

# Incidence Rate of Urosepsis Complication in Patient with Post DJ Stent Placement at Dr. Moewardi General Hospital Surakarta from January to March 2017: A Retrospective Study

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Author IUR designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author Wibisono managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background:** Double J stent is a tool that is often used by the urologist to reduce and prevent upper urinary tract obstruction and to treat the injury in the ureter segment, with a mechanism to reduce urinary extravasation and accelerate ureter healing. Placement of Double J stent to the ureter has a meaning as implantation of a foreign object in the body that can cause various complications, especially infection. Placement of DJ stent allows the bacteria to colonize in the urinary tract that leads to systemic infection. Urosepsis is a form of non-traumatic emergency marked by systemic infection originating from the focus of infection in the urinary tract causing bacteremia and septic shock.

**Objectives:** To determine the incidence rate of urosepsis complication in a patient with post DJ Stent placement at dr. Moewardi General Hospital Surakarta from January to March 2017.

**Methods:** Descriptive retrospective study design by taking medical record data of a patient with post DJ Stent placement, then adjusted to the research criteria from January to March 2017.  
**Results:** Male patients tend to develop urosepsis 1.3 times greater than female patients, with a percentage of 56%: 44%. Then, according to age criteria, patients with age > 50 years had a tendency 0.5 times greater than patients with age <50 years. (53%: 47%). Based on the length of installation found that patients with DJ stent placement > 1year tend to have sepsis 6.6 times greater than <1 year (87%: 13%).

*Keywords: Urosepsis; complication of DJ stent placement; urinary tract obstruction; non-traumatic emergency.*

## 1. INTRODUCTION

Emergency urology is a major urban emergency that can be caused by trauma or not trauma [1-3]. In urogenital trauma, doctors usually quickly provide help, and if the available facilities are inadequate, it usually refers directly to complete hospital facilities [1,2]. Unlike the case with urogenital non-trauma emergencies, which are often not diagnosed correctly, causing handling errors or delays in referral to a more complete hospital, thus causing organ damage and even a threat to the life of the patient. One of the most common non-traumatic emergency is urosepsis [4,5].

Urosepsis is sepsis caused by infections of the urinary tract, including cystitis, or lower urinary tract and bladder infections, and pyelonephritis, or upper urinary tract and kidney infection [1,6]. The incidence of urosepsis is 20-30% of all septicemia events and often from infection in the urinary tract [5]. The pathogenesis of clinical symptoms of urosepsis is the result of the entry of endotoxin, a lipopolysaccharide component from the bacterial cell wall that enters the blood circulation [7].

Sepsis is a Systemic Inflammation Response Syndrome (SIRS) that occurs due to an infection. Meanwhile, urosepsis is defined as sepsis (septicemia syndrome) caused by an infection in the urinary tract. Urosepsis is a part of sepsis whose severity depends on the host response [6].

DJ stent is a tool often used by the urologist to reduce and prevent upper urinary tract obstruction and handle injuries of the ureter to reduce urinary extravasation and accelerate ureter healing [6]. The placement of a DJ stent in the ureter aims to implant a foreign object in the body that can cause various complications, especially infection. The installation of DJ stent

can make the germs colonize in the urinary tract [6].

Research in hospitals in the United States each year more than 700,000 sepsis patients with mortality reached 35-45%. Then, urosepsis mortality reaches 20-49% if accompanied by shock [8]. According to Surviving rate of Sepsis, sepsis mortality in the ICU was 31.1%, and sepsis deaths occurring in the hospital were 39.8%. Patients who are more susceptible to urosepsis include elderly patients, diabetics, immunosuppressive patients (kidney transplantation recipients), cancer chemotherapy patients, and AIDS [8].

## 2. MATERIALS AND METHODS

### 2.1 Research Purposes

The purpose of this study is looking for the incidence rate of post-DJ Stent patient post-operative complications by sex, age, length of installation, and conformity with urosepsis criteria.

### 2.2 Patients and Methods

The descriptive retrospective study by taking data of medical record of post patient of DJ Stent installation, then adjusted to the criteria in question from period January - March 2017. This study has Inclusion Criteria (general characteristics of research subjects of an affordable target population to be studied), Sex, Age, Older Installation, Urosepsis Criteria (Frequency of breath, body temperature, pulse rate, leukocytes, PaCO<sub>2</sub>, Awareness), and also exclusion criteria (eliminating or removing subjects meeting the inclusion criteria from research due to certain causes) used were patients with comorbid diabetes mellitus and hypertension. A homogeneity data test by using Levene's test.

### 3. RESULTS

Characteristics data from the 63 post-DJ stent-placement patients were described as a whole in the Diagram 1. Male patients tend to have sepsis 1.3 times greater than female patients. With a percentage of 56%: 44%.

Obtained according to age criteria, patients > 50 years of age tended to have sepsis 0.5

times greater than patients <50 years of age. (53%: 47%) (Diagram 2).

Assessment based on the length of the installation was found that patients with DJ stent > 1 year tend to have sepsis 6.6 times greater than those with stent < 1 year (87%: 13%) (Diagram 3).

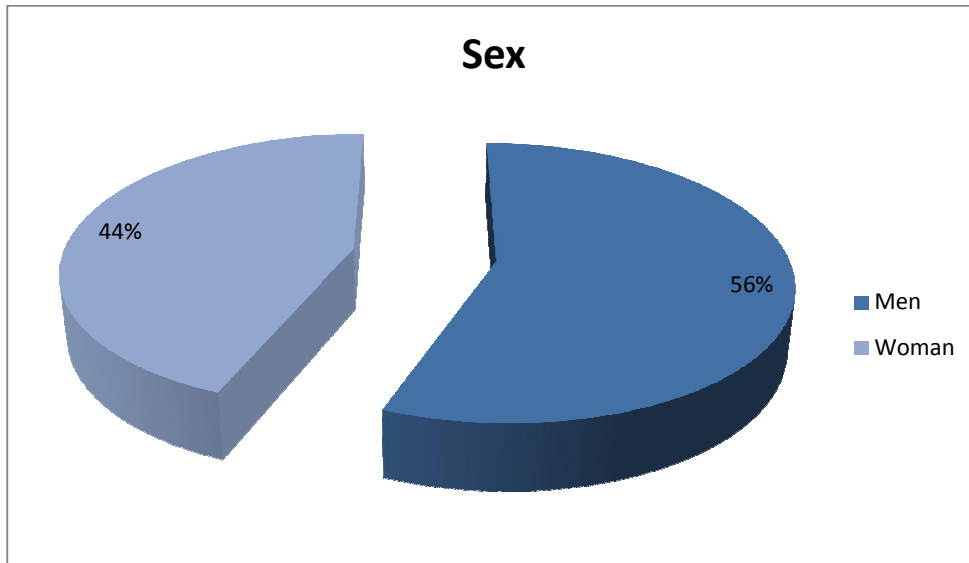


Diagram 1. Sex distribution of urosepsis complication patients post-installation DJ stent from january - march 2017

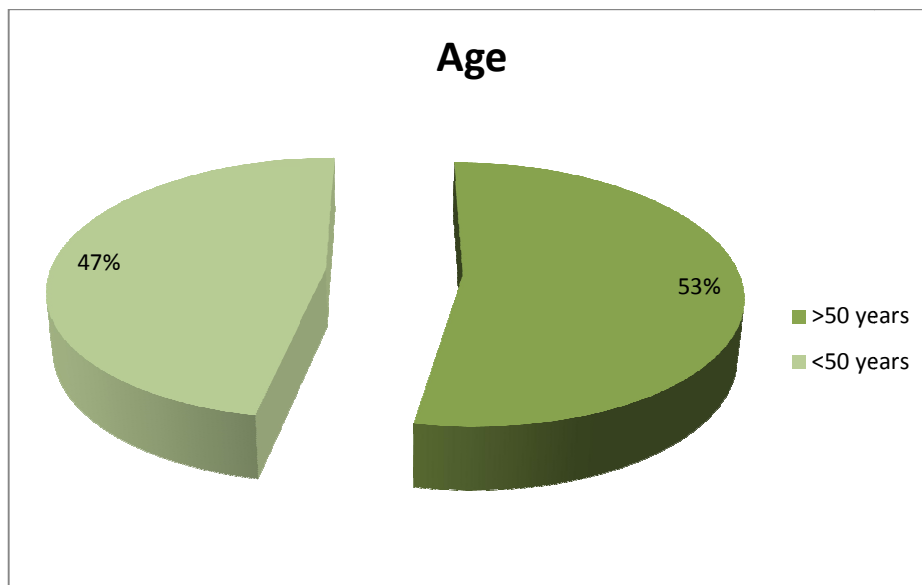
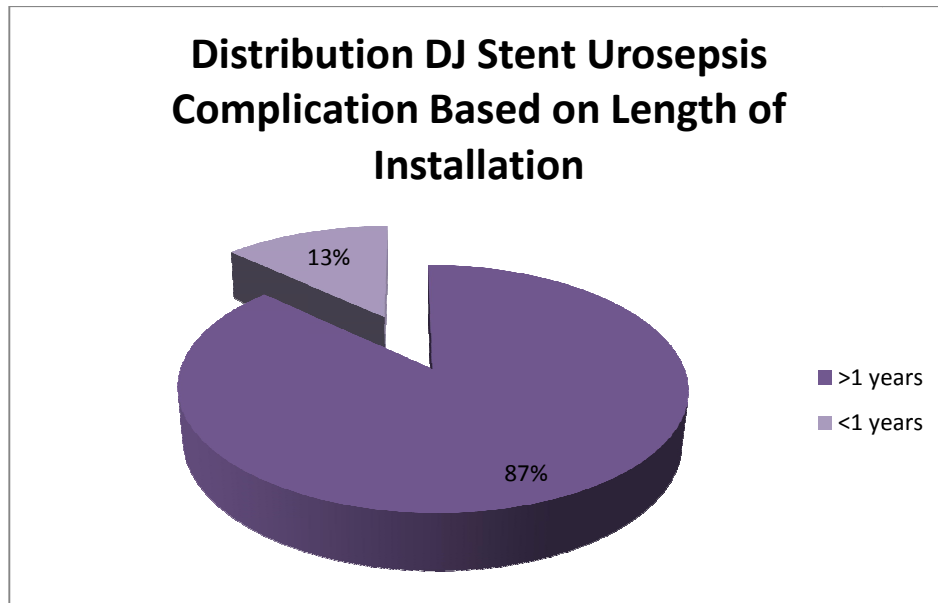


Diagram 2. Age distribution of urosepsis complication patients post-installation of DJ stent from january - march 2017

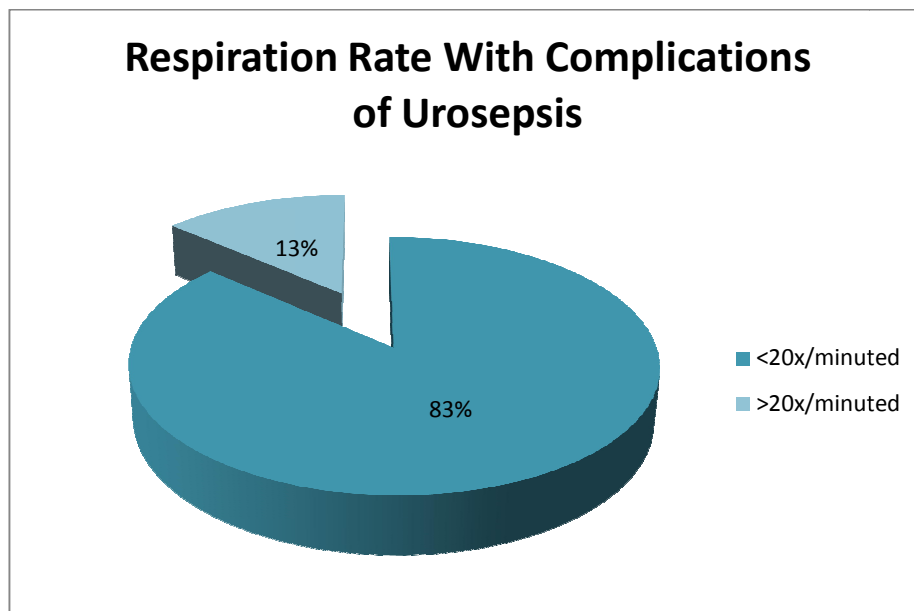


**Diagram 3. Distribution DJ stent urosepsis complication based on length of installation from january - march 2017**

### 3.1 Homogeneity Test

This is to find out whether the data distribution is homogeneous or not. Homogeneity test used Levene's test.

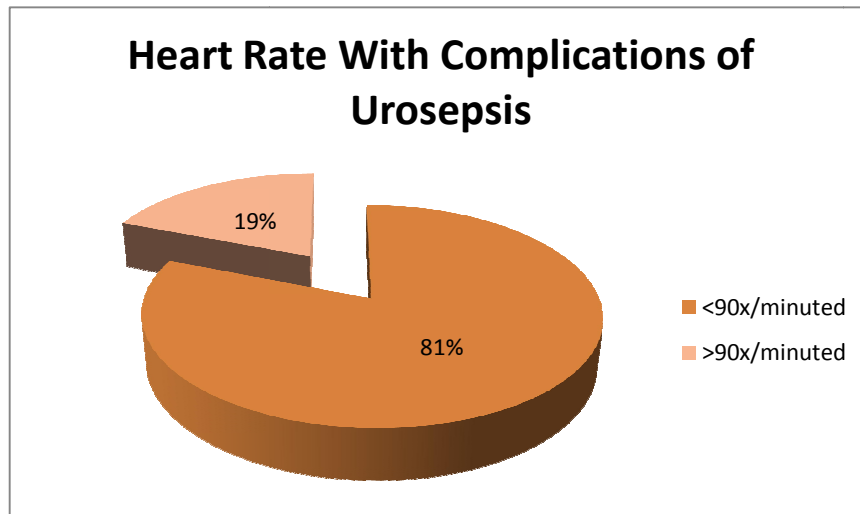
Because the significance (sig) of each data = 0.000 ( $p < 0.05$ ), it can be concluded that the data distribution is homogeneous and can be tested statistically with a parametric test.



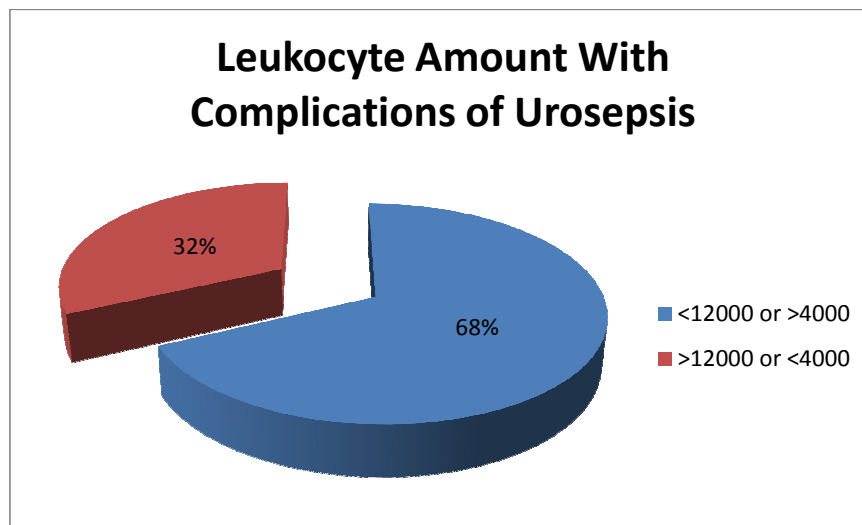
**Diagram 4. Distribution of groups based on urosepsis criteria depend on respiration rate with complications of urosepsis DJ stent from january - march 2017**

**Table 1. Homogeneity test**

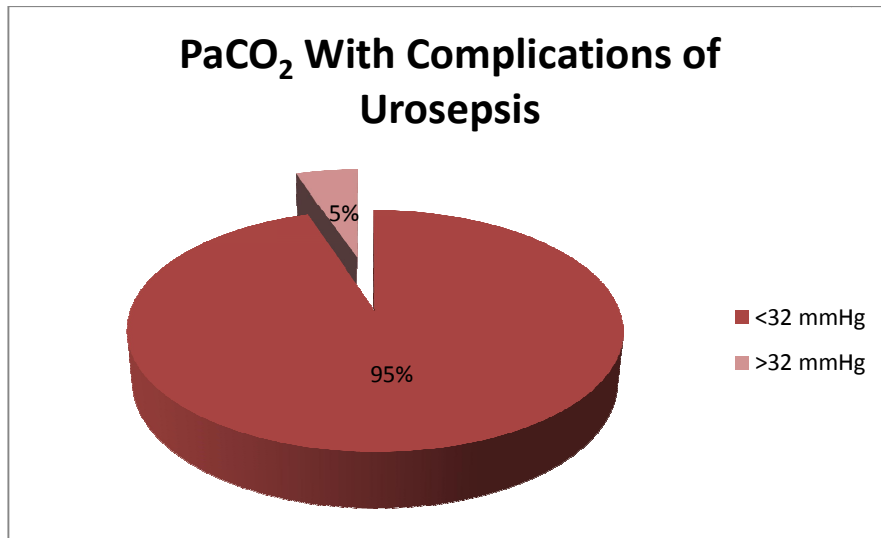
	Levene Statistic	df1	df2	Sig.
RR	247,742	1	60	,000
HR	743,226	1	60	,000
Systole	.	1	.	.
MAP	.	1	.	.
Leukocytosis	112,526	1	60	,000
PaCO2	17,419	1	60	,000
Duration of DJ Stent	2,964	1	60	,000
Awareness	.	1	.	.
Temperature	111,231	1	60	,000



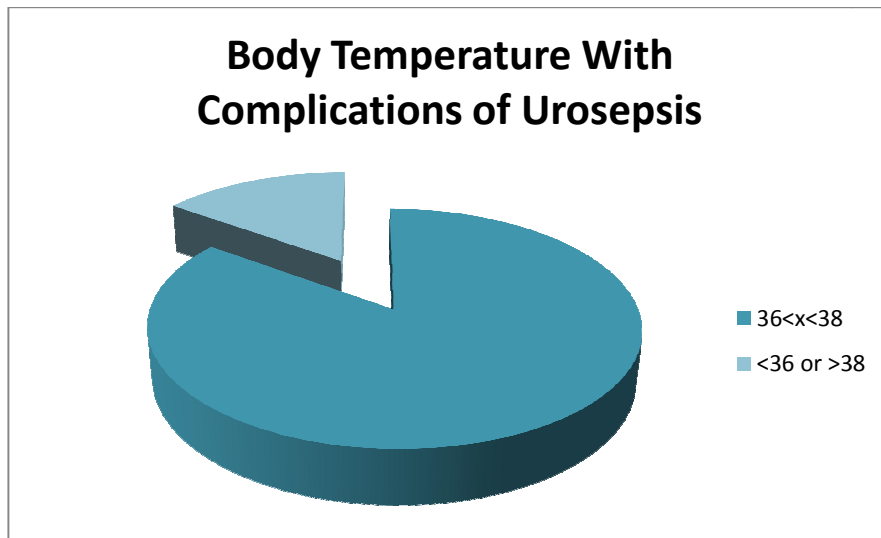
**Diagram 5. Distribution of groups based on urosepsis criteria depend on heart rate with complications of urosepsis post DJ stent from january - march 2017**



**Diagram 6. Distribution of groups based on urosepsis criteria depend on leukocyte laboratory examination patients with complications of urosepsis from January – March 2017**



**Diagram 7. Distribution of groups based on urosepsis criteria depend on levels of Pa CO2 in patients with complications of urosepsis post DJ stent period january - march 2017**



**Diagram 8. Distribution of groups based on urosepsis criteria depend on body temperature with complications of urosepsis post DJ stent period january – march 2017**

**4. DISCUSSION**

The DJ stent is a tool to facilitate the flow of urine from the kidneys to the bladder, which is disturbed due to the obstruction [9]. The installation of DJ stents in the ureters, whether unilateral or bilateral, this procedure can cause some complications, one of the common complications is an infection [9]. Indication of the DJ stent installation is to: Connecting a severed ureter, during the URS procedure the inner lining of the ureter was injured, after URS surgery,

distal ureteral stones because it is feared that the mouth of the ureter will swell so that urine cannot come out, Stenosis or narrowing of the ureter. The DJ stent functions so that after being installed, the narrowing becomes loose. Other Indication if the patient was after the URS with ureteral stones implanted, so that when the URS is finished, the inner lining of the ureter is not good. Surgery for kidney stones, which are numerous, and there is a possibility of residual stones which likely need to use DJ stent. If not installed, prolonged leakage of urine may

occur. DJ Stent is also used if there are large kidney stones and planned ESWL. If not installed, the stone chips can cause pain, secure the urinary tract in cervical cancer patients, secure the kidneys when both kidneys/ ureters are blocked and can only be treated on one side. Then the other side is fitted with a DJ stent. In patients with kidney failure due to urinary obstruction (if nephrostomy is not possible because of minor hydronephrosis) can be used DJ stent [10].

This descriptive retrospective research purpose is to determine the incidence of urosepsis on post-DJ-stent installation in Dr Moewardi general hospital. The subjects of this study were 63 patients that included inclusion criteria, and the method for this study was Total Sampling during January-March 2017. In this study obtained, male patients tend to have urosepsis 1.3 times greater than female patients, and according to age criteria, patients > 50 years old are likely to have urosepsis 0.5 times greater than patients <50 years old. Then, based on the length of installation, it was found that patients with DJ stent > 1st tend to have urosepsis 1.6 times greater than <1 year.

In another study, Patients with bilateral DJ Stent was 4 times more likely to develop urosepsis than unilateral DJ Stent after 6 weeks, and the Fisher test results showed that the installation of DJ stent after 1 week did not affect the onset of urinary tract infections ( $P > 0.05$ ) and the installation of DJ stent after 6 weeks had an effect on the incidence of urinary tract infection ( $p < 0.05$ ). The results showed that after 1 week of installation no patients were suffering from urinary tract infection due to DJ stent (0%) but after 6 weeks of installation 11 patients (34.4%) had urinary tract infection meanwhile 21 other patients (65.6%) did not suffer urinary tract infection. Another analysis using Spearman's rho test obtained  $r = 0.386$  which shows the strength of the weak relationship between the installation of DJ stent and the incidence of urinary tract infections, and the longer the installation of DJ stent, the greater the urinary tract infections that arise.

#### 4.1 Risk Factors [1,3-5]

Several factors increase the risk of urosepsis but not everyone with risk factors will get urosepsis. Risk factors for urosepsis include:

- Advanced immunocompromise due to conditions such as HIV and AIDS, corticosteroid consumption, organ transplants, or cancer treatment
- Diabetes
- Incontinence (inability to control bowel movements)
- Female
- Immobility
- urinary retention
- Polycystic kidney disease
- Pregnancy
- An operation or procedure involving the urinary tract, such as implant installation (DJ Stent)
- Urinary tract obstruction by stones, prostate hypertrophy, and stricture urethra.
- Use of catheter to drain urine

#### 4.2 Urosepsis Criteria [2,5,8,11]

**Criteria I:** Proved bacteremia or suspected sepsis from clinical manifestation.

**Criteria II:** Systemic Inflammatory Response Syndrome (SIRS):

- Body temperature  $\geq 38^{\circ}\text{C}$  or  $\leq 36^{\circ}\text{C}$ .
- Tachycardia  $\geq 90$  beats per minute.
- Tachypnea  $\geq 20$  breaths per minute.
- Respiratory alkalosis  $\text{PaCO}_2 \leq 32$  mm Hg.
- Leukocytes  $\geq 12,000 / \text{mm}^3$  or  $\leq 4000 / \text{mm}^3$ .

**Criteria III:** Multiple Organ dysfunction syndromes (MODS):

- **Heart, Circulation:** Arterial systolic blood pressure  $\leq 99$  mm Hg or mean arterial pressure  $\leq 70$  mmHg, for  $\geq 1$  hour although adequate vasopressor agent resuscitation is administered.
- **Kidney:** Urine production  $< 0.5$  ml / kgBW / hour despite adequate fluid resuscitation.
- **Lungs:** Partial pressure of arterial O<sub>2</sub> ( $\text{PaO}_2$ )  $\leq 75$  mm Hg (indoor air) or Inspiration concentration O<sub>2</sub> ( $\text{FiO}_2$ )  $\leq 250$  (breathing aid)
- **Platelets:** Thrombocyte  $< 80,000 / \text{mm}^3$  or decreased  $\geq 50\%$  in 3 days
- **Metabolic acidosis:** Ph blood  $\leq 7.30$  or lactate plasma  $\geq 1.5$  times normal.
- **Encephalopathy:** Somnolence, confusion, or coma.

From the criteria above sepsis syndrome divided into 3, namely:

1. Sepsis Criteria, I +  $\geq$  2 criteria II.
2. Severe sepsis, Criteria I +  $\geq$  2 criteria II +  $\geq$  1 criteria III.
3. Septic shock, Criteria I +  $\geq$  2 criteria II + arterial refractory hypotension  $\leq$  90 mmHg.

## 5. CONCLUSION

The need for education and dissemination of information to the public, other medical personnel on urosepsis complications, so they can be diagnosed and treated as early as possible.

Due to the installation of a DJ stent performed in the surgery room, appropriate antibiotic prophylaxis administration and education for proper operation preparation may need to be reviewed again.

## CONSENT

It's not applicable.

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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