

Risk assessment for surgeries during COVID-19 pandemic in Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia



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ABSTRACT

Introduction: Surgeries are potential procedures for Coronavirus Disease 2019 (COVID-19) transmission due to the presence of a multidisciplinary team and high-risk activities such as airway assessment and intubation. This study was carried out to assess risk of surgeries conducted at the main referral hospital in Aceh province, Indonesia during COVID-19 pandemic.

Method: A Medical necessary, Time-Sensitive (MeNTS) score was used to assess risk of emergency and elective surgeries conducted at Aceh main referral hospital, Dr. Zainoel Abidin, from July to August 2020. In total, 463 surgeries were screened, consisted of 126 emergency surgeries and 337 elective procedures.

Result: Orthopaedic department contributed the most with 129 patients (27.9%), while ear, nose, throat (ENT) departments contributed the least with only 16 patients (3.4%). Orthopedic surgeries had the lowest MeNTS score (36.23), while neurosurgeries had the highest MeNTS score (46.91). Most of the surgeries were elective (72.8%), and the MeNTS score for elective surgeries was higher than emergency procedures (41.0 to 39.6).

Conclusion: Neurosurgeries were the highest risk procedures conducted in Aceh main referral hospital, Indonesia, followed by ENT, thoracic-vascular, and digestive surgeries. MeNTS scoring can be used as an additional screening tool in the Department of Surgery, Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia to minimize the risk of COVID-19 transmission during surgical procedures.

Keywords: risk assessment, surgery, COVID-19 pandemic, Medical necessary Time-Sensitive (MeNTS).

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INTRODUCTION

On May 2020, the World Health Organization (WHO) declared coronavirus disease (COVID-19), caused by Severe Acute Respiratory Syndrome Coronavirus type 2 (SARS-CoV-2), as a pandemic.¹ The virus is believed to be air-borne and transmitted through respiratory droplets, physical contact, fomites, and fecal-oral route.^{2,3} To date, the virus has infected more than 36 million people worldwide and caused more than 1 million deaths.⁴ Now, ten months after the outbreak, some countries have started the new live after pandemic, some others are facing the second wave of the outbreak, while some others are still struggling to contain the virus, one of which is

Indonesia. An increase in COVID-19 cases is still observed in Indonesia, where it recorded more than 325.000 cases with more than 11.600 deaths.⁵

The rapidly spreading outbreak has put unprecedented challenges on the medical community and healthcare system, such as increased demand on resources, staff burnout, increased transmission risk, and increased load on the health care systems.⁶⁻⁸ Increased demand on personal protective equipment (PPE), inpatient admission, beds, ventilators, and staff has caused health system problems in affected countries.^{7,8} It is also reported that transmission inside healthcare facilities such as hospitals and clinics contributes to 3.8% of total COVID-19 cases on healthcare workers.⁹

Operating rooms (ORs) are potential areas for SARS-CoV-2 transmissions due to the presence of a multidisciplinary team and high-risk activities such as airway assessment and intubation.⁶ Surgical patients demand close contact and prolonged exposure during surgical care and are prone to aerosol-generating procedures, factors that made them should be treated as highly contagious.¹⁰ A systematic review showed that tracheal intubation, non-invasive ventilation, tracheotomy, and manual ventilation before intubation were significantly associated with increased risk of COVID-19 transmission.¹¹ Beside lungs, kidney, esophagus, bladder, ileum, and heart are also classified as organs with a high risk for SARS-CoV-2 transmission.¹²

made some surgeries like digestive, ENT, and heart are more high risk compare to operative procedures on other organs.

As the need for hospitalization and intensive care due to COVID-19 increases, hospitals curtail nonurgent surgeries' performance to divert resources.¹³ Moreover, previous study suggested that elective surgical procedures may contribute to COVID-19 transmission.⁸ However, Inconsiderate cancellation of elective surgery may cause immeasurable morbidity and mortality on the health of our communities than the impact caused by COVID-19.⁸ More than 50% of all elective surgeries will potentially cause significant harm to patients if canceled or delayed,¹³ and depending on how long the pandemic will happen, many elective surgeries will eventually become urgent at some point in time.⁸ Except for purely esthetic procedures, there is always a rationale to undergo elective surgery, such as treatment of malignancies, pain alleviation, quality of life improvement, and prevention of serious complications or disease progression.¹³

Careful consideration need to be taken before deciding to proceed with surgical treatment during pandemic like this including resource limitation, risk of COVID-19 infection to the healthcare team and patients, and COVID-19 impact on surgical outcomes including post-operative respiratory failure.^{7,13,14} Therefore, several countries have issued guidelines and taken some measurements to screen surgical procedures and their COVID-19 related risks to minimize the consequences.^{6,15,16} Each hospital has to develop a guideline based on the healthcare system level, infrastructure facilities, and national guidelines.⁶ Based on the above, screening for SARS-CoV-2 in all surgical patients is warranted.

Prachand et al. developed a scoring system to help deciding to proceed or postpone surgeries during COVID-19 pandemic called Medical Necessary, Time-Sensitive (MeNTS) score. The scoring system integrated factors associated with COVID-19 pandemic to weigh patient risk with the ethical necessity of optimizing public health concerns.¹³ Despite the limitation of MeNTS scoring system, the use of it was claimed to be significantly

useful to help surgeons in triage decisions during pandemics.

Dr. Zainoel Abidin Hospital is the main referral hospital in Aceh province, Indonesia.¹⁷ The hospital was also assigned as the referral hospital for COVID-19 patients in the province, thus, a strict screening for every patient who visited the hospital was warranted to minimize COVID-19 transmission risk.¹⁸ The hospital utilizes a checklist issued by the Ministry of Health to screen every patient that came to their Emergency Department for COVID-19 chance. In addition, patients were also screened with rapid antigen before any medical procedures. However, there is no specific screening to assess the risk of COVID-19 transmission on surgical patients yet. This study was carried out to determine the risk of COVID-19 on surgical procedures conducted at Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia, during COVID-19 pandemic.

RESEARCH DESIGN AND METHODS

A study was conducted at Dr. Zainoel Abidin General Hospital, Banda Aceh, Indonesia, from July to August 2020. Surgery procedures were screened using MeNTS score developed by Prachand et al. which consists of 3 evaluation components including 7 procedure factors, 6 disease factors, and 8 patient factors (Table 1). The Score from each assessment component has a scale range 1 to 5 with minimum and maximum scores 21 and 105, respectively. The high cumulative MeNTS score reflects more unsatisfactory perioperative patient outcomes, increased risk of COVID-19 transmission to the healthcare team, and/or increased hospital resource used during pandemic.¹³ All patients were screened using a checklist issued by Indonesian Ministry of Health at the Emergency Department, and were tested with SARS-CoV-2 antigen rapid test before admission. MeNTS score was used after the surgery being conducted to avoid decisional bias.

RESULTS

In total, we screened 463 surgeries during data collection period, consisted of 126 emergency surgeries and 337 elective

procedures. Information regarding the types of surgeries, patients' age, and mean MeNTS score for each procedure is shown on Table 2.

From Table 2 we could see that orthopedic department contributed the most with 129 patients (27.9%), while ENT department contributed the least with only 16 patients (3.4%). Regarding patients' average age, pediatric surgeries had the smallest while thoracic-cardiovascular surgery had the highest average age of patients, 2.1 years old and 51.5 years old, respectively. Orthopedic surgeries had the lowest MeNTS score (36.23), while neurosurgeries had the highest MeNTS score (46.91). When we divided the procedures based on their urgency, we could see that most of the surgeries were elective (72.8%). The mean of age for patients underwent elective surgeries was higher (41.7 years old), as well as its MeNTS score (41.0).

DISCUSSION

The screening for COVID-19 risk using MeNTS scoring in this study suggested that neurosurgery had the highest risk of COVID-19 transmission compare to other types of surgeries. This finding was different from prior studies that suggested thoracic-cardiovascular surgeries, digestive, and ENT surgeries as higher risk procedures.^{7,11-13} Besides lungs, kidneys, esophagus, bladder, ileum, and heart are also classified as organs with an increased risk for SARS-CoV-2 transmission because they produce ACE2 play a role in SARS-CoV-2 transmission.¹² MeNTS score used OR time, postoperative ICU need, and intubation probability as its components.¹³ Neurosurgeries in general take longer OR time compare to other procedures. The need for postoperative ICU is also higher among neurosurgery patients, as most of them will need to be intubated or be unconscious for some times after the surgery. All these might explain why in this study we found that neurosurgeries had the highest mean MeNTS score. On the contrary, orthopedic surgeries got the lowest MeNTS score, which was very likely because most of the procedures were not done on high-risk organs and areas.¹²

If we take a further look, we would see that ENT, thoracic-vascular, and digestive

Table 1. Medical necessary, time-sensitive (MeNTS) scoring system, consist of procedure, disease, and patient factors

Procedure	1	2	3	4	5
OR Time	< 30 min	31-60 min	61-120 min	121-180 min	≥ 181 min
LOS Anticipated	Outpatient	23hrs	24-48 hrs	2-3d	≥ 4d
Post-Op ICU need	Very Unlikely	< 5%	5-10%	11-25%	> 25%
Bleeding Risk/EBL	< 100cc	101-250cc	251-500cc	501-750cc	≥ 751cc
Surgical Team Size	1	2	3	4	> 4
Intubation Needed to Perform Procedure	≤ 1%	1-5%	6-10%	11-25%	≥ 25%
Surgical Site	None of the following	Abdominopelvic MIS Surgery	Abdominopelvic Open Surgery, Infra-umbilical	Abdominopelvic Open Surgery, Supraumbilical	OHNS/Upper GI/Thoracic
Disease	1	2	3	4	5
Non-Operative Treatment Option Effectiveness	None available	Available, <40% effective as surgery	Available, 40-60% effective as surgery	Available, 61-95% effective as surgery	Available, equally effective
Non-Operative Treatment Option Resource Use/ Exposure Risk	Significantly worse/ not applicable	Somewhat worse	Equivalent	Somewhat better	Significantly Better
Impact Of 2wk Delay in DISEASE Outcome	Significantly worse	Worse	Moderately worse	Slightly worse	Minimally worse
Impact Of 2wk Delay in Surgical Difficulty/Risk	Significantly worse	Worse	Moderately worse	Slightly worse	Minimally worse
Impact Of 6wk Delay in Disease Outcome	Significantly worse	Worse	Moderately worse	Slightly worse	Minimally worse
Impact Of 6wk Delay in Surgical Difficulty/Risk	Significantly worse	Worse	Moderately worse	Slightly worse	Minimally worse
Patient	1	2	3	4	5
Age (years old; yo)	<20 yo	21-40 yo	41-50 yo	51-65 yo	>65 yo
Lung Disease (asthma, COPD, CF)	None	-	-	Minimal (rare inhaler)	> Minimal
OSA	Not present	-	-	Mild/Moderate (no CPAP)	On CPAP
CV Disease (HTN, CHF, CAD)	None	Minimal (no meds)	Mild (1 med)	Moderate (2 meds)	Severe (≥ 3 meds)
Diabetes	None	-	Mild (no meds)	Moderate (PO meds only)	> Moderate (insulin)
Immunocompromised*	No	-	-	Moderate	Severe
ILI Sx's (fever, cough, sore throat, body aches, diarrhea)	None (Asymptomatic)	-	-	-	Yes
Exposure to known COVID+ Pt (14d)	No	Probably Not	Possibly	Probably	Yes

Table 2. Characteristics of surgeries screened with MeNTS score

Types of surgeries	n (%); n=463	Patients' average age (years old)	Mean MeNTS score
Based on department			
Pediatric surgery	19 (4.1)	2.1	38
Digestive surgery	59 (12.7)	47.8	42.6
Oncology surgery	43 (9.3)	41.3	40.7
Orthopedic surgery	129 (27.9)	36.5	36.2
Reconstructive/plastic surgery	44 (9.5)	32.5	39.9
Neurosurgery	22 (4.8)	41.5	46.9
Thoraco-cardiovascular surgery	58 (12.5)	51.5	42.7
Urology	73 (15.8)	48.2	41.4
ENT surgery	16 (3.4)	35.3	46.1
Based on urgency			
Emergency surgery	126 (27.2)	36.7	39.6
Elective surgery	337 (72.8)	41.7	41.0

surgeries are the next two procedures with high mean MeNTS scores. This is in accordance with prior study that showed procedures on respiratory, ENT, and digestive tract results in higher risk of COVID-19 transmission.^{7,11-13} Previous studies suggested that SARS-CoV-2 is an airborne disease and can be transmitted through procedures that generate aerosol.^{2,7,11} Besides, it can also be transmitted through organs that produce ACE2 such as kidney, esophagus, bladder, ileum, and heart.¹² Thus, a more strict consideration need to be done by surgeons before deciding to proceed with these procedures during pandemics like this.

Another interesting finding from this study was that elective surgeries had higher MeNTS scores compare to emergency surgeries. Most of elective procedures are thoracic-cardiovascular and ENT surgeries, which are in general high risk for COVID-19 transmission.^{7,12} As mentioned earlier, it is not easy to define elective surgical procedures, particularly in a prolonged pandemic like this as some surgeries will eventually become urgent at some point.^{8,13} Elective surgeries enrolled in this study might have been postponed before at the early phase of pandemic, results in worse condition of patients and disease progression that might lead to longer OR time or need of ICU post procedures.

This study's finding gave us a view of COVID-19 risk for various surgical procedures conducted at Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia.

As the main referral hospital for COVID-19 as well as other diseases, the stakeholders need to manage hospital resources and minimize intra-hospital COVID-19 transmission wisely, one way is by doing a thorough screening especially for patients undergoing invasive procedures. Ideally, every patient should be examined using nasopharyngeal swab rt-PCR as the gold standard for COVID-19.³ However, the examination is pricey for a low- and middle-income countries like Indonesia. Thus, Screening using MeNTS scoring combined with hospital checklist and rapid test is the least we can do to minimize the risk of COVID-19 transmission pre-, during, and post-operative procedures.

We understood that MeNTS scoring alone was not sufficient for COVID-19 screening, thus, we combined the screening with COVID-19 checklist issued by Indonesian Ministry of Health, and all patients in this study had a rapid antigen test before the administration of MeNTS scoring. Despite of a more comprehensive approach, our study could not decide the cut-off point for MeNTS score used in Dr. Zainoel Abidin Hospital, thus, we could not determine if the surgeries enrolled in this study were safe enough to be proceeded. This is due to the nature of MeNTS scoring which allows each institution to decide the cutoff point based on its capacity and condition. However, this study aimed to evaluate which types of surgeries had the highest risk of COVID-19 transmission so that the hospital and staff could be more careful in doing the procedures. We

believed that we had reached the primary purpose of this study.

This study concluded that neurosurgeries were the highest risk procedures conducted in Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia during COVID-19 pandemic, followed by ENT, thoracic-vascular and digestive surgeries. Extra efforts to maintain healthcare workers' health and strength and avoid the collapse of health care system during difficult time like this is warranted. Carefully planned routines include trustworthy screening can help to protect clinical workforce and providing excellent care to the patients. MeNTS scoring can be used as an additional screening tool in the Department of Surgery, Zainoel Abidin Hospital, Banda Aceh, Indonesia to minimize the risk of COVID-19 transmission before, during, and after surgeries.

CONFLICT OF INTEREST

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ETHICAL CONSIDERATION

This study has been approved by ethical committee Faculty of Medicine, Universitas Syiah Kuala with ethical clearance reference number 138/EA/FK-RSUDZA/2020

AUTHOR CONTRIBUTION

Safrizal Rachman is responsible for studying the concept, design, brainstorming of the main idea, reviewing the manuscript, and writing the original draft. Muhammad Yusuf & Syamsul Rizal responsible for concept design, data acquisition, and data analysis. Mirnasari Armisyah and Rovy Pratama responsible for literature search and writing the

original raft (supporting). All author had reviewed and agreed for the final version of the manuscript for publication.

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