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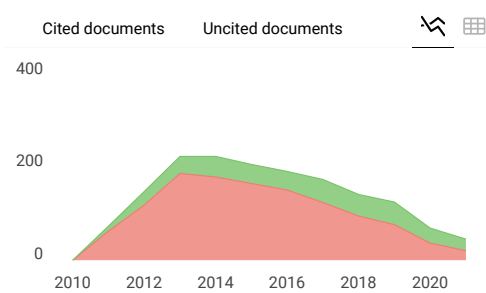
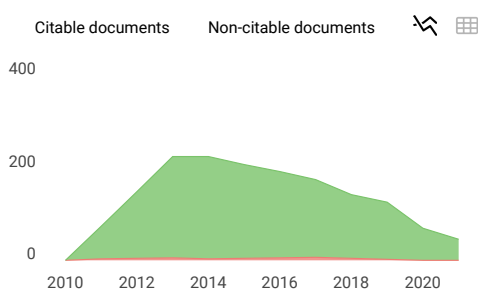
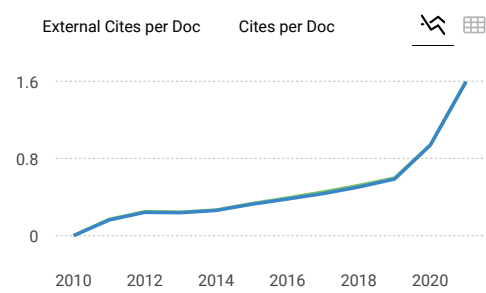
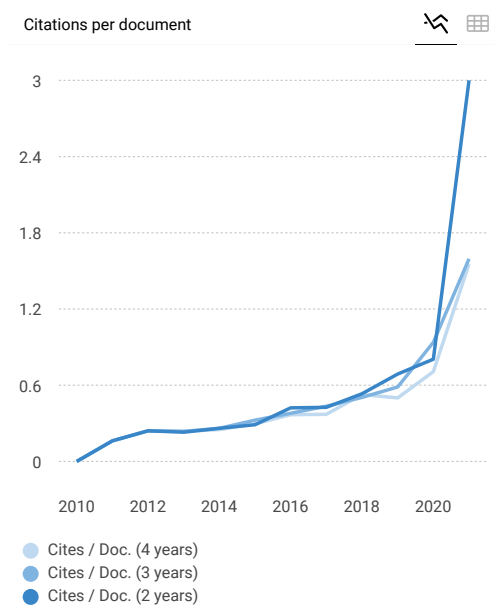
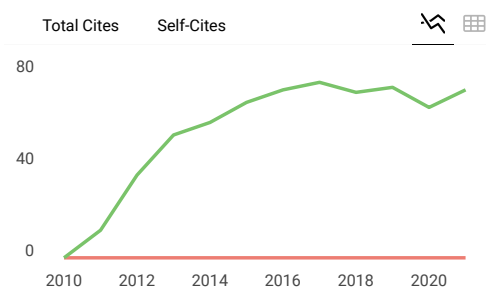
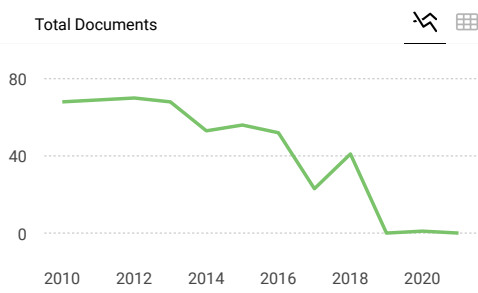
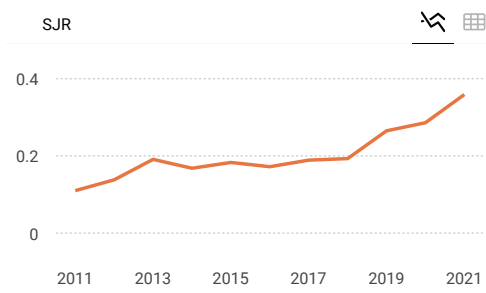
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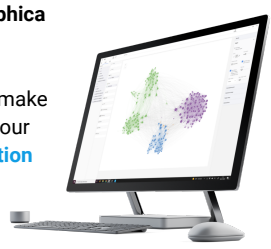
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# Outcome management of Fournier's gangrene cases at tertiary hospital: 7 Years experience

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Soetojo Wirjopranoto  and Yufi Aulia Azmi

## Abstract

**Objective:** This study aims to describe the condition of Fournier's gangrene in Dr. Soetomo General Hospital from January 2014 to December 2020.

**Material and methods:** This study used a retrospective analytic design, by taking data through medical records at Dr. Soetomo General Hospital from January 2014 to December 2020. This study used total sampling with recorded data: age, gender, length of stay, outcome, location, comorbidities, causes, management, culture results, and Fournier's gangrene severity index (FGSI) score.

**Result:** Of the 135 subjects collected, it was found that 55.56% were individuals over 50 years of age. About 91.11% were male patients, with some sites being in the scrotum 50.37%. Only 25.19% of patients had no comorbidities, while the rest had a history of CKD, hypertension, diabetes, or a combination of these diseases. Bacterial cultures obtained were mostly caused by the Enterobacteriaceae bacteria group (32.59%). Of the subjects we studied who experienced mortality, it was found that all were from the group with FGSI >9.

**Conclusion:** From the results of our descriptive study, at a glance, it appears that there is a tendency for the incidence of Fournier's gangrene in the elderly and individuals with comorbidities. And the mortality rate increases with a high FGSI value. So that FGSI could be used as a predictor of mortality in patients with FG.

## Keywords

Fournier, infection, scrotum, epidemiology, gangrene

Date received: 15 April 2021; accepted: 26 August 2021

## Introduction

Fournier's gangrene was first discovered by Dr. Alfred Fournier with a clinical presentation resembling necrotizing fasciitis in the external genitalia and perineum. The characteristic feature of Fournier's gangrene which is difficult to detect is inflammation that occurs in the subdermic area and fascia so that it does not show surface manifestations. The fascia that can be involved in this infection ranges from the fascia of Dartos, Colles, and even Scarpa. Due to the deep location, some doctors often make the wrong diagnosis.<sup>1</sup>

## Epidemiology

Fournier's gangrene has an annual incidence of 1.6 cases in 100,000 men, and the largest incidence age is between 50 and 70 years. Fournier gangrene is more common in men than in women with a ratio of 10:1.<sup>2</sup> Several studies

stated that the incidence of FG 95% accompanied by comorbidities can be in the form of infectious diseases of the anorectal or genitals. One of the diseases that has increased in recent years is diabetes mellitus, which has been shown to play a role in the incidence of FG.<sup>3</sup>

## Risk factor and predisposing factor

Other study stated that 95% of all cases of FG have predisposing factors that support the occurrence of FG.<sup>3</sup> The risk

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factor that has been strongly suspected of causing FG is diabetes mellitus because it has a role in decreasing the effectiveness of the immune system to fight infection. Diabetes mellitus is reported in 20%–70% of all cases of FG and is followed by alcoholism by 25%–50%. Apart from these two ballast, human immunodeficiency virus (HIV) also has a role in the occurrence of FG.<sup>4</sup> Which becomes very important in FG management to evaluate the comorbidities that the patients suffered.

### Etiology

Until now, the exact cause of FG has not been explained, but several events occurred in association with the incidence of FG in patients. Trauma is one of the most likely factors that support the incidence of FG in patients, followed by infection of the gastrointestinal tract, which is often associated with the anus (30%–50%), followed by genitourinary tract infection (20%–40%), and a focus on skin (20%).<sup>5</sup>

Diseases related to the digestive tract such as perianal abscess, appendicitis, diverticulitis, or after hemorrhoidectomy or anal dilation. Those associated with genitourinary infections such as urethral stricture, vasectomy, prostate biopsy, catheterization, etc.<sup>5</sup>

### Method

This study uses a descriptive research design and a retrospective approach. This case report has received a certificate of ethical clearance from Komite Etik Penelitian Kesehatan RSUD Dr. Soetomo with Ref. No: 0375/LOE/301.4.2/III/2021. The research was conducted at Dr. Soetomo from January 2014 to December 2020, with the study subjects of all patients with a diagnosis of Fournier's gangrene.

The sampling technique used was total sampling. The data collected came from the medical records of Dr. Soetomo General Hospital. Data recorded were name, age, sex, length of stay, outcome of therapy, location of gangrene, comorbids, causes, management, Fournier gangrene severity index (FGSI), and bacterial culture results. The results are then presented in tabular and narrative form.

### Result

From the results of this study, it was found that most research subjects came from the age group of 51–60 years (30.37%) followed by ages >60 years (25.19%). When totaled compared to other age groups, those over 50 contributed 55.56% of the total incidence of Fournier's gangrene. However, there was no significant relationship between age and the incidence of death in Fournier's gangrene patients with  $p=0.455$  (Table 1).

**Table 1.** Characteristic patient's based on age compared to therapy outcome.

Age (years old)	<i>n</i>	%	<i>p</i>
20–30	15	11.11	0.455
31–40	16	11.85	
41–50	29	21.48	
51–60	41	30.37	
>60	34	25.19	
Total	135	100	

**Table 2.** Characteristic of the subjects.

Criteria	<i>n</i>	%
Genderis		
Male	123	91.11
Female	12	8.89
Length of stay		
<14	67	49.63
15–28	52	38.52
>28	16	11.85
Outcome		
Survive	112	82.96
Death	23	17.04
Location		
Scrotum	68	50.37
Perineum	44	32.59
Penoscrotum	23	17.04

Table 2 showed that the incidence of Fournier's gangrene in men was 10 times greater than that in women (91.11%–8.89%).

The average length of stay of Fournier's gangrene patients in this study was 13 days with a group distribution <14 days of 49.63% among the others. The total length of stay included the group who died and the group who recovered, with the group that recovered more than 82.96%. Of the total patients treated in this study, only 25.19% had no comorbids, while 62.22% had diabetes, 11.85% had chronic kidney disease, and 25.93% had a history of hypertension. Most locations in this study were in the scrotum by 50.37%, followed by the perineum and in the penoscrotal. With most causes caused by perianal abscess amounted to 42.96%. From these results in Tables 3 and 4, it appears that there is no significant relationship between therapeutic outcomes and comorbidities with  $p=0.204$ .

Prior to medical or surgical treatment, the wound was swabbed and cultured. From the results obtained, *Klebsiella* sp. and *Pseudomonas* spp. has the highest percentage of incidence, amounting to 17.78%. Although the incidence of Fournier's gangrene is often associated with



**Table 3.** Patient's comorbidities compared to therapy outcome.

Comorbidity*	n	%	p
DM	84	62.22	
CKD	16	11.85	
HT	35	25.93	
No comorbid	34	25.19	
Total	135	100	
Among female subjects			0.244
DM	6	50	
CKD	1	8.3	
HT	—	0	
No comorbid	5	41.67	

\*Some subjects had two or more comorbid.

**Table 4.** Management of Fournier's Gangrene.

Surgical management	N	%
Debridement + Necrotomy	135	100
Total	135	100

**Table 5.** Bacterial culture.

Culture result	n	%	p
Klebsiella pneumonia	24	17.78	
Acinetobacter baumannii	19	14.07	
Candida, sp	7	5.19	
E.Coli	20	14.81	
Pseudomonas aeruginosa	24	17.78	
Clostridium Perfringens	5	3.70	0.404
Streptococcus beta-haemolyticus	5	3.70	
Fusobacterium	13	9.63	
Staphylococcus epidermidis	3	2.22	
Gemella morbillorum	1	0.74	
Streptococcus bovis II	1	0.74	
Steril	13	9.63	
Total	135	100	

the infectious process, 9.63% obtained sterile cultures and it is not known which microorganism causes the disease.

From the results of the comparative test, it was found that there was no relationship between microbiologic culture found and treatment outcomes with  $p=0.404$  (Table 5).

Additional therapy that we give to patients in addition to surgical therapy is antibiotic therapy. A total of 35 subjects (26%) used ceftriaxone as a postoperative antibiotic, while the remaining (74%) used metronidazole as a postoperative antibiotic.

Fournier gangrene severity index (FGSI) was used to assess the severity of Fournier gangrene, in our study, of all subjects 65.93% had an FGSI value  $<9$  while 34.07% had a value  $>9$ . 50% of those who had FGSI  $>9$  were

**Table 6.** Additional treatment of the subjects.

Antibiotics	n	%
Ceftriaxone	35	26
Metronidazole	100	74
Total	135	100

**Table 7.** FGSI Score overall compared to therapy outcome.

FGSI score	n	%	p
$<9$	89	82.96	
$>9$	46	17.04	
Total	135	100	
Outcome among $>9$			$<0.001$
Survive	23	50	
Death	23	50	
Total	46	100	

subjects with outcome death, and of all subjects who died 100% had FGSI scores  $>9$ .

In the comparative test, it was found that there was a relationship between the results of therapy and the FGSI number, it can be seen in Table 6. It appears that there is a significant relationship with  $p < 0.001$ .

## Discussion

Fournier's gangrene is a necrotizing fasciitis whose occurrence and healing process is mostly related to the balance of the immune system of the host involved.<sup>6</sup> In our findings, patients with increasing age are at increased risk of developing Fournier's gangrene. The mean age of our study subjects was 50.89 years, not much different from the findings of Garg et al.<sup>6</sup> with a mean age of 56.27 years. This can be related to the susceptibility of the elderly to infections and associated with degenerative diseases.<sup>7</sup>

In our study, it was also found that the majority of cases came from male subjects (91.1%) while only a small proportion (8.9%) came from the female group. This finding is also in line with the epidemiological study of Sorensen et al.<sup>8</sup> of the 1680 study subjects, there were only 39 female subjects. In addition, the incidence of Fournier's gangrene is strongly associated with comorbidities. In our study, it was found that only 25.19% of patients had no comorbidities while the other subjects had comorbidities. Of the highest, the incidence of Fournier's gangrene associated with diabetes mellitus was 62.22%. This finding is in line with Garg's research, which states that 36.1% of patients affected by Fournier's gangrene have a history of diabetes mellitus.<sup>6</sup>

The most common cause of Fournier's gangrene in our study was perianal abscess of 42.96%. This was also confirmed by the findings of culture results from study subjects, which 32.59% were caused by enterobacteriaceae.

Apart from being caused by an abscess, any contact with non-sterile mucosa (in this case the urinary tract and colorectal tracts) can cause contamination of Fournier's gangrene which can aggravate the wound condition.<sup>9</sup>

In our study, all study subjects received antibiotic therapy after surgery, receiving 74% of metronidazole and 26% of ceftriaxone. Necrotic tissue needs to be removed because it interferes with the wound healing process and can become a place for bacterial growth which can then aggravate the infection at the gangrene site.<sup>9</sup> In addition to surgery, in some cases systemic antibiotics can also be given to help eliminate bacteria at the site of gangrene.<sup>10</sup> Antibiotic therapy given to patients with FG can focus on giving ampicillin-sulbactam in combination with metronidazole or clindamycin. In conditions where methicillin-resistant *Staphylococcus aureus* (MRSA) is found, ampicillin-sulbactam can be replaced with a cephalosporin group antibiotic.<sup>11</sup>

FGSI is one of the scores used to evaluate the severity of Fournier's gangrene and is directly proportional to the incidence of mortality in patients.<sup>6,12</sup> In this study, the mortality rate was 17.04%, and all of them had an FGSI rate >9. This finding is in line with the study of Garg et al., which showed that patients who did not respond to therapy had a higher FGSI value.

This study has limitations, this study only involved one center, so that epidemiological conditions could not be determined from this study. So that the next research can be carried out by involving several reference centers so that epidemiological research can be carried out which is more representative of the condition of the population

## Conclusion

Fournier's gangrene is a disease that has a high mortality if adequate therapy is not accomplished. Comorbid control and wound bed preparation is one of the steps that determines the success of the management of Fournier's gangrene therapy. Special attention needs to be given to patients with an FGSI of more than 9 because the mortality rate is quite high in this group.

## Author contributions

Soetojo Wirjopranoto: Conceptualization, Investigation, Methodology, Resources, Validation, Writing-Original Draft, Writing-Review and Final Editing. Yufi Aulia Azmi: Conceptualization, Investigation, Methodology, Resources, Validation, Data Curation, Investigation, Writing-Original Draft, Formal analysis.

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