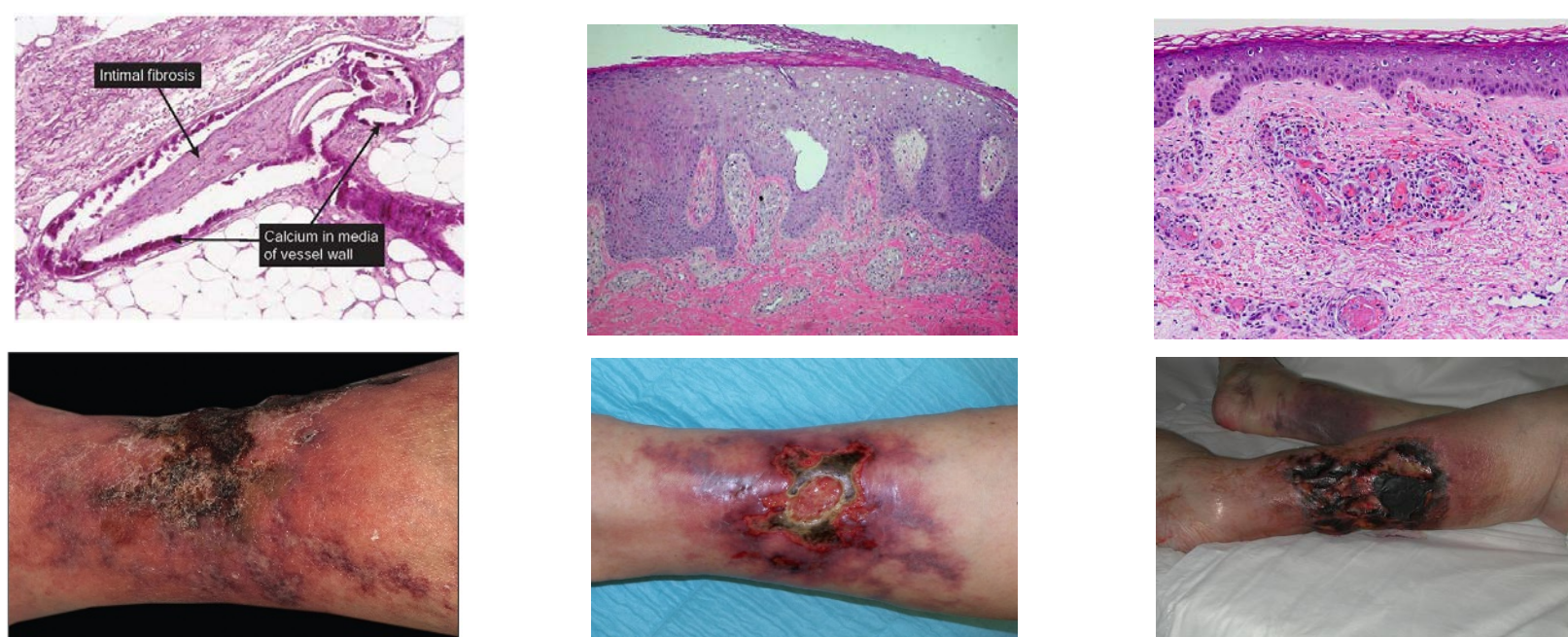


INTRODUCTION

- Calciphylaxis (CUE) (1898), Coumadin Necrosis (CN) (1954) and Pyoderma Gangrenosum (PG) (1916) are rare, poorly understood conditions that present with painful ulceration and necrosis in the skin
- In our clinical experience, these diseases are almost exclusively seen in women and temporally relate to a change in drug load or a change in clearance capacity in already sick individuals. We sought to study drug load and clearance capacity with gender in three diseases with overlapping clinical features.
- Figure 1: Microscopic and Gross Images of the Three Pathologies of Interest



METHODS

- ICD 9 and 10 codes were combined with laboratory (LOINC), procedure (CPT) codes and drug burden.
- PG had the most precise coding structure in 9 and 10, CUE and CN were embedded in larger codes and required accessory LOINC and CPT codes to narrow the search. Data in Health Facts is extracted using ICD 9 and 10, LOINC, CPT and NDC
- Table 1. Query tool combining ICD 9 and 10, LOINC, CPT

	calciphylaxis	coumadin necrosi	pyoderma gangrenosum		
age					
gender					
BMI					
race					
cholecystectomy	not used	not used	not used	not used	
creatinine					
albumin					
lnr	not used	not used	not used	not used	not used
ca phosphorus	not used because it is re	not used because it	not used because it is related t	not used because it is	
drug>5					
ICD 9 codes that help isolate					
calcification disorders 275.49					
coumadin necrosis 709.8	improved in 2nd round	improved in 2nd round	improved in 2nd round with T	improved in 2nd round	
pyoderma gangrenosum 696.01	taken out of 2nd round	taken out of 2nd round	taken out of 2nd round	taken out of 2nd round	
wound care V58.30					
gangrene 785.4					
dermatomyositis 710.3	not used	not used	not used	not used	
ICD 9 to take out and narrow					
decubitus heel 707.07	not used	not used	not used	not used	not used
kidney stones 590.51	could not be accessed	could not be accessed	could not be accessed	could not be accessed	
CPT codes that help					
dialysis 90935, 37, 60, 61, 62					
histopath 88305	not used	not used	not used	not used	not used
skin bx 11100	not used	not used	not used	not used	not used
wound care 97597, 98	taken out in 2nd statisti	taken out in 2nd statisti	taken out in 2nd statisti	taken out in 2nd statisti	
wound care debride 11040, 41, 42	taken out in 2nd statisti	taken out in 2nd statisti	taken out in 2nd statisti	taken out in 2nd statisti	
CPT to take out to narrow					
lithotripsy 52317, 18					

- Gender, BMI ,presence of polypharmacy, Albumin <2.5, Cholecystectomy, Cr > 1.5, and presence of warfarin were variables of interest
- UMKC IRB Protocol ID: 14-567

RESULTS

The FREQ procedure in SAS was used for analysis of interested variables in 8559 patients; 1325 with PG, 3566 with CN and 3668 with CUE

PG showed a gender predominance in women

- Patients with PG and CN had a higher BMI
- Patients with CUE had the highest percentage of polypharmacy
- Patients with PG and CUE tended to have lower albumin
- The rate of cholecystectomy was similar across all three
- Patients with CUE were more likely to have an elevated Cr level
- Higher use of warfarin was seen in both CN and CUE
- Table 2: Results

	Gender F/M	BMI (>25)	5 drugs	low alb (<3)	chole	cr>1.5	warfarin
PG	64/36	65	32	99	3	39	3
control		35	68	1	97	61	97
CN	46/54	64	28	69	3	43	8
control		36	72	31	97	57	92
CUE	51/49	57	50	98	5	64	7
control		43	50	2	95	36	93
	PG is the only one that shows gender predominance in women.	PG and CN show higher BMI %	CUE has the highest % of polypharmacy	PG and CUE both show high % of low alb	Similar across all 3 diseases	CUE show high % of elevated creatinine	CN and CUE show higher use of warfarin

SUMMARY

- Although CUE, CN, and PG have similar features at the bedside, direct comparisons were complicated by imprecision in physician generated coding systems
- ICD 10 was more precise for CN than ICD 9

CONCLUSIONS AND FUTURE PROJECTS

80% of data in medical records is unstructured and not linked in ways that could improve patient safety and outcomes

- Although not shown in this study, our experience is consistent with the scenarios described in figure 1, that critical interrelationships can be found between drug addition and/or clearance breach immediately preceding the onset of disease. Changes in drug load and clearance measures are found in the medical record and could be linked with NDC, CPT and LOINC codes for predictive modeling.
- Predictive modeling of risk is an important topic in many industries, particularly the industrial sector and medicine. Sensors and performance data can be correlated to predict failure and need for maintenance in the 'Internet of Things.'
- Digital insight for off target drug effects within the medical record will require the alignment of time stamped pharmacy data with changes in clearance capacity. An ontology for rapid onset, single organ disease would improve navigation around antiquated clinician generated nomenclature.
- Machine learning can accommodate missing data by modeling structured data such as gender, age, BMI, quantitative change in drug burden and defined laboratory values.

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