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Understanding the Prodrome of Fournier's Gangrene and Missed Opportunities for Earlier Diagnoses

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Introduction

- Fournier's Gangrene carries a high mortality and delay in treatment after diagnosis has been shown to affect patient survival. It is less clear how a delay in diagnosis affects outcomes.
- We aimed to characterize healthcare utilization in a large population of insured patients prior to their diagnosis of Fournier's in order to better understand the natural history of the Fournier's Gangrene prodrome.
- We **hypothesized** patients that a significant percentage of patients would present to healthcare providers with symptomatically similar diagnoses (SSD) to bladder cancer in the year leading up to formal diagnosis

Methods

Patient Population

- Insured adults with a new diagnosis of Fournier's Gangrene between 2001 and 2017 with evidence of surgical debridement

Study Design

- Retrospective review of the Truven Health Analytics Commercial Claims and Encounters Database
- All healthcare utilization examined in year prior to diagnosis.
- Administrative codes that were commonly found within the Fournier's Gangrene cohort were compiled.

Study Analyses

- The top 500 administrative billing codes found in the year prior to diagnosis were analyzed for their relationship to Fournier's Gangrene using change-point analysis.
- Candidate diagnoses were identified as those with an incidence that significantly changed (i.e. acute change in incidence slope) in the year prior to Fournier's Diagnosis.
- Candidate diagnoses were then analyzed for their symptomatic relationship to Fournier's (e.g. cellulitis (related), arthritis (unrelated))
- Symptomatically similar diagnoses (SSD) were aggregated and simulation models were run to determine the cumulative change point in the Fournier's Gangrene cohort when the diagnosis could have reasonably been made.

Results

Figure 1. Examples of encounters for specific ICD codes prior to diagnosis of FG, plotted over time

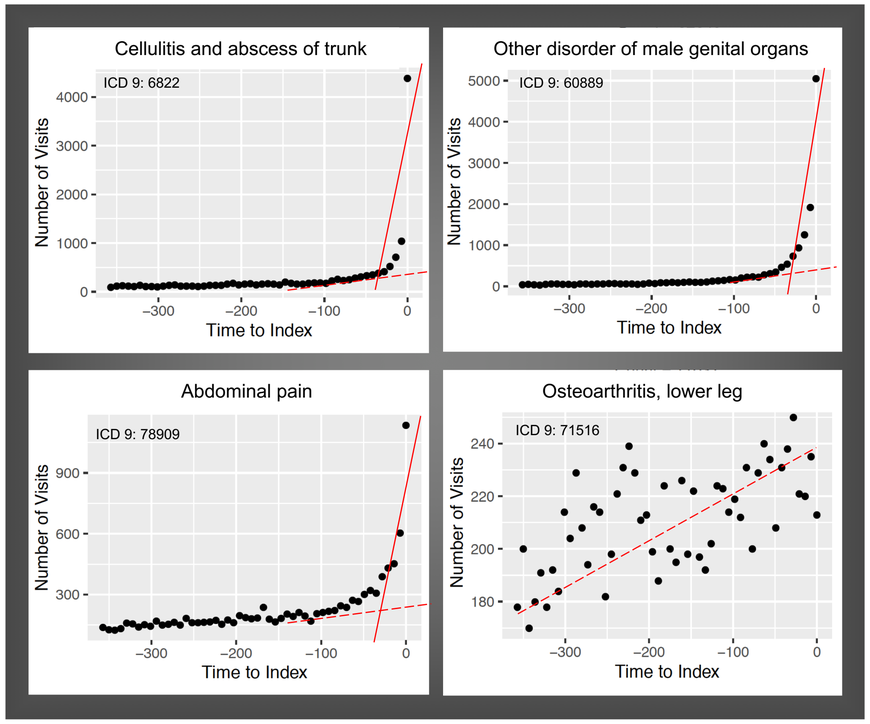

Figure 2. Aggregate encounters for SSDs prior to diagnosis of FG, plotted over time

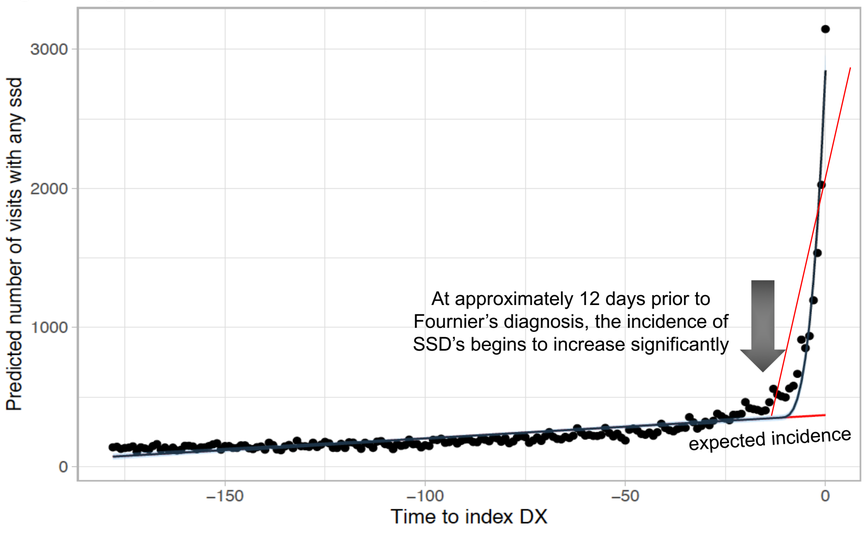

Table 1: Demographics	n
Patients diagnosed with Fournier's Gangrene (n)	22,087
Age, mean (yrs)	52 ± 41 - 61
Gender, no. (%)	
Male	17,225 (78%)
Female	4,862 (22%)

Table 2: Details of Patient Presentation	n
Mean duration prior to FG diagnosis where diagnostic opportunities existed (days)	12 (CI 12 – 13)
Number of healthcare encounters where diagnostic opportunities existed (n)	8,230 (CI 8,029 – 8,606)
Patients with opportunity for earlier diagnosis (n)	6,554 (CI 6,393 – 6,732)
Most common SSDs, grouped by category	
Skin and soft tissue infections (%)	58.7
Male external genitalia abnormalities (%)	38.2
Pain/discomfort (%)	23.3
Mean estimated opportunities for earlier diagnosis per patient with ≥ 1 SSD (n)	1.26 (CI 1.25 – 1.s9)
Estimated mean duration of diagnostic delay (days)	3.09 (CI 2.97 - 3.25)

Discussion/Conclusions

- On average, patients with Fournier's Gangrene begin to present with SSD's 12 days prior to formal diagnosis. The most common diagnoses include a) skin infection, b) genitalia abnormalities, c) pain
- Simulation models suggest the estimated delay in diagnosis of the entire cohort is 3.09 days.
- Future Studies:
  1. Determining the impact of diagnostic delay on stage of presentation and treatment outcomes
  2. Development and testing of "trigger rules" that can be integrated into an EMR to aid in earlier Fournier's diagnosis and/or prevention