data.worldbank.org/indicator/ny.gnp.pcap.cd
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

| 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        |          |          |         | 3           | 2       | 1       | 6     |
| 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                | 2        | 4         | 4        | 3       | 4           | 3       | 3       | 20    |
| General specialist               | 3        | 2         | 1        | 2       | 4           | 3       | 1       | 14    |
| None                             | 2        | 4         |          |         |             |         | 1       | 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         | 5        | 2       | 4           | 3       | 3       | 19    |
| None                             | 2        | 4         | 1        | 1       | 2           | 1       | 1       | 13    |
| Subtotal                         | 1        | 7         | 7        | 1       | 4           | 7       | 5       | 23    |
| Nuclear medicine physician       |          |           |          |         |             |         |         |       |
| Pediatric trained                | 1        | 1         |          |         |             |         | 2       | 1     |
| General specialist               | 1        | 2         | 5        | 2       | 4           | 3       | 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           | 1       | 1       | 5     |
| None                             | 2        | 1         |          |         |             |         | 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

| 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%                        | 3         | 2        | 1       | 1           | 2        | 1       | 10    |
| 25%-50%                      | 2         | 1        | 1       | 3           | 4        | 2       | 14    |
| 50%-75%                      | 1         | 3        | 1       | 2           | 3        | 1       | 7     |
| > 75%                        |           |          |         |             |          |         |       |
| Subtotal                     |           |          |         |             |          |         | 10    |
| Surgeon                      |           |          |         |             |          |         |       |
| < 25%                        |           |          | 1       | 1           | 2        | 1       | 5     |
| 25%-50%                      | 2         | 1        | 1       | 3           | 4        | 2       | 14    |
| 50%-75%                      |           |          | 1       | 3           | 4        | 2       | 14    |
| > 75%                        |           |          |         |             |          |         |       |
| Subtotal                     |           |          | 6       | 4           | 1        | 2       | 22    |
| Total                        | 10        | 8        | 2       | 4           | 11       | 8       | 43    |
| Years of work experience     |           |          |         |             |          |         |       |
| Oncologist                   |           |          |         |             |          |         |       |
| < 5                          | 1         |          |         |             | 1        | 2       | 3     |
| 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       | 2     |
| > 10                         | 3         | 4        | 2       | 5           | 3        | 4       | 17    |
| Subtotal                     |           |          |         |             | 6        | 4       | 22    |
| Total                        | 10        | 8        | 2       | 4           | 11       | 8       | 43    |
### TABLE A3. Likert Scale Responses Among Respondents

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

(Continued on following page)
TABLE A3. Likert Scale Responses Among Respondents (Continued)

| Question and Respondents | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--------------------------|-------------------|----------|---------|-------|----------------|
| Promotes cost effectiveness | 1                 | 0        | 7       | 8     | 5              |
| Oncologist               |                   |          |         |       |                |
| Surgeon                  |                   |          |         |       |                |
| Views on patients being discussed at MDTBs | 4                 | .620     |         |       |                |
| 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            |                   |          |         |       |                |
| 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             |                   |          |         |       |                |

(Continued on following page)
| Question and Respondents                     | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | df | P   |
|---------------------------------------------|-------------------|----------|---------|-------|----------------|----|-----|
| 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.