

A Descriptive Quantitation of Cardiac Amyloidosis Related Hospitalizations in Saskatchewan

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Background

Cardiac amyloidosis is a condition in which there is systemic production and deposition of the amyloidogenic protein fibrils in the cardiac muscle and surrounding tissues. This infiltrative process makes it difficult for the cardiac tissue to contract effectively and pump blood to the human body.

Most common forms of amyloid proteins include the immunoglobulin light chain proteins (AL; "L" referring to light chain) and the transthyretin proteins (ATTR). AL proteins are produced as a result of plasma-cell dyscrasia. Therefore, this type of cardiac amyloidosis can be associated with conditions such as multiple myeloma.

Alternatively, ATTR can be due to wild-type or hereditary defects in the TTR protein that predisposes it to misfolding and aggregating.

Cardiac amyloidosis is under-diagnosed as diagnostic methods are not well established. Due to the less common exposure of cardiac amyloidosis on the wards, physicians are not as knowledgeable about diagnostic methods nor have an established care pathway to follow.

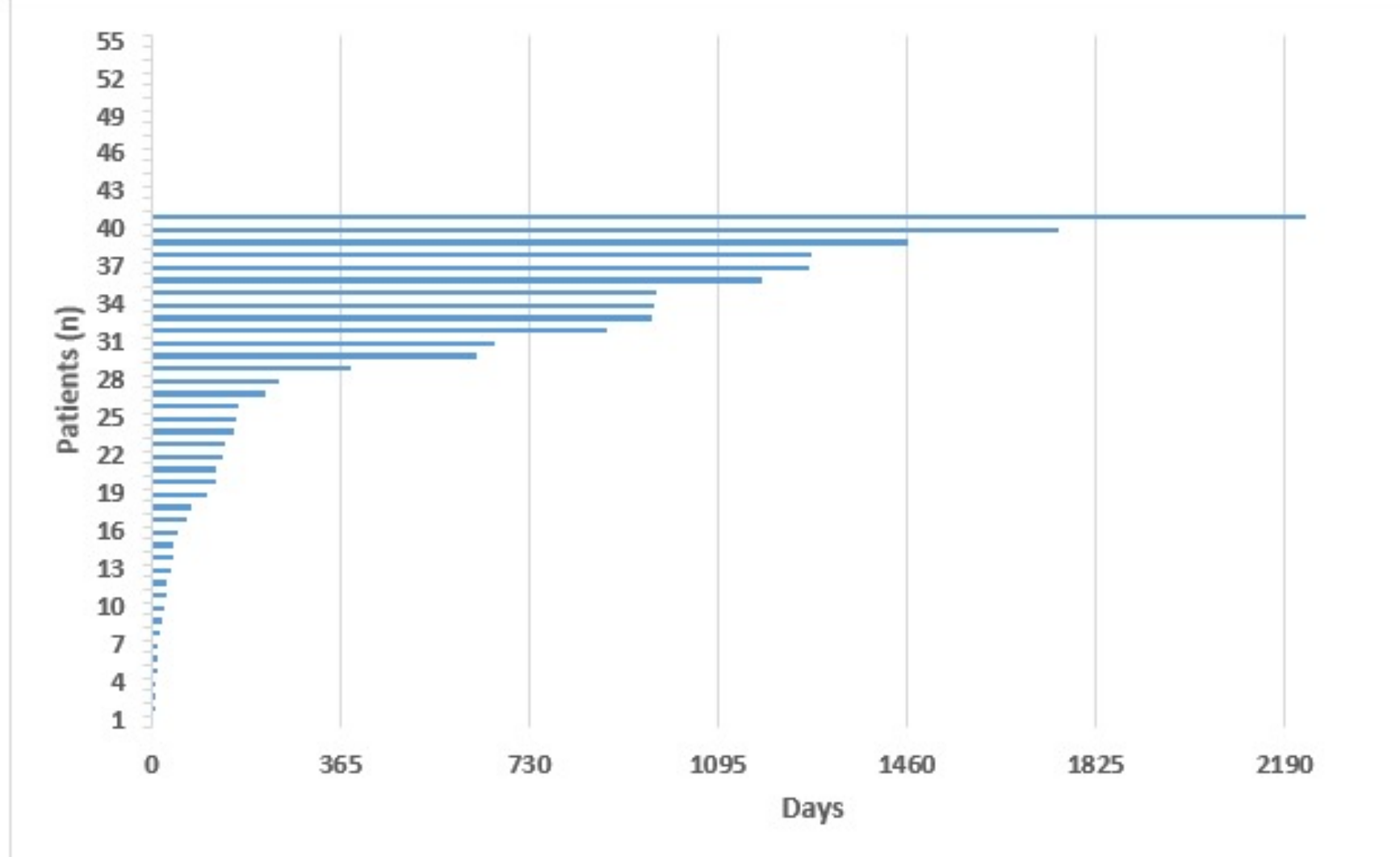
Objectives

- To determine the hospitalization rate of cardiac amyloidosis between 2010 and 2020 in Saskatchewan
- To explore the characteristics, hospitalization, and outcomes of cardiac amyloidosis in Saskatchewan.

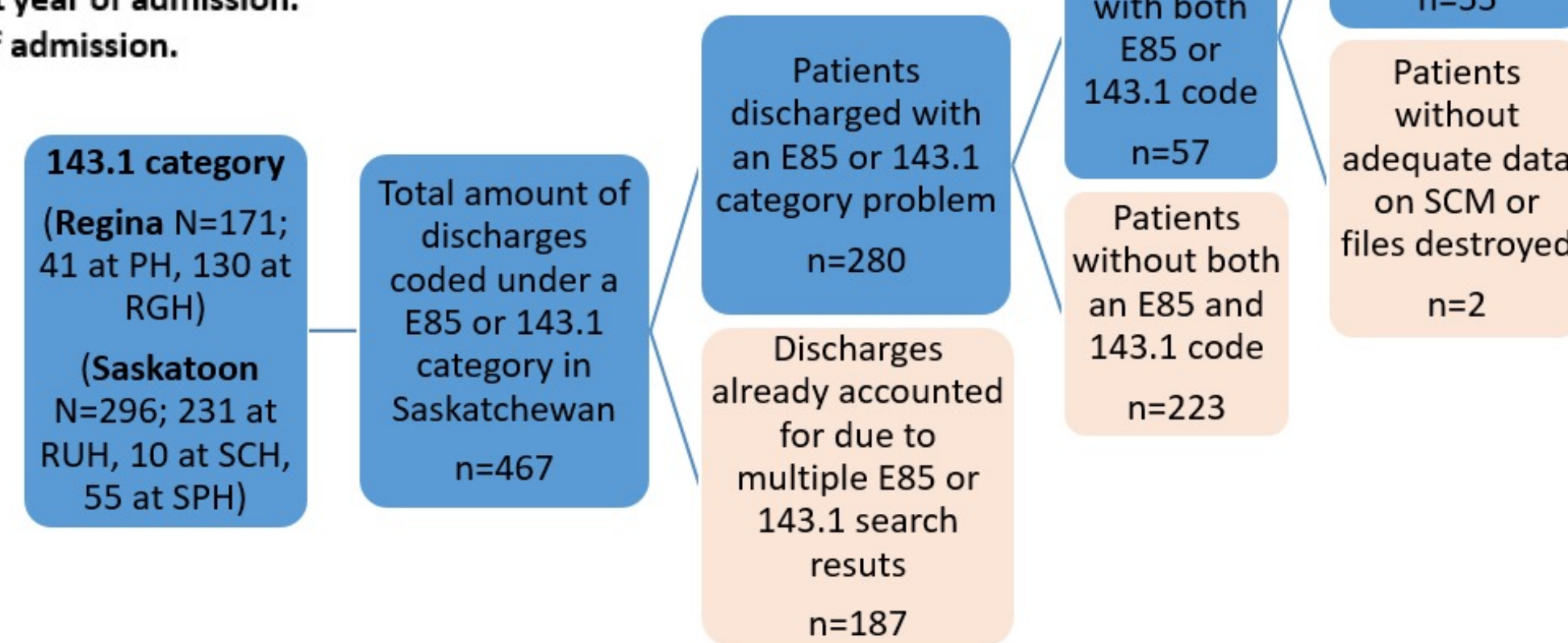
Materials & Methods

- A retrospective cohort study of cardiac amyloidosis related hospitalizations was performed in Regina and Saskatoon, Saskatchewan. Admission records from 2010 to 2020 were reviewed at Regina General Hospital and Royal University Hospital based on International Classification of Diseases (ICD-10) codes.
- Data was obtained through documents, lab results, and medical imaging stored on Sunrise Clinical Manager (SCM) as well as in physical paper charts found at Royal University Hospital, St. Paul's Hospital, Regina General Hospital, and Pasqua Hospital. This data was reviewed by a medical student who was not involved in the assessment or treatment of the patients. Informed consent was not obtained from patients as data retrieved from patient charts was deidentified on the data abstraction form and research database.
- Categorical data was summarized in counts and percentages. Continuous data was summarized as means and standard deviation.

Results



Graph: Time Elapsed from Admission Date to Death
28/41 (68.3) patients that died did so within 1 year of admission.
50% of study population died within 1 year of admission.



Blood Markers of included Participants

	N	Mean	SD
Most recent LVEF (%)	54	41.7241	12.42
Blood Urea (mmol/L)	55	11.23	5.56
Creatinine (µmol/L)	55	155.27	121.49
Albumin	54	28.75	6.65
Troponin	51	371.94	1416.01
HDL (mmol/L)	36	1.02	0.29
LDL (mmol/L)	31	2.24	0.83
TG (mmol/L)	37	1.06	0.41
Total Cholesterol (mmol/L)	36	3.57	1.11
Random glucose	52	6.15	1.58
HbA1c (%)	17	6.10	0.89
Hemoglobin (mmol/L)	53	125.36	22.10
TSH	31	6.57	7.81
Free T4	26	15.36	3.62
ALP-alkaline phosphatase	46	135.59	127.75
ALT-alanine aminotransferase	49	28.84	19.68

Common ECG Findings

	Frequency	Percent
Atrial Fibrillation		
No	30	54.5
Yes	25	45.5
Left bundle branch block		
No	49	89.1
Yes	6	10.9
Right bundle branch block		
No	44	80.0
Yes	11	20.0
AV Block		
No	40	72.7
Yes	15	27.3
Sinus Rhythm		
No	51	92.7
Yes	4	7.3
NSTEMI		
No	52	94.5
Yes	3	5.5
Premature Ventricular Contractions		
No	49	89.1
Yes	6	10.9

Common Reasons of Hospitalization

	Frequency	Percent
Edema		
No	43	78.2
Yes	12	21.8
Cardiac symptoms (Chest pain, A-Fib, etc)		
No	33	60.0
Yes	22	40.0
Shortness of breath		
No	29	52.7
Yes	26	47.3
Neurological (syncope, TIA)		
No	40	72.7
Yes	15	27.3
General weakness		
No	42	76.4
Yes	13	23.6
Gastrointestinal (epigastric pain, nausea, diarrhea)		
No	50	90.9
Yes	5	9.1

Common Echo Findings

	Frequency	Percent
Left ventricular hypertrophy		
No	1	27.3
Yes	54	72.7
Right ventricular hypertrophy		
No	45	81.8
Yes	10	18.2
Diastolic dysfunction		
No	33	60.0
Yes	22	40.0
Systolic dysfunction		
No	50	90.9
Yes	5	9.1
Mitral regurgitation		
No	50	90.9
Yes	5	9.1
Tricuspid regurgitation		
No	47	85.5
Yes	8	14.5
Aortic stenosis		
No	50	90.9
Yes	5	9.1

Basic Demographics & Comorbidities

	Frequency	Percent
Location		
Regina	14	25.5
Saskatoon	41	75.5
Age (years)		
<40	1	1.8
40-64	19	34.5
65-74	11	20.0
75-84	11	20.0
>86	13	23.6
Gender		
Female	19	34.5
Male	36	65.5
BMI		
Normal Weight	16	29.1
Overweight	31	56.4
Obese	8	14.5
Current Smoker		
Smoker	11	20.0
Ex smoker	15	27.3
non smoker	29	52.7
Coronary Artery Disease		
No	30	54.5
Yes	25	45.5
Hypertension		
No	9	16.4
Yes	46	83.6
Orthostatic Hypotension		
No	33	60.0
Yes	22	40.0
Diabetes		
No	40	72.7
Yes	15	27.3
Dyslipidemia		
No	17	30.9
Yes	38	69.1
Diagnosis of CHF		
No	6	10.9
Yes	49	89.1
History of AS		
No	38	69.1
Yes	17	30.9
Thyroid problems		
None	33	60.0
Hyperthyroidism	2	3.6
Hypothyroidism	20	36.4
Multiple Myeloma		
No	45	81.8
Yes	10	18.2

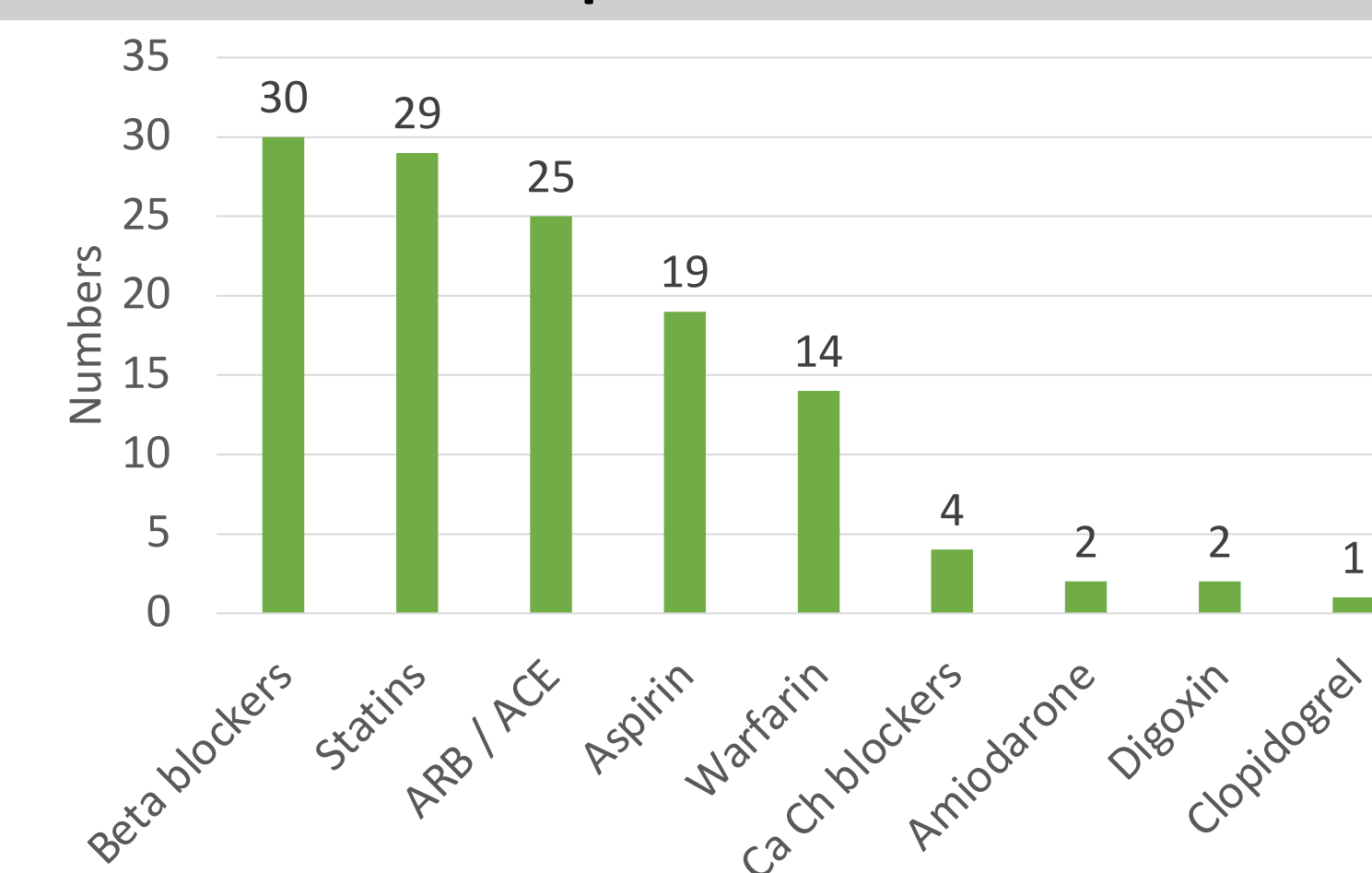
Conclusions

- Cardiac amyloidosis often presents with nonspecific symptoms as demonstrated in this study. Therefore, considering it is a less common condition, the possibility of under-diagnosis is high.
- Majority of the patients did not have a formal diagnosis and typing of their amyloidosis. The diagnosis was made on the basis of echocardiograph and ECF findings in conjunction with a diagnosis of CHF. This results in treatment that is less effective.
- Mortality was as high as 50% within the first year after admission in Saskatchewan. This highlights the delay and ineffectiveness of our current care pathway
- The study is limited by the absence of definitive diagnosis of cardiac amyloidosis in patient as numerous patient records showed symptoms associated with cardiac amyloidosis as well as a systemic amyloidosis code on discharge but no cardiac amyloidosis code.
- This study will serve as baseline data for future studies in order to create an effective care pathway in Saskatchewan that establishes diagnostic methods and treatment

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Medication use among Cardiac Amyloidosis patients



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