

**Poor Resource Setting Hindering Surgeries Based on Indonesian General Surgeon Competencies in West Timor, Indonesia**

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**Background:** A surgeon is trained and educated to do a wide-range of surgeries, but some surgeries may not materialize due to lack of supporting facilities or other essentials. Our objective is to provide an insight of what type of surgery that can or cannot be done in a poor resource setting in West Timor, Indonesia. **Methods:** Ours is a cross-sectional and qualitative study conducted in the only general hospital in each district town: Soe (TTS), Kefamenanu (TTU), and Betun General Hospital (Malaka). The data were collected from the surgeons in each district. We listed whether the surgeries in the Indonesian surgeon competencies can or cannot be done in the district public hospitals, and we interviewed the surgeons about the facilities lacking in their hospitals. **Result:** From a total of 184 surgeries in the competency list, the percentage of surgeries that cannot be done in Soe was 38.59% (f=71), Kefa 20.11% (f=37), and Betun 30.43% (f=56). The figures included some emergency surgeries unavailable in three hospitals. **Conclusion:** Poor resources hindered the surgeons from delivering the services they were trained for.

**Keywords:** poor resource surgery care, rural surgery service, essential surgical care

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**INTRODUCTION**

Timor is one of the islands of East Nusa Tenggara Province. The island consists of 5 districts, from west to east: Kupang, Timor Tengah Selatan (TTS), Timor Tengah Utara (TTU), Malaka, and Belu.<sup>1</sup> Three districts—TTS, TTU, Malaka—are known to have only one first-referral hospital in each area.

The surgeons are trained and educated to do a wide range of surgeries listed in the Indonesian general surgeon's competencies.<sup>2</sup> Indeed, a new regulation has been imposed to a newly graduated surgeon to work in remote areas in Indonesia.<sup>3</sup> But, some surgeries may not materialize, or imperfect

surgeries may be executed because of the facilities and other essential constraints.<sup>4</sup> An incomplete surgical team, worsened by the poor facilities, inadequate technology, limited drugs, and materials may contribute to a higher mortality from trauma and non-traumatic surgical disorders.<sup>5</sup>

The World Health Organisation (WHO) recommends the developing countries to do a situational analysis to assess the surgical care at a district level.<sup>6</sup> But, up until this piece is written, there has not been a readily available data about the lack of surgical facilities in remote areas in Indonesia. Our study will give a perspective of the type of surgery that can be done in district hospitals located in remote areas in Indonesia compared to the surgery listed in the Indonesian general surgeon's competencies. It can be used to prepare the expectation of a newly graduated surgeon when the surgeon is going to be stationed in a remote area. Indeed, our data can also be used as a

situational analysis for the government or non-governmental organizations interested in improving the facilities before employing a surgeon, or to support the surgeons who worked in the areas or other similar conditioned areas. Thus, the improvement may benefit the district residents who are at risk or currently suffering a surgically treatable condition.

## **METHODS**

This is a descriptive and qualitative study. We collected the data of the type of hospital, the surgery and anesthesiologist workforce (specialists and nurses), and whether the hospitals have a diagnostic radiology and diagnostic lab tests necessary for any operation by asking the surgeons on duty. We also used the Indonesian general surgeon list of competencies. We asked the surgeons on duty as if they have to do the surgeries in January 2017, to classify the surgeries listed into 3 groups:

- (1) The surgeries that the surgeon showing confidence in delivering (standard group) because the hospital have all the supporting facilities needed
- (2) The surgeries that the surgeon can deliver but need an improvement of the facilities because if not, the surgeries are regarded as having an inferior quality (inferior group) because there are some facilities needed but missing
- (3) The surgeries that the surgeon deemed cannot be done in the hospital (undeliverable group) because important facilities needed are missing

We enrolled 3 public district general hospitals: Soe Public General Hospital (Rumah Sakit Umum Daerah/RSUD Soe), Kefamenanu Public General Hospital (RSUD Kefa), and Betun Border-Region Public General Hospital (Rumah Sakit Penyangga Perbatasan/RSPP Betun). The data were collected by the surgeons on duty based on the hospital human resources, drugs and essential material supplies, and other surgery-supporting facilities in January 2017. The surgeons classified the surgeries without considering whether there was an actual patient needing the surgery.

We interviewed the surgeons about the drugs and materials they regarded necessary but unavailable, the condition of the Intensive Care Unit (ICU) and whether the ICU was equipped with a ventilator, and about the availability of the anesthesiologist and surgery-supporting workforce.

We analyzed the data to reveal the number of the surgery grouped into standard deliverable surgeries, inferior deliverable surgeries, and undeliverable surgeries, against the surgeries listed as an Indonesian general surgeon competencies. For the inferior deliverable and the undeliverable surgeries, we traced the factors underlain. We group the factors that may hinder a delivery of surgery into operating tools, drugs and other materials, diagnostic lab, diagnostic radiology (ultrasonography/USG and x-ray), ICU, anesthesiologist workforce, surgery-supporting workforce.

## **RESULTS**

### **Surgeon Competency List vs. Poor-Resource Setting**

From a total of 184 surgeries in the competency list, Soe was capable of delivering both standard and inferior surgeries for 61.41% (f=114), Kefa 79.89% (f=147), Betun 69.57 % (f=128). The percentage of surgeries that cannot be done in Soe was 38.59% (f=71), Kefa 20.11% (f=37), and Betun 30.43% (f=56).

The type of surgeries which all of the surgeons claimed can be delivered in a standard quality were: hydrocoelectomy, open appendicectomy, circumcision, suprapubic puncture/cystostomy, abscess incisions (mammas, maxillofacial, sub-lingual phlegmon, others), cellulitis and soft tissue infection management, ranula excision and marsupialisation, wound management (sterile, contaminated, infected, gangrene) including wound toilet, necrotomy, irrigation, vacuum, suturing.

The procedures regarded undeliverable in any hospital were: Gastrectomy, laparoscopic procedures (appendicectomy, cholecystectomy, diagnostic/emergency), endorectal pull-through, diaphragm plication, submandible dissection, mandible resection (ameloblastoma), emergency thoracotomy, embolectomy/thrombectomy, emergency peripheral embolectomy, internal fixation of the costae (clipping, wiring), Sympathectomy, varices stripping, trepanation/craniectomy in epidural and subdural hematoma, decompression craniectomy for cerebral edema, spina bifida defect closure, rib resection, thorax window operation, diagnostic endoscopy, cystoscopy, ureter-ileal shunt, external fixation.

**Table 1.** Proportion of Deliverable and Undeliverable Surgeries Based on Indonesian Surgeon Competency List

Surgery in the competency list vs. reality	Public General Hospital					
	Soe		Kefa		Betun	
	f	%	f	%	f	%
Deliverable – standard	31	16.85	66	35.87	26	14.13
Deliverable – inferior	82	44.57	81	44.02	102	55.43
Undeliverable	71	38.59	37	20.11	56	30.43
<b>Total of surgeries in the competency list</b>	<b>184</b>		<b>184</b>		<b>184</b>	

**Table 2.** Proportion of Inferior Deliverable Surgery and The Underlying Factors

Surgery-hindering factors	Public General Hospital					
	Soe (n=82)		Kefa (n=81)		Betun (n=102)	
	f	%	f	%	f	%
Surgical tools	54	65.85	56	69.14	7	6.86
Drugs and materials	39	47.56	32	39.51	5	4.90
Diagnostic lab	49	59.76	32	39.51	0	0.00
Diagnostic radiology	54	65.85	36	44.44	102	100.00
ICU and ventilator	22	26.83	30	37.04	102	100.00
Anesthesiologist workforce	0	0.00	64	79.01	102	100.00
Surgery-supporting workforce	0	0.00	0	0.00	102	100.00

**Table 3.** Proportion of Undeliverable Surgery and The Underlying Factors

Surgery-hindering factors	Public General Hospital					
	Soe (n=71)		Kefa (n=37)		Betun (n=56)	
	f	%	f	%	f	%
Surgical tools	68	95.77	32	86.49	18	32.14
Drugs and materials	64	90.14	20	54.05	18	32.14
Diagnostic lab	61	85.92	24	64.86	10	17.86
Diagnostic radiology	66	92.96	24	64.86	56	100.00
ICU and ventilator	37	52.11	22	59.46	56	100.00
Anesthesiologist workforce	0	0.00	31	83.78	56	100.00
Surgery-supporting workforce	0	0.00	0	0.00	56	100.00

In Soe, the most factors underlying 82 inferior surgeries were surgical tools and diagnostic radiology (each was present in 65.85% of the total inferior surgeries). And, the most listed factor underlying undeliverable surgeries was surgical tools (listed in 68 procedures or 95.77%).

In Kefa the most factor underlying 81 inferior surgeries was anesthesiologist workforce (79.01%). And, the most factor underlying undeliverable surgeries was surgical tools (listed in 32 procedures or 86.49%).

In Betun, the most factors underlying 102 inferior surgeries were diagnostic radiology, ICU and ventilator, anesthesiologist and surgery-supporting workforce (each was present in 100%). And, the most factors underlying undeliverable surgeries were the same as those underlying the inferior surgeries (each was listed in 56 procedures or 100%).

#### Factors Hindering Surgeries

Soe and Kefa were Type C hospitals, and Betun was Type D.

All of the surgeons reported the basic surgical tools available, such as scissors and needle holder, were of inferior quality. There was no Fogarty catheter in any hospitals.

The surgeons reported parenteral nutrition (lipid), heparin, were not available in any of the three hospitals. The surgeons in Soe and Kefa reported an absence of anti-hyperthyroid and thyroid replacement drug. Whole blood transfusion, albumin, premedication for general anesthesia, and general anesthesia were not always available in Soe and Kefa. The surgeon in Betun was only equipped with catgut and silk for suturing, and a few drugs necessary in anesthesia: Prostigmin, atracurium, diazepam, clonidine. The surgeon in Betun often had to prescribe antibiotics, opioid,

and non-opioid analgesics to be bought from another district because they were not always available. Moreover, blood transfusion was not available in Betun.

Basic radiology examinations (USG and x-ray) were available in Kefa, but not in Soe or Betun. Not any of the hospitals employed a radiology specialist.

A room meant to be an ICU and 2 ventilators were available in Soe, but there was not

any health worker trained yet. Thus, the ICU had not been operating yet. In Kefa, the ICU was attended by poorly trained nurses (lack of intubation and fluid monitoring skills) and was operating without a ventilator. A vacant room for ICU and a ventilator were available in Betun, but the room was without electricity, and no nurse had been trained yet.

**Table 4.** Diagnostic Lab Tests Availability

<b>Diagnostic Lab Tests</b>	<b>Soe</b>	<b>Kefa</b>	<b>Betun</b>
Complete blood count	+	+	+
Urinalysis	+	+	+
Liver function test	+	+	+
Renal function test	+	+	+
WIDAL	+	+	+
hCG test pack	+	+	+
Leprosy skin smear	+	+	+
Tuberculosis sputum smear	+	+	+
Malarial blood smear	+	+	+
Dipstick – malaria	+	+	+
Dipstick – syphilis	+	+	-
Dipstick – HIV	+	+	-
Coagulation - BT, CT	+	+	+
Coagulation - PT, APTT, INR	-	-	-

+ = available

- = unavailable

Each district hospital in this study only employed one surgeon, but only in Soe an anesthesiologist specialist was employed. A nurse trained in anesthesiology assisted all surgeries in Kefa. Betun did not have any nurse trained in anesthesiology, causing the surgeon had to do by himself a local or block or general anesthesia whenever possible.

## **DISCUSSION**

Our data depends on the surgeons' concept of a standard quality surgery. Surgeons who due to facility restrictions feels comfortable to rely on physical examination and waive pre-operation diagnostic tests heavily may list more surgeries in the "deliverable" groups. The data also depends on the surgeon's confidence in other workforces' skills, for example, the anesthesiology nurse ability in administering anesthesia to assist the surgery. The unavailability of drug and materials, diagnostic tests (both lab and radiology) may contribute to the number of surgeries the surgeons reported as inferior or undeliverable.

However, the data will provide an insight into the condition of surgical care services in the remote areas which is previously unknown or had a scant information about. A more objective questionnaire should be developed to analyze a district hospital. It hopefully will help the hospital to improve or prepare their facility in order to ensure that the employed surgeon may exercise his or her full competencies.

The WHO recommends Primary Surgical Packages for basic surgical services of District Hospital to ensure essential surgical services availability in poor-resources settings.<sup>7,8</sup> This packages includes surgical procedures related to maternal health and trauma injuries, especially emergency procedures to prevent disability, complications and life-threatening conditions. However, our data showed that some recommended emergency procedures were not available. A total of 20.11% to 38.59% of the surgical procedures listed in the surgeon competency list were undeliverable in any of the hospitals; emergency peripheral embolectomy,

emergency thoracotomy, trepanation or craniectomy in epidural and subdural hematoma, decompression craniectomy for cerebral edema. Consequently, Patients who need these emergency procedures had to be referred to the nearest hospital which is located 2-hours or more drive away. This may contribute to an increased risk of developing debilitating complications and mortality. Thus, it is critical to resolving various factors which are constraining the surgical care services in the area.

The surgical care services in the hospital depend on the type of hospital. It determines the availability of some advanced surgical tools procurement, such as laparoscopy. Laparoscopic surgeries are only available in type A or type B hospital in Indonesia.<sup>9</sup> Because Soe and Kefa hospitals are type C, and Betun hospital is type D, none of the hospitals has the equipment for laparoscopic surgeries. Moreover, the type of hospital influences the ability to provide essential surgical care services with the availability of anesthesiologist. It is regulated that the type C hospital to have an anesthesiologist supported with radiologist and clinical pathology specialist while the type D hospital is only supported with radiologist and clinical pathology specialist without an anesthesiologist.<sup>10</sup> This shows that there is an urgent need for Kefa Hospital to employ an anesthesiologist and all of the hospitals to employ a radiologist in order to deliver a better surgical care service. Hence, the insufficiency in terms of surgical tools procurements and human resources hinder surgeons in delivering optimal surgical care services in rural areas.

## CONCLUSION

The percentage of undeliverable surgeries in West Timor was 20.11% to 38.59%. Due to facility limitations, the 3 districts are deprived of essential emergency surgeries such as emergency peripheral embolectomy, emergency thoracotomy, trepanation or craniectomy in epidural and subdural hematoma, decompression craniectomy for cerebral edema. Improvement in operating tools, drugs and other materials, diagnostic lab, diagnostic radiology, ICU, anesthesiologist workforce, surgery-supporting workforce availability were needed so that a surgeon in a district hospital in a remote area may exercise his or her full competencies.

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