DEPARTMENT OF INTERNAL MEDICINE
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THE FOLLOWING:

PODIUM JUDGES

Dr. Shantanu BANERJI
Associate Professor, Section of Hematology and Oncology

Dr. Liam O’NEIL
Assistant Professor, Section of Rheumatology

Dr. Navdeep TANGRI
Associate Professor, Section of Nephrology

POSTER JUDGES

Dr. Christina KIM
Assistant Professor, Section of Hematology and Oncology

Dr. Asher MENDELSON
Assistant Professor, Section of Critical Care

Dr. Barret RUSH
Assistant Professor, Section of Critical Care

BEST PUBLISHED PAPER JUDGES

Dr. Danielle DESAUTELS
Assistant Professor, Section of Hematology and Oncology

Dr. Shuangbo LIU
Assistant Professor, Section of Cardiology
DEPARTMENT OF INTERNAL MEDICINE
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TOPIC: RESEARCH DURING A PANDEMIC: BUILDING THE PLANE WHILE FLYING IT

DATE: Tuesday, November 16, 2021
TIME: 8:00 am
VIA ZOOM

DR. SRINIVAS MURTHY MD,
Investigator – BC Children’s Hospital
Clinical Associate Professor,
Department of Pediatrics, Faculty of Medicine, University of British Columbia

Srinivas Murthy | BC Children’s Hospital Research Institute (bcchr.ca)
ASSOCIATION OF PHYSICAL ACTIVITY AND POOR HEALTH OUTCOMES IN PATIENTS WITH ADVANCE CKD
Christie Rampersad, Ranveer Brar, Kelsey Connelly, Paul Komenda, Claudio Rigatto, Bhanu Prasad, Clara Bohm and Navdeep Tangri
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**Association of Physical Activity and Poor Health Outcomes in Patients With Advanced CKD**

Christie Rampersad, Ranveer Brar, Kelsey Connelly, Paul Komenda, Claudio Rigatto, Bhanu Prasad, Clara Bohm, and Navdeep Tangri

### Rationale & Objective: Chronic kidney disease (CKD) is associated with declining physical function and activity. In the general population, lower physical activity is associated with poorer quality of life and greater all-cause mortality. The aim of this study was to assess if lower physical activity levels are associated with adverse health outcomes in patients with advanced CKD.

### Study Design: A multicenter prospective cohort study.

### Setting & Participants: 579 adult patients with CKD glomerular filtration rate categories 4 and 5 (G4-G5) treated at 4 Canadian multidisciplinary kidney health clinics between 2012 and 2018.

### Exposure: Patient-reported measures of physical activity using the Physical Activity Scale for the Elderly (PASE) questionnaire and subsequently stratified PASE scores into tertiles.

### Outcome: All-cause mortality, progression to kidney failure, and future falls.

### Analytical Approach: Outcomes were analyzed using time-dependent proportional hazards models and logistic regression models.

**Results:** In 1,193 days of follow-up observation, 118 patients died, 204 progressed to dialysis, and 129 reported a fall. When compared with low physical activity, higher levels of physical activity were associated with a 52% lower all-cause mortality (adjusted HR, 0.48; 95% CI, 0.27-0.85) in models adjusted for age, sex, and comorbidity. No associations were detected between higher levels of physical activity and either slower progression to kidney failure or a lower rate of future falls.

### Limitations: Physical activity and falls were self-reported. Our population was of limited racial/ethnic diversity, which may affect generalizability. Findings were observational and do not indicate whether interventions targeting physical activity may affect adverse health outcomes.

### Conclusions: Higher levels of physical activity were associated with about 50% lower all-cause mortality in the advanced CKD population. These findings are consistent with a potential benefit from maintained physical activity as patients approach kidney failure.

Chronic kidney disease (CKD) affects 1 in 8 individuals and is disproportionately more common in older adults. Compared with the general population, individuals with CKD tend to be more sedentary and have lower levels of physical activity. The reasons for this are multifactorial and likely related to a combination of malnutrition, sarcopenia, anemia, vascular dysfunction, and neuropathy.

A low level of physical activity in patients with CKD is associated with adverse health outcomes, including poor quality of life and increased cardiovascular disease, hospitalizations, and all-cause mortality. Poor physical activity level is also associated with worsening of CKD itself, while an increase in physical activity level has been shown to modestly increase glomerular filtration rate (GFR). Physical activity level has been shown to be a potentially modifiable risk factor for adverse outcomes in a number of populations, including individuals on hemodialysis and those with mild to moderate CKD.

However, there is a paucity of studies examining this association in patients with advanced CKD who are not receiving kidney replacement therapy (KRT). The Canadian Frailty Observation and Interventions Trial (CanFIT) study is a longitudinal observational multicenter study that measures multiple domains of frailty in this population. As part of the study visits, patients self-reported their physical activity using the Physical Activity Scale for the Elderly (PASE), which is a well-validated questionnaire that includes activities commonly performed by older adults.

Our primary objective was to determine whether lower physical activity levels were associated with adverse health outcomes, including all-cause mortality, time to kidney failure, and falls, in a prospective cohort of patients CKD glomerular filtration rate categories 4 and 5 (G4-G5) who were not receiving KRT.

### Methods

#### Study Design and Population

CanFIT is a multicenter prospective cohort study of individuals with CKD G4-G5 (ie, defined by a GFR <30 mL/min/1.73 m²). Patients were recruited from four Canadian multidisciplinary renal health clinics from September 1, 2012, to July 1, 2018. The 3 sites in Winnipeg, MB, included Seven Oaks General Hospital, St Boniface General Hospital, and Health Sciences Centre. Patients were also recruited from the Kidney Health Centre in Regina General Hospital in Regina, SK.
The multidisciplinary care model provides a collaborative care plan from the clinical expertise of a nephrologist, pharmacist, dietician, and nurse practitioner to manage the care of patients with advanced CKD. Patients were excluded if they were unable to provide informed consent, did not speak English, or had a history of blindness, dementia, or previous KRT.

Patients were assessed at baseline on multiple domains of frailty (Fried Frailty Criteria and Clinical Frailty Scale) and physical function (Short Physical Performance Battery). The participants were followed for subsequent assessments annually (9-15 months) until an end point of death, opting out, or loss to follow-up assessment was reached. Ethics approval was obtained from the University of Manitoba Health Research Board, the St Boniface General Hospital Research Review Committee, and the Regina Qu’Appelle Health Region Research Ethics Board.

Physical Activity Assessment

Patients were assessed at entry into the study and then annually. Participants self-reported physical activity level at each study visit using the PASE, which includes questions about occupational, household, and leisure activities performed during the preceding 7 days. Various types of leisure activities, muscle strengthening, and intensities of sport and recreation were recorded and stratified by frequency performed as “never,” “seldom” (1-2 days/week), “sometimes” (3-4 days/week), and “often” (5-7 days/week). The daily duration for each activity was coded as “less than 1 hour,” “between 1 and 2 hours,” “2 to 4 hours,” or “more than 4 hours.” Household activities received a score of 1 if they were done and 0 if they were not. The total hours of paid or voluntary occupational activities were recorded unless this activity involved only sitting. A total PASE score was then calculated by multiplying the total time spent per week or participation (yes/no) by the weighted score assigned to each activity and summed across all activity items. Based on previous literature, we stratified PASE scores into tertiles that were our primary exposure of interest: 0-40 (low physical activity), 41-90 (light physical activity), and >90 (moderate to high physical activity).

Outcomes

Outcomes included all-cause mortality, progression to kidney failure, or future falls. Charts and electronic health records were reviewed to confirm and identify all-cause deaths, dialysis modality, and comorbidities and to record laboratory data. Our outcome of kidney failure was based on progression to either maintenance in-center dialysis or home-based dialysis therapies or receipt of a pre-emptive kidney transplant. Acute kidney injury events requiring dialysis were not included. Falls were self-reported as part of the CanFIT assessment. Our outcome of future falls was only assessed in those participants who had a follow-up assessment. Participants were asked “How many falls have you had in the last 12 months?” at baseline and follow-up assessment.

Statistical Analysis

Statistical analysis was performed using SAS 9.3 (SAS Institute, Inc). Descriptive statistics included baseline demographic information, kidney function, and comorbidities. We presented categorical variables with their frequency and percentage and compared them using the \( \chi^2 \) test. Continuous variables were reported as median and interquartile range and were compared using the Kruskal-Wallis rank test.

The association between PASE score tertiles and the outcome of mortality or kidney failure was evaluated using cause-specific hazards models with PASE score tertile as a time-varying exposure. We subsequently applied a model adjusted for age and sex, and a model adjusted for age, sex, congestive heart failure, cerebrovascular disease, diabetes, arthritis, estimated glomerular filtration rate (eGFR), hemoglobin, serum albumin, and systolic and diastolic blood pressure. Baseline physical function measured by the Short Physical Performance Battery was not included as a covariate in all models because the association between physical function and physical activity was strong (Cramer’s \( V = 0.42 \)). Future falls (a fall within 12 months of first subsequent follow-up visit) were evaluated using a logistic regression model that was adjusted for age, sex, congestive heart failure, cerebrovascular disease, diabetes, arthritis, visual impairment, previous fall at baseline, eGFR, hemoglobin, and serum albumin.

As a secondary analysis to account for any bias in the number of participants who were able to complete follow-up PASE assessments, we conducted an analysis that considered the baseline PASE assessment as the primary exposure for risk of mortality, progression to kidney failure,
and future falls. We also modeled the event of progression to kidney failure using Fine and Gray’s models. 22

Results

Study Population

The study cohort consisted of 600 individuals from the CanFIT study who completed baseline PASE assessments. Twenty-one participants did not complete PASE assessments, so 579 complete cases were included in the analysis (Fig S1). The median age of the cohort was 72 years (interquartile range, 62–82), and 59% were male. There were 6 individuals who received a kidney transplant. Mean follow-up time was 1,194 days for the primary outcome of mortality and 903 days for our secondary outcome of progression to kidney failure. The baseline characteristics of these patients, including PASE scores, are presented in Table 1.

There were 142 (24.5%) patients with a PASE score of 0–40, 198 (34.2%) patients with a PASE score of 41–90, and 239 (41.3%) patients with a PASE score of >90. The patients with a moderate to high level of physical activity compared with those with lower levels were more likely to be younger. The moderate to high physical activity group had a lower prevalence of almost all comorbidities when compared with the groups with low and light physical activity, with the exception of the patients with diabetes and neurological disease.

Clinical Outcomes of Interest

We examined the association of physical activity level with mortality (Table 2). A total of 118 deaths occurred over the

| Table 1. Baseline Characteristics by Level of Physical Activity in Patients With Advanced CKD |
|------------------------------------------|-----------------|-----------------|-----------------|
| PASE Score                              | Low: 0–40       | Light: 41–90    | Moderate-High: >90 |
| No. of participants                     | 142             | 198             | 239             |
| Demographics                            |                 |                 |                 |
| Age, y                                  | 77 [70–85]      | 74 [67–83]      | 65 [56–76]      |
| Female sex                              | 53 (37%)        | 106 (53%)       | 81 (34%)        |
| Clinical measurements                    |                 |                 |                 |
| Weight, kg*                             | 87 [72–105]     | 81 [70–97]      | 84 [73–97]      |
| Diastolic BP, mm Hg*                    | 69 [64–78]      | 73 [64–82]      | 77 [68–85]      |
| Hemoglobin, g/L                         | 111.0 [100.0–124.0] | 114.0 [105.0–126.0] | 117.0 [107.0–126.0] |
| Creatinine, mmol/L*                     | 277.5 [207.0–347.0] | 235.0 [191.0–347.0] | 279.0 [206.0–343.0] |
| Serum albumin, g/L                      | 36.0 [33.0–39.0] | 35.0 [32.0–38.0] | 37 [34.0–39.0]  |
| eGFR, mL/min/1.73 m²                    | 18 [13–24]      | 20 [14–26]      | 19 [14–25]      |
| PASE score                              | 25.0 [2.2–31.4] | 61.4 [52.2–76.0] | 139.8 [111.8–186.0] |
| Frail by Fried criteria                 | 93 (65%)        | 70 (35%)        | 27 (11%)        |
| Prefrail by Fried criteria              | 43 (30%)        | 115 (58%)       | 146 (61%)       |
| Comorbidities                           |                 |                 |                 |
| Diabetes                                | 99 (70%)        | 121 (60%)       | 111 (46%)       |
| Hypertension                            | 129 (91%)       | 177 (89%)       | 196 (82%)       |
| Myocardial infarction                   | 39 (28%)        | 34 (17%)        | 42 (18%)        |
| Congestive heart failure                | 32 (23%)        | 17 (9%)         | 13 (5%)         |
| Stroke                                  | 13 (9%)         | 15 (8%)         | 17 (7%)         |
| Malignancy                              | 33 (23%)        | 41 (21%)        | 42 (18%)        |
| Peripheral vascular disease             | 21 (15%)        | 28 (14%)        | 22 (31%)        |
| Arthritis                               | 65 (46%)        | 96 (48%)        | 80 (34%)        |
| Depression                              | 29 (20%)        | 35 (18%)        | 34 (14%)        |
| Visual impairment                       | 81 (57%)        | 99 (50%)        | 82 (34%)        |
| Previous falls*                         | 44 (31%)        | 60 (31%)        | 66 (28%)        |
| Values for categorical variables are given as number (percentage), and for continuous variables as median (interquartile range). Abbreviations: BP, blood pressure; eGFR, estimated glomerular filtration rate; PASE, Physical Activity Scale for the Elderly; SPPB, Short Physical Performance Battery. *Variables are reported in complete cases; proportion missing by variable: weight, 1.0%; height, 9.1%; systolic BP, 1.7%; diastolic BP, 1.7%; creatinine, 0.3%; previous falls, 0.8%. |
study period. Light physical activity level was associated with lower mortality risk in the unadjusted time-dependent Cox model only (hazard ratio [HR], 0.62 [95% CI, 0.41-0.92]; P < 0.001) or when the model was adjusted for age and sex (adjusted HR, 0.80 [95% CI, 0.60-1.05]). A moderate to high physical activity level was associated with a lower mortality risk in the unadjusted model (HR, 0.23 [95% CI, 0.14-0.39]; P = 0.02) or when the model was adjusted for age, sex, and comorbidities (adjusted HR, 0.48 [95% CI, 0.27-0.85]; P < 0.001) (Table 2).

A total of 204 individuals progressed to kidney failure over the study period. Neither low nor moderate to high physical activity levels were significantly associated with progression to kidney failure in patients with advanced CKD when we used the unadjusted or adjusted time-dependent cause-specific hazards models (Table 3). Physical activity levels were not associated with progression to kidney failure when we used the Fine-Gray model (Table 4). Our Fine-Gray models did not violate the Cox proportional hazards assumption.

Secondary Analysis

All-Cause Mortality

In unadjusted models, both baseline light physical activity (HR, 0.58 [95% CI, 0.39-0.88]) and moderate physical activity (HR, 0.30 [95% CI, 0.19-0.48]) were associated with a lower risk of mortality. After adjustment for age, sex, and comorbid conditions, moderate to high physical activity was associated with a 41% reduction in the risk of all-cause mortality (adjusted HR, 0.59 [95% CI, 0.36-0.98]). All models met the Cox proportional hazards assumption (Table S1).

Progression to Kidney Failure and Future Falls

Moderate to high level of baseline physical activity was associated with a lower risk of progression to kidney failure in the age- and sex-adjusted models (adjusted HR, 0.61; 95% CI, 0.42-0.90), but not in the unadjusted model (HR, 0.94 [95% CI, 0.67-1.39]) or after adjustment for laboratory variables and comorbid conditions (HR, 1.11 [95% CI, 0.74-1.68]). All models met the Cox proportional hazards assumption (Table S2). Of the 400 individuals who had follow-up assessments, 129 had a future fall event. Moderate to high baseline physical activity was not associated with future falls in unadjusted (odds ratio, 0.58 [95% CI, 0.34-0.99]) or adjusted (HR, 0.77 [95% CI, 0.42-1.43]) models (Table S3). Only a history of falls was associated with future falls (Table S4).

Discussion

In this prospective study of 579 individuals with advanced CKD not receiving KRT, we found that higher levels of physical activity were associated with about 50% reduction in all-cause mortality. Although we did not demonstrate any association with progression to kidney failure or future risk of falls, this mortality association suggests a benefit of moderate to high levels of physical activity in patients with advanced CKD.

Our findings should be considered complementary to the growing body of evidence that physical activity impacts clinical outcomes. A recent analysis from the National Health and Nutrition Examination Survey (NHANES) measured physical activity using accelerometers to...
examine the association with mortality. The investigators found that high levels of sedentary time and low levels of moderate to vigorous physical activity strongly and independently predicted early all-cause mortality.\(^2\) However, only 5.9% of individuals in the NHANES study population had CKD, and most of those individuals had relatively preserved kidney function.\(^2\) Several previous studies have also examined the association between physical activity and mortality in patients on dialysis.\(^24-26\) In a large prospective analysis of the US dialysis population, investigators found that higher levels of physical activity were associated with a 30% lower risk of mortality.\(^27\) Our

Table 3. Association of Physical Activity Level and Progression to Kidney Failure in Patients With Advanced CKD Using Time-Dependent Cause-Specific Hazards Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (^a)</th>
<th>Model 2 (^b)</th>
<th>Model 3 (^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Light</td>
<td>1.06 (0.73-1.54); P = 0.8</td>
<td>0.93 (0.64-1.35); P = 0.7</td>
<td>1.40 (0.94-2.09); P = 0.1</td>
</tr>
<tr>
<td>Moderate-high</td>
<td>1.07 (0.75-1.52); P = 0.7</td>
<td>0.69 (0.47-1.01); P = 0.06</td>
<td>1.20 (0.79-1.81); P = 0.4</td>
</tr>
<tr>
<td>Age, per 1 y older</td>
<td>0.97 (0.96-0.98)</td>
<td>0.98 (0.97-0.99)</td>
<td></td>
</tr>
<tr>
<td>Male sex</td>
<td>1.31 (0.98-1.75)</td>
<td>1.37 (1.00-1.87)</td>
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</tr>
<tr>
<td>CHF</td>
<td>1.02 (0.61-1.71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD</td>
<td>1.21 (0.68-2.15)</td>
<td></td>
<td></td>
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<tr>
<td>Stroke</td>
<td>1.51 (0.91-2.52)</td>
<td></td>
<td></td>
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<tr>
<td>Diabetes</td>
<td>1.43 (1.03-1.99)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>0.93 (0.69-1.27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eGFR, per 1 mL/min/1.73 m(^2) greater</td>
<td>0.81 (0.79-0.84)</td>
<td>0.93 (0.90-0.96)</td>
<td>0.99 (0.98-0.99)</td>
</tr>
<tr>
<td>Serum albumin, per 1 g/L greater</td>
<td></td>
<td>1.01 (1.00-1.01)</td>
<td></td>
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<tr>
<td>Hemoglobin, per 1 g/L greater</td>
<td></td>
<td>1.01 (0.99-1.02)</td>
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<tr>
<td>Systolic BP, per 1 mm Hg greater</td>
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<tr>
<td>Diastolic BP, per 1 mm Hg greater</td>
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</table>

Associations given as hazard ratio (95% CI). Abbreviations: BP, blood pressure; CHF, congestive heart failure; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate.

\(^a\)Unadjusted time-dependent cause-specific hazards models (N = 579).
\(^b\)Adjusted time-dependent cause-specific hazards models for age and sex (N = 579).
\(^c\)Adjusted time-dependent cause-specific hazards models for age, sex, CHF, CVD, diabetes, arthritis, eGFR, hemoglobin, serum albumin, and systolic BP. In complete cases only (n = 569); systolic BP missing = 1.7%, diastolic BP missing = 1.7%.

Table 4. Association of Physical Activity Level and Progression to Kidney Failure in Patients With Advanced CKD Using Fine-Gray Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (^a)</th>
<th>Model 2 (^b)</th>
<th>Model 3 (^c)</th>
</tr>
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<tbody>
<tr>
<td>Physical activity</td>
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</tr>
<tr>
<td>Low</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Light</td>
<td>1.10 (0.72-1.51); P = 0.6</td>
<td>0.89 (0.62-1.30); P = 0.6</td>
<td>0.95 (0.63-1.45); P = 0.8</td>
</tr>
<tr>
<td>Moderate-high</td>
<td>1.04 (0.77-1.56); P = 0.8</td>
<td>0.69 (0.47-1.01); P = 0.06</td>
<td>1.09 (0.74-1.62); P = 0.7</td>
</tr>
<tr>
<td>Age, per 1 y older</td>
<td>0.97 (0.96-0.98)</td>
<td>0.97 (0.96-0.98)</td>
<td></td>
</tr>
<tr>
<td>Male sex</td>
<td>1.28 (0.96-1.71)</td>
<td>1.37 (1.00-1.87)</td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td>0.70 (0.41-1.21)</td>
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<tr>
<td>CVD</td>
<td>1.31 (0.73-2.37)</td>
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<tr>
<td>Stroke</td>
<td>1.43 (0.85-2.42)</td>
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<tr>
<td>Diabetes</td>
<td>1.38 (0.97-1.94)</td>
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<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>1.03 (0.76-1.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eGFR, per 1 mL/min/1.73 m(^2) greater</td>
<td>0.83 (0.81-0.86)</td>
<td>0.94 (0.91-0.97)</td>
<td>0.99 (0.98-1.00)</td>
</tr>
<tr>
<td>Serum albumin, per 1 g/L greater</td>
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<tr>
<td>Hemoglobin, per 1 g/L greater</td>
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<tr>
<td>Systolic BP, per 1 mm Hg greater</td>
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<tr>
<td>Diastolic BP, per 1 mm Hg greater</td>
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</tbody>
</table>

Associations given as hazard ratio (95% CI). Abbreviations: BP, blood pressure; CHF, congestive heart failure; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate.

\(^a\)Unadjusted, N = 579.
\(^b\)Adjusted for age and sex, N = 579.
\(^c\)Adjusted for age, sex, CHF, CVD, diabetes, arthritis, eGFR, hemoglobin, serum albumin, systolic BP. In complete cases only (n = 569); systolic BP missing = 1.7%, diastolic BP missing = 1.7%.
findings are consistent with the previous studies and extend the evidence to patients with CKD who do not yet require KRT.

It is important to note that we did not find any association between physical activity level and progression to kidney failure. The reasons for this negative finding may be multifactorial. First, for patients with advanced CKD, the longer survival seen with higher physical activity levels may paradoxically increase the risk of kidney failure as the competing risk of mortality is attenuated. Second, it is also possible that, unlike mortality, the risk of progressive CKD in our cohort of individuals with an already low GFR of 20 mL/min/1.73 m² is relatively nonmodifiable. Longitudinal studies examining the association between physical activity and progression of earlier stages of CKD, where kidney function is preserved and the competing risks of mortality are lower, can help clarify these hypotheses.

We also found that previous falls, but not physical activity level, were associated with an increased risk of future falls. A previous study of patients on dialysis found that a majority of patients who had a previous fall had a subsequent fall in the following 12 months. Although there is a lack of studies looking at the association between falls and physical activity in the CKD population, multiple studies have shown this association in the geriatric (non-CKD) population. It is important, as we have shown, for CKD patients to maintain moderate to high levels of physical activity as the competing risks of mortality are lower, can help clarify these hypotheses.

There are important clinical, research, and policy implications of our findings. For clinicians, predominantly nephrologists, who provide care for patients with advanced CKD, these findings suggest that there is a benefit to being physically active. It also supports efforts to ascertain physical activity levels during clinic visits and promote physical activity using interventions such as exercise prescription. Studies in patients on dialysis have shown that exercise programs are associated with improved mortality, reduced hospitalization risk, and enhanced functional status. Future studies are needed in patients with CKD who do not require KRT to determine whether increased physical activity can delay the progression of CKD. The broader policy implications of our study include evidence for supporting exercise and rehabilitation programs as part of kidney care units and dialysis facilities, and reimbursement for these activities by payers and other stakeholders.

Limitations of our study include inherent errors in using a tool that measures physical activity based on self-reporting. As the PASE is not an objective measurement and requires patients to recall physical activity, it may result in inaccurate reporting of true physical activity level. The use of accelerometers may facilitate a more objective measurement of physical activity and allow detection of stronger associations. Similarly, self-reporting of falls, lack of a validated falls history question, and recall bias may have led to underreporting. Other limitations include the makeup of the study population, which was largely of European ancestry with some individuals of Asian ancestry. As such, these findings should be replicated in other settings with a higher proportion of individuals of Hispanic, African, and Indigenous descent. Furthermore, we were unable to adjust for smoking, body mass index, and proteinuria, which have been shown to be independently associated with mortality in patients with advanced CKD. Finally, it is important to note that these findings are observational in nature, and interventional studies targeting physical activity behavior in the CKD population are needed to confirm whether physical activity is truly a causal and modifiable risk factor for mortality.

Strengths of our study include a large and unique cohort of individuals with advanced CKD with prospectively collected data on physical function and physical activity level. As a result of the Canadian universal health care system, there was minimal loss to follow-up assessment for mortality and kidney failure outcomes. We also used PASE scores, which have previously been shown to be associated with mortality, functional status, and development of sarcopenia in multiple populations. This well-validated, noninvasive, and easy to perform questionnaire for assessing physical activity could potentially be implemented into clinical practice with ease.

In conclusion, our study found that higher levels of physical activity are associated with reduced all-cause mortality in patients with advanced CKD. Interventional studies are now needed to investigate the effect of maintaining or increasing physical activity in the CKD population.

Supplementary Material

Supplementary File (PDF)
Figure S1: Participant inclusion.
Table S1: Association of physical activity level and mortality.
Table S2: Association of physical activity level and progression to kidney failure.
Table S3: Association of physical activity level and future falls in patients who had a follow-up visit.
Table S4: Association of physical function and future falls in patients who had a follow-up visit.

Article Information

Authors’ Full Names and Academic Degrees: Christie Rampersad, MD, Ranveer Brar, BSc, Kelsey Connelly, BSc, Paul Komenda, MD, MHA, Claudio Rigatto, MD, Bhanu Prasad, MD, Clara Bohm, MD, MPH, and Navdeep Tangri, MD, PhD.

Authors’ Affiliations: Rady Faculty of Health Sciences, University of Manitoba (CRa, KC, PK, CRi, CB, NT); Seven Oaks General
Hospital, Chronic Disease Innovation Centre (RB, PK, CR, BP, CB, NT), Winnipeg, MB, Canada.

Address for Correspondence: Christie Rampersad, MD, GF324 – 820 Sherbrook St, Winnipeg, MB R3A 1R9, Canada. Email: umrampec@myumanitoba.ca

Authors’ Contributions: Research idea and study design: NT, CB, CR, PK, KC, RB, BP; data acquisition: NT, CB, RB; data analysis and interpretation: NT, CB, CRa, KC, RB, CRi, PK, BP; statistical analysis: RB; supervision or mentorship: NT. Each author contributed important intellectual content during manuscript drafting or revision and accepts accountability for the overall work by ensuring that questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved.

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Disclaimer: The results and conclusions are those of the authors and no official endorsement by Manitoba Health was intended or should be inferred.

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References


9:10AM
INTRODUCTORY REMARKS
Dr. Navdeep Tangri
Chair, Department of Internal Medicine Resident Research Day

GROUP 1
9:15AM – 10:15AM

Original Investigation
CLINICAL PRESENTATION AND OUTCOMES OF PATIENTS PRESENTING WITH TAKOTSUBO CARDIOMYOPATHY: iFAST
PRESENTED BY: Dr. Anas Alzahrani, PGY2 - Cardiology
SUPERVISOR: Dr. Shuangbo Liu

Original Investigation
MEDICAL CANNABIS USE BY RHEUMATOLOGY PATIENTS ATTENDING A TERTIARY OUTPATIENT CLINIC: A STUDY OF 1000 PATIENTS IN CANADA
PRESENTED BY: Dr. Shane Cameron, PGY3 - Internal Medicine
SUPERVISOR: Dr. Christine Peschken

Original Investigation
INCIDENT AND PREVALENT PATIENTS HAVE HIGH PAIN AND FATIGUE DESPITE DIFFERENCES IN DISEASE ACTIVITY: DATA FROM THE CANADIAN NETWORK FOR IMPROVED OUTCOMES IN SYSTEMIC LUPUS ERYTHEMATOSUS (CANIOS) NATIONAL REGISTRY
PRESENTED BY: Dr. Kaien GU, PGY3 - Internal Medicine
SUPERVISOR: Dr. Christine Peschken

Original Investigation
MASS-MEDIA AND TARGETED EDUCATION INTERVENTIONS TO MINIMIZE DELAY TO HOSPITAL IN PATIENTS WITH CHEST PAIN: A SYSTEMATIC REVIEW
PRESENTED BY: Dr. Kirsten Marshall, PGY6 - Cardiology
SUPERVISOR: Dr. Shuangbo Liu

GROUP 2
10:20AM – 11:20AM

Original Investigation
RIFAMPIN COMBINATION THERAPY FOR STAPHYLOCOCCAL PROSTHETIC JOINT INFECTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS
PRESENTED BY: Dr. Jennifer Ziegler, PGY6 – Critical Care
SUPERVISOR: Dr. Ahmed Abou-Setta
Original Investigation

RISKS OF MELANOMA AND NON-MELANOMA SKIN CANCERS PRE- AND POST-IBD DIAGNOSIS
PRESENTED BY:  Dr. Mariam Narous, PGY2 - Internal Medicine
SUPERVISOR:   Dr. Charles Bernstein

Original Investigation

PREVALENCE OF UNDER-RECOGNIZED ATRIAL FIBRILLATION IN PATIENTS WITH VENTRICULAR-PACED RHYTHM
PRESENTED BY:  Dr. Liane Arcinas, PGY6 - Cardiology
SUPERVISOR:   Dr. Nasir Shaikh

Original Investigation

CHARACTERISTICS, TREATMENT PATTERNS AND OUTCOMES OF LONG-TERM SURVIVORS WITH HER2-POSITIVE METASTATIC BREAST CANCER IN MANITOBA
PRESENTED BY:  Dr. Erin McAndrew, PGY2 – Internal Medicine
SUPERVISOR:   Dr. Christina Kim

GROUP 3
11:25AM – 12:25PM

Original Investigation

EFFECTIVENESS AND FINANCIAL IMPACT OF A PROVINCIAL POLICY ELIMINATING ROUTINE USE OF CREATINE KINASE TESTING FOR WORK-UP OF SUSPECTED ACUTE CORONARY SYNDROME IN THE EMERGENCY DEPARTMENT
PRESENTED BY:  Dr. Tony Mao, PGY2 - Internal Medicine
SUPERVISOR:   Dr. Evan Wiens

Original Investigation

HIGH OUTPUT HEART FAILURE, A FORGOTTEN PHENOTYPE: EVALUATING THE INCIDENCE, PLAUSIBLE ETIOLOGIES AND OUTCOMES
PRESENTED BY:  Dr. Hilary Bews, PGY6 - Cardiology
SUPERVISOR:   Dr. Ashish Shah

Original Investigation

REAL-WORLD EFFICACY AND SAFETY OF DUAL ANTIPLATELET THERAPY WITH TICAGRELOR AS COMPARED TO CLOPIDOGREL
PRESENTED BY:  Dr. Evan Wiens, PGY5 - Cardiology
SUPERVISOR:   Dr. Ashish Shah

Original Investigation

MOLECULAR ASSESSMENT OF BIOPSIES FROM PATIENTS WITH ULCERATIVE COLITIS REVEALS HETEROGENEITY IN CLINICAL DISEASE ACTIVITY
PRESENTED BY:  Dr. Jeffery Venner, PGY3 – Internal Medicine
SUPERVISOR:   Dr. Brendan Halloran
12:30PM - 1:00PM
BEST PUBLISHED PAPER DERIVED FROM NOVEMBER 2019 RESIDENT RESEARCH DAY

ASSOCIATION OF PHYSICAL ACTIVITY AND POOR HEALTH OUTCOMES IN PATIENTS WITH ADVANCE CKD

Christie Rampersad, Ranveer Brar, Kelsey Connelly, Paul Komenda, Claudio Rigatto, Bhanu Prasad, Clara Bohm and Navdeep Tangri
AJKD 78(3): 391-398. Sept 2021
Published online February 10, 2021

1:00PM - 1:30PM                     * * * BREAK * * *

GROUP 4
1:30PM – 2:45PM

Original Investigation
FEASIBILITY OF A FAMILY LIASON VOLUNTEER INITIATIVE TO SUPPORT CRITICALLY ILL INTENSIVE CARE UNIT (ICU) PATIENTS AND THEIR FAMILIES DURING COVID-19 VISITOR RESTRICTIONS
PRESENTED BY:  Dr. Megan Sorokopud-Jones, PGY1 – Internal Medicine
SUPERVISOR:  Dr. Kendiss Olafson

Original Investigation
TIME TRENDS AND PREDICTORS FOR SURGICAL EXCISION OF LARGE COLORECTAL POLYPS IN MANITOBA
PRESENTED BY:  Dr. Carmen Tse, PGY2 - Internal Medicine
SUPERVISOR:  Dr. Harminder Singh

Original Investigation
QUALITY ASSESSMENT OF PROVINCIAL SCREENING PROGRAM FOR LYNCH SYNDROME IN MANITOBA
PRESENTED BY:  Dr. Remington Winter, PGY3 – Internal Medicine
SUPERVISOR:  Dr. Harminder Singh

Original Investigation
IMPACT OF BOTULINUM TOXIN INJECTION ON PAIN AND CAREGIVER BURDEN IN PERSONAL CARE HOME RESIDENTS WITH HYPERTONIA, A RETROSPECTIVE COHORT ANALYSIS
PRESENTED BY:  Dr. Nicholas Miller, PGY4 – PM&R
SUPERVISOR:  Dr. Karen Ethans
Original Investigation
PREVALENCE OF OBESITY AND BODY MASS INDEX IN CANADA AMONG A RURAL-URBAN CONTINUUM: A CROSS-SECTIONAL STUDY – THE CANADIAN LONGITUDINAL STUDY ON AGING
PRESENTED BY: Dr. Samuel Quan, PGY5 – Geriatric Medicine
SUPERVISOR: Dr. Phil St. John

GROUP 5
2:50PM–4:05PM

Original Investigation
SURGICAL VERSUS CHEMICAL ANDROGEN DEPRIVATION THERAPY IN PROSTATE CANCER PATIENTS IN MANITOBA
PRESENTED BY: Dr. Unice Chang, PGY3 – Internal Medicine
SUPERVISOR: Dr. David Dawe

Original Investigation
IMPACT OF AGE, POLYPHARMACY, AND COMORBIDITY ON PATIENT REPORTED OUTCOME TRAJECTORY IN PATIENTS TREATED FOR LATE-STAGE CANCER
PRESENTED BY: Dr. Hongru Ren, PGY2 - Internal Medicine
SUPERVISOR: Dr. David Dawe

Original Investigation
THE NEGATIVE IMPACT OF T-CELL MEDIATED REJECTION ON RENAL ALLOGRAFT SURVIVAL IN THE MODERN ERA
PRESENTED BY: Dr. Christie Rampersad, PGY5 - Nephrology
SUPERVISOR: Dr. Chris Wiebe

Original Investigation
LOOP DIURETIC RESISTANCE PREDICTION MODEL
PRESENTED BY: Dr. Joey Mercier, PGY3 - Internal Medicine
SUPERVISOR: Dr. Navdeep Tangri

Original Investigation
PATIENT NAVIGATORS FOR CHRONIC KIDNEY DISEASE AND KIDNEY FAILURE: A SYSTEMATIC REVIEW
PRESENTED BY: Dr. Ali Taha, PGY3 - Internal Medicine
SUPERVISOR: Dr. Jay Hingwala
GROUP 1
9:15AM – 9:30AM

Original Investigation
HIGH RESOLUTION DATA MODIFIES INTENSIVE CARE UNIT DIALYSIS OUTCOME PREDICTIONS AS COMPARED WITH LOW RESOLUTION ADMINISTRATIVE DATA SET
PRESENTED BY: Dr. Jennifer Zeigler, PGY6 -Critical Care
SUPERVISOR: Dr. Barret Rush

Research Proposal
THE PROGNOSTIC VALUE OF NON-INVASIVE VENTRICULAR RESERVE MEASUREMENTS IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION
PRESENTED BY: Dr. Lauren Bath, PGY2 - Internal Medicine
SUPERVISOR: Dr. David Christiansen

Research Proposal
INCIDENCE AND PREDominANCE OF HEPATOCYTOPLASMA CARCINOMA IN MANITOBA FOLLOW UP STUDY COHORT
PRESENTED BY: Dr. Pedram Hassan-Tash, PGY2 – Internal Medicine
SUPERVISOR: Dr. Julia Uhanova

Research Proposal
IMPROVING REFERRAL RATES TO PULMONARY REHABILITATION FOR PATIENTS WITH COPD EXACERBATION
PRESENTED BY: Dr. Japandeep Sethi, PGY3 - Internal Medicine
SUPERVISOR: Dr. Rachel Fainstein

GROUP 2
9:30AM – 9:45AM

Original Investigation
PATIENT EDUCATION USING AN INTERNET INTERVENTION TEACHING MOVEMENT PATTERNS IN NON-SPECIFIC LOW BACK PAIN: A PILOT STUDY
PRESENTED BY: Dr. Ans Sabzwari, PGY5 – PM&R
SUPERVISOR: Dr. Ryan Skrabek

Research Proposal
MATERNAL AND FETAL OUTCOMES OF PREGNANCY IN THE SETTING OF MATERNAL CARDIOVASCULAR DISEASE, MANAGED BY MULTIDISCIPLINARY CARE IN MANITOBA
PRESENTED BY: Dr. Sarah Gibbs, PGY2 - Internal Medicine
SUPERVISOR: Dr. Robin Ducas

Original Investigation
THE PAST DECADE OF ACTH STIMULATION TESTING IN WINNIPEG
PRESENTED BY: Dr. Umair Sajid, PGY3 – Internal Medicine
SUPERVISOR: Dr. Abdi Sokoro
GROUP 3
9:45AM - 10:00AM

Case Report
THE ENDOCRINOLOGIC ASSOCIATIONS OF BIRT-HOGG-DUBE SYNDROME: A REVIEW AND CASE REPORT
PRESENTED BY:  Dr. Alex Dalphy, PGY3 – Internal Medicine
SUPERVISOR:  Dr. A. Arnaout

Original Investigation
A RETROSPECTIVE ANALYSIS OF THE PRESENTATION, DIAGNOSIS, AND INITIAL MANAGEMENT OF ADULTS PRESENTING WITH MENINGITIS TO HEALTH SCIENCES CENTER 2007-2020
PRESENTED BY:  Dr. Megan Sorokopud-Jones, PGY1 - Internal Medicine
SUPERVISOR:  Dr. Ben Fultz

Research Proposal
PROMOTION OF ECONSULT HEMATOLOGY SERVICE AMONGST PRIMARY CARE PROVIDERS IN MANITOBA TO REDUCE WAIT TIMES AND IMPROVE PATIENT ACCESS
PRESENTED BY:  Dr. Farshad Ghasemi, PGY2 – Internal Medicine
SUPERVISOR:  Dr. Vi Dao

GROUP 4
10:00AM - 10:15AM

Research Proposal
WHO IS FIT TO DRIVE HOME? A LOCAL REVIEW OF PHYSICIAN ADHERENCE WITH MANDATORY REPORTING OF MEDICALLY UNFIT DRIVERS
PRESENTED BY:  Dr. Carlo Navarro, PGY3 - Internal Medicine
SUPERVISOR:  Dr. Jeff Wheeler & Dr. Ben Fultz

Research Proposal
PREVALENCE OF CHRONIC SPONTANEOUS URTICARIA REQUIRING OMALIZUMAB THERAPY IN MANITOBA’S FIRST NATIONS AND NON-FIRST NATIONS POPULATION
PRESENTED BY:  Dr. Brian Lee, PGY2 - Internal Medicine
SUPERVISOR:  Dr. Chrystyna Kalicinsky
Research Proposal
TRANSFUSION STEWARDSHIP – ALTERNATIVES TO TRANSFUSION (FOR SYMPTOMATIC AND ASYMPTOMATIC ANEMIA) IN WOMEN OF CHILD-BEARING AGE (<45 YEARS)
PRESENTED BY: Dr. Izabella Supel, PGY2 – Internal Medicine
SUPERVISOR: Dr. Arjuna Ponnampalam

Research Proposal
DETERMINING THE ASSOCIATION BETWEEN METABOLIC ACIDOSIS AND OSTEOPOROSIS IN MANITOBAN CKD PATIENTS
PRESENTED BY: Dr. Antonia Zhu, PGY2 – Internal Medicine
SUPERVISOR: Dr. Navdeep Tangri

Original Investigation
SLEEP DISTURBANCE AND TRAVEL INTERRUPTION PRIOR TO COLONOSCOPY
PRESENTED BY: Dr. Carmen Tse, PGY2 – Internal Medicine
SUPERVISOR: Dr. Harminder Singh

12:30PM - 1:00PM
BEST PUBLISHED PAPER DERIVED FROM NOVEMBER 2019 RESIDENT RESEARCH DAY

ASSOCIATION OF PHYSICAL ACTIVITY AND POOR HEALTH OUTCOMES IN PATIENTS WITH ADVANCE CKD
Christie Rampersad, Ranveer Brar, Kelsey Connelly, Paul Komenda, Claudio Rigatto, Bhanu Prasad, Clara Bohm and Navdeep Tangri
*AJKD 78(3): 391-398. Sept 2021
Published online February 10, 2021
https://doi 10.1053/j.ajkd.2020.12.018*
POSTERS DISPLAYED IN ABSENTIA

Original investigation
COURSE AND OUTCOME OF LUPUS NEPHRITIS IN VULNERABLE PATIENTS
PRESENTED BY: Dr. Matthew Thiessen, PGY2 - Internal Medicine
SUPERVISOR: Dr. Christine Peschken

Original investigation
SEVERE DISTRIBUTIVE SHOCK, NEUTROPHILLIC DERMATOSIS, AND KOUNIS SYNDROME (ALLERGIC CORONARY VASOSPASM) ARISING FROM AZATHIOPRINE HYPERSENSIVITY SYNDROME
PRESENTED BY: Dr. Samuel Su, PGY3 - Internal Medicine
SUPERVISOR: Dr. Marcus Blouw

Original investigation
COMPARING RESPONSE TO INTRAVENOUS IRON INFUSION IN CROHN’S DISEASE AND ULCERATIVE COLITIS
PRESENTED BY: Dr. Samuel Su, PGY3 - Internal Medicine
SUPERVISOR: Dr. Charles Bernstein

Original investigation
ADHERENCE TO GUIDELINES FOR INPATIENT PHARMACOLOGIC MANAGEMENT OF GLUCOSE LEVELS USING WRITTEN COMPARED TO ELECTRONIC ORDERS
PRESENTED BY: Dr. Jared Galloway, PGY3 - Internal Medicine
SUPERVISOR: Dr. Elizabeth Salamon
ABSTRACTS

Abstracts are organized in alpha order by resident’s last name
Introduction: Takotsubo cardiomyopathy (TCM) is a condition that usually mimics acute coronary syndrome in presentation and electrocardiographic ischemic changes. The underlying pathophysiologic mechanism is not well understood. TCM is believed to occur in the setting of catecholamine surge, and hence proposed mechanisms include microvascular dysfunction, coronary vasospasm and endothelial stress-induced injury. Patients typically present with chest pain, however, clinical presentation varies from ischemia, heart failure, arrhythmia, to cardiogenic shock or death.

Objectives: To assess the clinical presentation and outcomes of patients with TCM in Manitoba from 2017-2020.

Methods: Using the data from Mac Lab (cardiac catheterization laboratory database), all patients diagnosed with acute coronary syndrome but did not require percutaneous coronary intervention were screened for TCM. A chart review was performed to obtain demographic characteristics, clinical presentation, comorbidities and outcomes. Data was analyzed using Excel and SPSS.

Results: A total of 121 patients with TCM were identified and included in the study. Eighty-four percent of the patients were females. Median age was 68±12 years at time of TCM. Less than 5% of the patients had a history of previous myocardial infarction or percutaneous or surgical revascularization. At least one cardiac risk factor was present in >55% of the patients, including hypertension (46%) or dyslipidemia (29%), diabetes (12%) or current or previous smoking history (19 and 16%, respectively), and 10% of patients had atrial fibrillation (AF). The use of angiotensin converting enzymes inhibitor (ACEI) or angiotensin receptor blocker was seen in 21% of patients whereas 10% of patients were on beta-blockers medications prior to the time of the index event. The majority of patients (75%) of patients presented with chest pain. Non-ST elevation MI (75%) presentation was more common than STEMI (25%). Approximately two-thirds of the presentations (68%) have been found to be in the setting of precipitating factor including physical stress (15%), medical condition (28%) and negative emotional stress (37%). The mean left ventricle ejection fraction (LVEF) was 50±13%, with a mean left ventricular end-diastolic pressure (LVEDP) of 20±8 mmHg. Apical subtype was the most common (69%). More than half of the patients (53%) had no coronary artery disease (CAD) and only 7% of patients had moderate and 3% had severe CAD. Left anterior descending artery disease was found in <5% of the study population.

Conclusion: While Takotsubo cardiomyopathy is an uncommon cause of acute coronary syndrome, it is not rare in high-risk patient populations. A precipitating factor was determined in the majority of patients. While traditional cardiac risk factors were not uncommon in TCM patients, most patients did not have any evidence of coronary artery disease. The next phase of the study will be to assess clinical outcomes and predictors of poor adverse outcomes in TCM patients.
PREVALENCE OF UNDER-RECOGNIZED ATRIAL FIBRILLATION IN PATIENTS WITH VENTRICULAR-PACED RHYTHM
Arcinas LA, Seifer CM, Shaikh NS
1Section of Cardiology, Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba

Introduction: Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and a major preventable cause of stroke. The role of anticoagulation is well-established in the prevention of thromboembolic events associated with AF. The diagnosis of AF on electrocardiogram is through the recognition of absent p waves and an irregularly irregular ventricular rhythm. However, in ventricular-paced patients, the rhythm on ECG is often regular and may obscure AF diagnosis. Thus, unrecognized AF on ECG poses a potential risk among untreated ventricular-paced patients. There is scant published data reporting the prevalence of underrecognized and untreated ECG-detected AF among ventricular-paced patients.

Objectives: In the first part of this study, we aim (1) to determine the prevalence of unreported AF on ECGs with ventricular-paced rhythm among patients who had their ECGs done in Winnipeg (WRHA facilities). Using data obtained from (1), we then aim (2) to report the rates of untreated and unreported ECG-detected AF among ventricular-paced patients with an indication for anticoagulation, (3) to describe the length of delay in AF recognition and treatment among patients who should be considered for anticoagulation at the time of ECG-detected AF and (4) to identify possible strategies that can improve reporting of AF on ECGs with ventricular-paced rhythm using our institutional software (MUSE Editor ©).

Methods: This will be a retrospective multicenter review of ventricular-paced ECGs stored in MUSE Editor ©, the ECG software used by physicians to report ECGs done in WRHA facilities. ECGs will be reviewed and confirmed by two independent cardiologists who are blinded from the MUSE interpretation of the ECGs.

Results: Of the sample of 1500 ECGs with ventricular-paced rhythm from 2017-2019, 2 independent cardiologists agreed that AF was present in 565 (37.7%) while atrial flutter was present in 110 (7.33%). Of these, 210 (37.1%) and 38 (34.6%) were not reported by the interpreting physician to have AF and atrial flutter, respectively.

Conclusions: Our study shows that there is a high prevalence of unreported AF and atrial flutter in patients with ventricular-paced rhythm in our WRHA Facilities. Further studies are warranted on describing whether this impacts treatment and outcomes among ventricular-paced patients. This study also highlights the importance of identifying possible strategies that can improve reporting of AF on ECGs with ventricular-paced rhythm using our institutional software (MUSE Editor ©) in WRHA hospitals.
THE PROGNOSTIC VALUE OF NON-INVASIVE VENTRICULAR RESERVE MEASUREMENTS IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

Bath, L.1, Christiansen, D.2

1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2Project Supervisor. Department of Internal Medicine, Section of Respiratory Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: Pulmonary arterial hypertension (PAH) is a condition characterized by progressive pathological remodelling of the pulmonary arteries leading to eventual right heart failure, decreased cardiac output (CO), and death.1 Advancements in treatment have focused on accurate risk stratification to determine initiation, response, and escalation of therapies.2 The 6MWT is a commonly used clinical tool for risk stratification, however, this lacks specificity and prognostic value is only significant once walking distance is severely impaired.3 A healthy individual will increase cardiac output (CO) during exercise. In PAH there are physiological changes that limit the ability of the heart to increase output during exercise, referred to as impaired ventricular reserve.4 It has previously been demonstrated that in PAH that the degree of rise in ∆cardiac index (CI= CO x body surface area) and ∆CO with exercise correlates with survival.5 However, the technical requirements and invasiveness to obtain these measurements limit their clinical use. Impedance cardiography is a non-invasive tool to measure CO/CI based on Ohms law. This technology has been validated in patients with pulmonary hypertension, with CO measurements correlating well with those done via traditional Thermodilution and direct Fick methods.6

Objectives: In the present prospective study we aim to further the understanding of impaired ventricular reserve in PAH. We propose non-invasive measurements of ventricular reserve using ICG can provide prognostic information beyond the limitations of the 6MWT. This information can improve PAH patient risk stratification which is a key parameter in clinical treatment decision making. We aim to use ICG to calculate ∆CI as a measurement of ventricular reserve during a submaximal exercise (ie. 6MWT). We predict the degree of ∆CI response during the 6MWT will be predictive of clinical worsening over 1 year in patients with PAH.

Methods: Included patients will be those with WHO Group 1 pulmonary arterial hypertension with ability to complete a 6MWT. The 6MWT will be performed as usual, with NiCAS (NIMedical) impedance cardiography device applied to measure CI at rest, and at completion of 6MWT. Ventricular reserve will be calculated as cardiac index at the end of 6MWT subtract the cardiac index at rest prior to 6MWT represented as ΔCI for each patient. Target n=20. Following data acquisition, statistical analysis will be performed to determine the association between ventricular reserve (ΔCI) and clinical worsening at 1 year. A secondary analysis will be to examine the predictive capacity of 6MWD on clinical worsening using logistic regression, to assess if ventricular reserve has additional prognostic value over 6MWD alone.

Results: REB approval obtained, with local approval and recruitment in progress.
HIGH OUTPUT HEART FAILURE, A FORGOTTEN PHENOTYPE: EVALUATING THE INCIDENCE, PLAUSIBLE ETIOLOGIES AND OUTCOMES
Bews H1, Hiebert B2, Shah A.H1.
1. Section of Cardiology, Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada.
2. Institute of Cardiovascular Sciences, St. Boniface Hospital, University of Manitoba, Winnipeg, Manitoba, Canada.

Introduction: High output heart failure (HOHF), defined by a cardiac index (CI) of >4 L/min/m², is a relatively unknown and under-recognized condition. In fact, the current heart failure guidelines do not recommend investigating patients to identify HOHF. Unless suspected and thoughtfully evaluated, the diagnosis of HOHF is likely to be missed. In contrast to other heart failure states, the heart is a bystander and HOHF is driven by a reduction in systemic vascular resistance due to multiple etiologies. As such, treatment should be directed towards the underlying process.

Objectives: To identify the incidence, plausible etiologies and outcomes among the HOHF patients at the St. Boniface Hospital.

Methods: Patients investigated by right heart catheterization at the St. Boniface Hospital between January 2009 and March 2020 were identified using the MACLAB Database. Two groups of patients were included in the study: 1) HOHF, defined as a CI >4 L/min/m² and 2) pre-HOHF, defined as a CI between 3.8-4.0 L/min/m². A chart review was completed on both patient groups, focusing on the identification of plausible etiologies, investigations (echocardiography, cardiac catheterization and magnetic resonance imaging), outcomes (hospital admission with arrhythmia, heart failure, surgery/intervention to address HOHF related etiologies, death), and whether the abnormal hemodynamics were recognized.

Results: Reviewing the 4061 right heart catheterizations during the study period, 185 individual patients were identified to have HOHF; 154/185 had a CI >4 L/min/m², whereas 31/185 were noted to have a CI between 3.8-4.0 L/min/m². 46% of patients in the HOHF group were female with a mean age of 51 years (range 19 to 81 years), 16% of the pre-HOHF group were female with a mean age of 52.5 years (range 29 to 74 years). Etiologies of HOHF included systemic arteriovenous shunts, cirrhosis, pulmonic disease, myeloproliferative hematological conditions, obesity, anemia, and thyrotoxicosis. Most cases were not identified to have HOHF by their responsible physicians. The population experienced high rates of hospitalization for heart failure and arrhythmia and 24% of patients were deceased, on average 3.4 years after catheterization.

Conclusions: HOHF is an under-recognized condition with high mortality. With this in-depth review we hope to provide (1) valuable insight into this condition, (2) increase awareness and (3) aim to improve the clinical outcomes.
MEDICAL CANNABIS USE BY RHEUMATOLOGY PATIENTS ATTENDING A TERTIARY OUTPATIENT CLINIC: A STUDY OF 1000 PATIENTS IN CANADA
Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: In October 2018, cannabis achieved legal status as a recreational product in Canada. Since then, there has been a substantial increase in the number of requests for medical marijuana prescriptions observed in the Health Sciences Centre (HSC) Rheumatology Clinic. Despite increased access to cannabis in Canada, there is limited evidence regarding the benefits and harms of cannabis in the treatment of rheumatic disease. Furthermore, there is little Canadian data regarding the prevalence of cannabis use in patients with rheumatic disease, apart from a study by Fitzcharles et al in 2020 which found that 7% of patients reported current medical cannabis use in a McGill rheumatology clinic. Given the uncertainty regarding medical cannabis use in rheumatic disease, The Arthritis Society has identified greater evidence for therapeutic marijuana as a high priority issue.

Objectives: To assess the overall prevalence of marijuana use in a rheumatology patient population following its legalization, and to further examine the use of marijuana for therapeutic reasons in this patient population including perceived benefits and harms, and its association with patient demographics, diagnoses and severity of disease. In addition, to compare the pattern of marijuana use in the HSC Rheumatology Clinic to that observed at a rheumatology clinic associated with McGill University, as reported by Fitzcharles et al in 2020.

Methods: This is an observational study involving one thousand consecutive patients attending the Health Sciences Centre Rheumatology Clinic who were provided a questionnaire regarding cannabis, with topics including previous and current medical or recreational use, symptoms relieved or side effects experienced, as well as form, route, and dose of cannabis. Rheumatologists at the HSC Rheumatology Clinic also completed a questionnaire to provide information regarding patients’ diagnosis, comorbid conditions, rheumatologic medications, and disease severity.

Results: A total of 998 surveys were completed. 255 patients (26%) reported a history of medical cannabis use, with 158 patients (16%) reporting current medical use. History of recreational use was reported in 340 patients (34%), with current recreational use in 118 patients (12%). Of the patients who had no history of medical cannabis use, 364 (49%) reported that they would consider it. Patients with a history of medical cannabis use were younger compared to never medical cannabis users (48.7 vs 54.3 years of age). Medical marijuana users were more likely to have mood disorders, other psychiatric comorbidities, and secondary fibromyalgia, and more likely to be using opioids, antidepressants and gabapentinoids. The most common methods of use among ever medical cannabis users were smoked in 132 patients (51%), vaporized in 39 patients (15%), oil/capsules in 108 (42%), edible in 70 patients (28%), and rubbed in 35 patients (14%).

Conclusions: These results demonstrate that a significant proportion of patients in the HSC Rheumatology Clinic are using medical cannabis, and that the prevalence is significantly higher than previous reports. The relatively high rate of medical cannabis use observed in our study, coupled with the high proportion of patients who would consider use suggest that medical cannabis is gaining popularity. Cannabis is not an innocuous substance and there is still much that remains unknown about its safety and efficacy in the treatment of rheumatic diseases. Although many patients reported benefit, these results indicate not just the need for further study, but careful monitoring of the risks and benefits.
SURGICAL VERSUS CHEMICAL ANDROGEN DEPRIVATION THERAPY IN PROSTATE CANCER PATIENTS IN MANITOBA
Chang T1, Czaykowski P1,2, Decker K1,2, Lambert P2, Bravo J2, St. John P1, Turner D1,2, Dawe DE1,2.
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2CancerCare Manitoba, Winnipeg, MB, Canada

Introduction: Androgen deprivation therapy (ADT) is an essential component of the treatment of metastatic prostate cancer. Surgical castration by bilateral orchiectomy has similar efficacy in oncologic control and similar risks of osteoporosis, cardiovascular disease, and metabolic syndrome compared with chemical castration by luteinizing hormone-releasing hormone (LHRH) agonists. The advantages of surgical ADT include convenience and cost savings given the one-time procedure versus ongoing injections, while chemical ADT has can be used intermittently in some patients and does not have the psychological impact of surgical castration. The overwhelming majority of ADT strategy in the modern era is chemical ADT. This study looks at trends in ADT strategy in Manitoban patients with de novo metastatic prostate cancer and the effects on healthcare cost.

Objectives: 1a) To provide descriptive statistics on rates of metastatic prostate cancer, receipt of ADT, and modality of ADT (chemical versus surgical) in the Manitoban population; 1b) To develop a regression model to determine which factors impact receipt of ADT; 2) To estimate the cost difference between bilateral orchiectomy and chemical ADT.

Methods: In a population-based retrospective cohort design, data was extracted from the Manitoba Cancer Registry (MCR), Hospital Discharge Abstracts Database (DAD), Drug Program Information Network (DPIN), Manitoba Health billing data, Manitoba Health Population Registry, and Statistics Canada Census. Multivariable logistic regression was used to determine the impact of age, sex, cancer stage (Stage IV vs unknown), comorbidity (as calculated based on Resource Utilization Band (RUB) and weighted Charlson Comorbidity Index (CCI)), number of medications, and income quintile on the receipt of systemic therapy.

Results: Of 1415 patients diagnosed with Stage IV or unknown stage prostate cancer between 2004-2015, 946 (67%) received systemic medical therapy, bilateral orchiectomy or both. ADT was provided to 78.5% of stage IV patients versus 17.4% of those with unknown stage. 74.6% of patients aged 50-59 got ADT versus 31.3% of those aged 90+ years. In multivariable analysis, age, cancer stage (IV vs unknown) were significant predictors of receipt of ADT (p < 0.0001). 51 patients (3.6%) received bilateral orchiectomy. Bilateral was completed in 9% of patients in 2004 versus 0-1% per year for 2013-15. Of patients who underwent surgery, 22 (43%) had day surgery and 7 (14%) had brief admission of 1-3 days. We are currently finalizing cost estimates.

Conclusion: Bilateral orchiectomy represents an uncommon but effective and well-tolerated strategy for ADT in patients with metastatic prostate cancer. Compared to the recurrent costs of chemical ADT, it likely represents a potential route for significant cost savings. Our analysis will be completed by Research Day.
THE ENDOCRINOLOGIC ASSOCIATIONS OF BIRT-HOGG-DUBE SYNDROME: A REVIEW AND CASE REPORT

Dalphy A¹, Arnaout A²
¹Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
²Department of Adult Endocrinology and Metabolism, University of Ottawa, Ottawa, ON, Canada

Birt-Hogg-Dube syndrome (BHDS) is a rare autosomal dominant genodermatosis occurring due to defects of the FLCN gene¹, which is favoured to act as a tumour suppressor gene. It has variable phenotypic penetrance, with the most common features being skin fibrofolliculomas, diffuse pulmonary cysts, and benign or malignant renal tumours². Associated endocrinologic manifestations such as parathyroid adenomas have been infrequently described in prior case reports. We describe the case of a 49-year-old man found to have parathyroid adenomas and primary hyperparathyroidism following a recent BHDS diagnosis, managed with partial parathyroidectomy. Based on the limited available literature, there may be a role for total subtotal or total parathyroidectomy rather than minimally invasive parathyroidectomy in BHDS patients, given a potential predisposition for multiple concomitant parathyroid adenomas.
ADHERENCE TO GUIDELINES FOR INPATIENT PHARMACOLOGIC MANAGEMENT OF GLUCOSE LEVELS USING WRITTEN COMPARED TO ELECTRONIC ORDERS
Galloway J1 and Salamon E1
Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: Canadian Diabetes Association (CDA) glycemic control guidelines for non-critically ill patients with type 2 diabetes (T2DM) provide recommendations for in-hospital glucose management. Hypo- and hyperglycemia have both been associated with increased morbidity, mortality, and prolonged hospitalization.

Objectives: The purpose of this study was to ascertain compliance with CDA guidelines and whether there was a difference in guideline adherence or glycemic control between two clinical sites that use written records versus electronic medical records (EMR) by the same residents.

Methods: Patients with T2DM receiving insulin or oral anti-hyperglycemics who were not admitted for events related to their diabetes were retrospectively identified. Admission orders, first three days of blood sugars and any response to any hyperglycemic or hypoglycemic events were collected. Standard parametric testing was performed.

Results: 109 adult patients with T2DM admitted to clinical teaching units at two tertiary hospitals which use either written or electronic orders were retrospectively reviewed. There was no statistically significant difference comparing the total number of hyperglycemic events between the two sites (p=0.542) or in compliance with CDA guidelines. Type of insulin correction factor used between sites was significantly different (p<0.001).

Conclusions: We suspect that EMR did not make any difference in number of glycemic events following admission as there was no response to these events for changing medications and the insulin correction factor was not being customized for each patient with electronic orders. We propose that forced reassessment of insulin orders automatically triggered through an EMR may be required to show improved glycemic control.
PROMOTION OF ECONSULT HEMATOLOGY SERVICE AMONGST PRIMARY CARE PROVIDERS IN MANITOBA TO REDUCE WAIT TIMES AND IMPROVE PATIENT ACCESS
Farshad Ghasemi1, Dr. Vi Dao2
1 PGY2 Internal Medicine Univ of Manitoba. Winnipeg, MB, Canada.
2 Chair, General hematology DSG, CancerCare Manitoba. Winnipeg, MB, Canada

Introduction: Increasing wait-times to specialist care poses a significant barrier to healthcare in Manitoba, further compounded by the COVID19 pandemic. The hematology department at SBH alone receives close to 3,000 referrals annually from which an estimated 25% require in-person assessment. The eConsult service has the potential to reduce wait times and improve delivery of specialist care for concise, non-urgent questions (e.g., Does my patient require work up for inherited thrombophilias? Should this patient continue anticoagulation and for how long? What would you suggest for monitoring of MGUS?) within an average 2-7 business days. Still, the eConsult Manitoba service remains underutilized. Barriers to using the eConsult service include a lack of awareness amongst primary care providers (PCPs), a lack of understanding regarding ease of use, and a lack of promotion by specialists to their primary care colleagues.

Objectives: 1) To identify appropriate clinical questions for direct to eConsult service 2) To implement a centralized referral form for the hematology department at SBH promoting the eConsult service to PCPs 3) To quantify the impact of implementing direct to eConsult hematology service on the volume of in-person referrals and user satisfaction.

Methods: eConsults made between September 1st, 2020 and February 28th, 2021 will be reviewed to identify common questions asked by PCPs that did not result in a subsequent referral. The volume of eConsults and paper referrals will be quantified during that time period using the eConsult and centralized hematology intake databases. The primary outcome for this study will be the number of eConsult received. This will be a time series study with the primary outcome (number of eConsults) tracked on a run chart to allow for observation of impact after each intervention.

Results: Pending

Conclusion: Pending
Introduction: Maternal cardiac disease in pregnancy is increasing, both from older women with acquired cardiovascular disease undergoing pregnancy as well as an increasing number of women with congenital heart lesions surviving to childbearing age. Maternal cardiovascular disease is associated with an increased risk of negative outcomes for both the mother and her child in pregnancy and is the leading cause of peripartum mortality. There is increasing evidence which supports a multidisciplinary team in improving outcomes in cardio obstetrics patients. The health care resource utilization and maternal/fetal outcomes of patients with cardiovascular disease have not been characterized in Manitoba. Understanding the experience of mothers in Manitoba with cardiac disease undergoing pregnancy will allow for: defining the current incidence of pregnancy in women with cardiac disease requiring specialized care; defining the demographics and cardiac pathology of women with heart disease undergoing pregnancy; evaluating the current model of referral, joint care, and postpartum evaluation that women with cardiac disease receive in Manitoba; and analyzing the outcomes of women and their offspring in pregnancy with cardiac disease.

Methods: Retrospective cohort study of cardio obstetric patients cared for through the Maternal Cardiology Clinic and Maternal Fetal Medicine clinics at St. Boniface Hospital, Winnipeg between March 2018-March 2021. Subjects will be identified by Maternal Cardiology and Maternal Fetal Medicine clinic lists and billing sheets (St. Boniface Hospital, Winnipeg, Manitoba; Women’s Hospital Winnipeg, Manitoba). Pregnant patients without documented cardiac disease/symptoms will be excluded from the study.

Objective: To characterize the cardio obstetric population in Manitoba and to analyze maternal/fetal outcomes of pregnancies with maternal cardiac disease.

Results: Results are not currently available as the data is undergoing analysis. Results to be presented at Resident Research Day.

Conclusion: Unavailable at present as results are pending. Conclusion to be presented at Resident Research Day.
INCIDENT AND PREVALENT PATIENTS HAVE HIGH PAIN AND FATIGUE DESPITE DIFFERENCES IN DISEASE ACTIVITY: DATA FROM THE CANADIAN NETWORK FOR IMPROVED OUTCOMES IN SYSTEMIC LUPUS ERYTHEMATOSUS (CaNIOS) NATIONAL REGISTRY

Kaien Gu1, Paul Fortin2, Ann Clarke3, Catherine Ivory4, Jennifer Reynolds5, Antonio Avina-Zubieta5, Mark Matsos6, Derek Haaland6, Kimberly Legault6, Carol Hitchon1,7, Annalieze Tisseverasinghe1,7, Janet Pope8, Lily Lim7, CaNIOS Investigators, and Christine Peschken1,7

1Department of Medicine, University of Manitoba, Winnipeg, MB
2Department of Medicine, Université Laval, CHU de Québec, Québec City, QC
3Section of Rheumatology, University of Calgary, Calgary, AB
4Division of Rheumatology, Department of Medicine, University of Ottawa, Ottawa, ON
5Department of Medicine, University of British Columbia, Vancouver, BC
6Division of Rheumatology, Department of Medicine, McMaster University, Hamilton, ON
7Section of Rheumatology, University of Manitoba, Winnipeg, MB
8Division of Rheumatology, Western University, London, ON

Introduction: Systemic lupus erythematosus (SLE) is an autoimmune disease that predominantly affects women in their childbearing years and has a wide variety of manifestations. Within SLE research, patient reported outcomes (PROs) are becoming increasingly important, though little is known about PROs. We aim to better understand PROs in SLE using the Canadian Network for Improved Outcomes in SLE (CaNIOS) registry, a multicenter longitudinal SLE cohort with standardized data collection since 1995.

Objectives: Compare incident versus prevalent patients in the CaNIOS Registry at cohort entry with respect to demographics, disease-related measures, and PROs.

Methods: Baseline visit data was extracted, including demographics, clinical manifestations, treatment, disease activity and damage measures, and PROs including the SLE Activity Questionnaire (SLAQ), the SF36, global activity, pain and fatigue VAS, and categorical questions about flares, disease activity and improvement. Incident SLE was defined as symptom onset within 15 months of enrolment. Between-group comparisons were conducted with the independent-samples t-test for continuous variables and the chi-square test for categorical variables. Statistical significance was set at 0.05.

Results: There were 681 patients enrolled in the registry from seven Canadian sites as of January 2020; 166 patients (24.4%) were incident cases; with mean age at enrolment 48.1±14.9 years, average disease duration 12.1±11.5 years, 80.6% of patients residing in urban areas, 71.0% white, and 89% female. Mean disease duration for incident patients was 5 months. SLEDAI and Physician Global VAS were higher in incident compared to prevalent patients (5.14±4.85 versus 3.41±3.54; p<0.001) and (0.65±0.71 versus 0.30±0.42; p<0.001) respectively. Patient Global VAS (in the preceding three months) was higher in incident patients (4.64±3.00 vs. 3.93±2.81, p=0.026); incident patients were more likely to report any lupus activity (90% vs. 84%, p=0.028), and flares (74% vs 64%, p<0.001), but there were no differences in the fatigue and pain VAS scores. Mean SF-36 PCS and MCS scores on initial presentation were 39.5±11.8 and 45.3±11.8, respectively, and mean SLAQ symptom scores were 10.1±5.4 and global scores were 12.3± 8.1; these did not differ between incident and prevalent patients. However, incident patients were more likely to report improvement in their lupus over the preceding month (52% vs. 22%; p<0.001).

Conclusion: Incident patients had higher physician and self-reported disease activity compared to prevalent patients; however, symptoms, pain, fatigue, and SF-36 scores did not differ from prevalent patients. This suggests that symptom burden is high and quality of life is low from disease onset and does not improve with either time or reduced disease activity. Future work will aim to analyze the evolution of PROs in SLE patients over time and the relationship between PROs and other disease measures.
INCIDENCE AND PREVALENCE OF HEPATOCELLULAR CARCINOMA IN MANITOBA FOLLOW UP STUDY COHORT.
Hassan-Tash P1, Uhanova J1
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: The idea for longest running Canadian study, Manitoba follow up study (MFUS), dates back to World War II. Initially started after the medical team involved in assessment of about 7,000 male recruits to Royal Air Force saw an opportunity in calling back the survivors to partake in a longitudinal study in order to monitor their health. These efforts led to recruitment of close to 4,000 healthy male participants between 1946 and 1948. Their average age at entry was 31 years old. This study which is still ongoing has evolved through time. Participants were assessed initially every 5 years and this interval has shortened over time to every 3 years, then every 1 year, and then bi-annually. Through time other elements such as comprehensive medical records and autopsy record reviews were added to the study. This has provided and excellent opportunity for conducting nested studies. We set to investigate incidence and prevalence of hepatocellular carcinoma (HCC) in this cohort. HCC is only second to pancreatic cancer when it comes to lethality. HCC’s incidence worldwide in 2018 was just shy of 850,000, and its 5-year survival is estimated at only about 18%. Factors such as fatty liver disease, metabolic syndrome, viral hepatitis, alcohol and tobacco use, liver failure and genetics have been linked to development of HCC. On the other hand, there are certain factors that have been associated with lower risk of HCC, factors such as vaccination against hepatitis viruses, use of HMG-CoA reductase inhibitors, aspirin and even drinking coffee are amongst such risk reducing factors.

Objective: (i) To determine incidence and prevalence of HCC in a cohort of healthy men over duration of recent past 20 years. (ii) To investigate the relationship between HCC and medical comorbidities, lifestyle, and nutrition.

Method: Given the unique nature of this cohort there are pending additional clearances required. We aim to conduct a retrospective cohort analysis. Medical charts and available collaterals such as autopsy reports will be reviewed. Keyword searches for HCC, nutrition, diabetes, metabolic syndrome, NAFLD, NASH, alcohol, smoking, viral hepatitis, chronic hepatitis, cirrhosis will be conducted in database.

Results: Results of this study are pending.

Conclusion: This study has the potential to further provide insight on epidemiology of HCC. Further, detection of relationship between a comorbidity and/or lifestyle choice may pave the way to designing further cellular and biochemical investigations. A major limitation of this study is that it only involves healthy males at the time of recruitment.
HOST GENE VARIANTS ASSOCIATED WITH PNEUMONIA IN PATIENTS LIVING WITH HUMAN IMMUNODEFICIENCY VIRUS
Hutchings R1, Rueda Z2, Keynan Y2
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2Department of Medical Microbiology and Infectious Diseases, University of Manitoba, Winnipeg, MB, Canada
3Section of Infectious Diseases, Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: People living with human immunodeficiency virus (HIV) have significantly higher rates of morbidity than HIV-negative people, even with strict adherence to anti-retroviral therapy and undetectable viral loads. Lung disease represents a large portion of the burden of non-AIDS chronic diseases in the HIV-infected population. Recurrent pulmonary infections induce permanent lung damage and appear to contribute significantly to chronic lung disease in these patients. However, there is substantial variability in which patients develop pneumonia after exposure to the same microbial environment. The reasons for this are unclear. Differences in host genetics may account for this difference in susceptibility to pneumonia. Identifying the genetic determinants may lead to identification of therapeutic targets to reduce the susceptibility of HIV patients to pneumonia.

Objectives: Identify host genetic polymorphisms associated with the development of community-acquired pneumonia (CAP) in patients with HIV.

Methods: This is a case-control, gene-association study using a candidate-gene approach. Two cohorts of patients have been recruited in Medellín, Colombia. Inclusion criteria included HIV-positive adults (age ≥ 18) with CAP or without CAP. At admission, patients had blood taken for whole exome sequencing. A review of the scientific literature is being performed to identify candidate genes - single nucleotide polymorphisms (SNPs) in the host genome that have been previously implicated or studied for association with development of pneumonias (including Pneumocystis jiroveci, tuberculosis, and bacterial pneumonia). To test for association with pneumonia, the frequency of each candidate gene SNP will be compared between the group with CAP and the group without CAP. Relationships will be tested using a SNP-set Kernel Association Test.

Results: Pending.

Conclusions: Pending.
PREVALENCE OF CHRONIC SPONTANEOUS URTICARIA REQUIRING OMALIZUMAB THERAPY IN MANITOBA’S FIRST NATIONS AND NON-FIRST NATIONS POPULATION
Lee B1, Salter C2, and Kalicinsky C1
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2Department of Surgery, University of Manitoba, Winnipeg, MB, Canada

Introduction: Chronic spontaneous urticaria (CSU) is a common autoimmune disorder that predominantly affects women in their middle age. Although CSU is not a lifespan-limiting condition, its main symptom of pruritus affect functioning and general wellbeing of patients with the disease and can be disabling. It can also impose a significant financial burden to the individual, and by extension, society. Omalizumab is a recombinant monoclonal antibody against immunoglobulin E (IgE) when symptoms are inadequately controlled with conventional pharmacologic therapy with antihistamines. Anecdotally, there appears to be a high proportion of patients with CSU requiring omalizumab who are of First Nations (FN) descent (i.e., either recognized as having status under the Indian Act, as well as those who self identify or are identified by the clinicians to be of FN descent).

Objectives: This study aims to determine the prevalence of CSU requiring omalizumab therapy in patients of FN descent, compared to the prevalence of CSU requiring omalizumab therapy in the non-FN population that are treated at the Health Sciences Centre (HSC) Allergy and Immunology Clinic from 2018 onwards.

Methods: A list of patients who have been treated with omalizumab from 2018 onwards as identified on the Accuro electronic medical record (EMR) software will be obtained from HSC medical records. Prevalence of CSU requiring omalizumab therapy will be calculated for FN and non-FN populations, then stratified based on age and sex. Internal standardization will be performed based on the non-FN population studied. Information such as health region of residence, urban and rural demographics, and efficacy of omalizumab-therapy based on standardized symptom scoring systems will be collected and compared.

Results: As the study is still undergoing REB review there are no results to present at this time.

Conclusions: Conclusions will be determined pending data analysis.
EFFECTIVENESS AND FINANCIAL IMPACT OF A PROVINCIAL POLICY ELIMINATING ROUTINE USE OF CREATINE KINASE TESTING FOR WORK-UP OF SUSPECTED ACUTE CORONARY SYNDROME IN THE EMERGENCY DEPARTMENT

Mao T1, Wiens E1
1Department of Internal Medicine, University of Manitoba, Winnipeg, Manitoba

Introduction: Creatine kinase (CK) has long been a cornerstone in the diagnosis of ACS. However, it has been demonstrated that CK is not useful in the era of high-sensitivity troponin (hsTn) assays. In August 2020, a joint Choosing Wisely Manitoba® and Shared Health Manitoba practice change statement eliminating the routine use of CK for diagnosis of ACS was adopted. The policy was a written document highlighting that CK was an unnecessary test for ACS screening, and was distributed broadly to all health regions in Manitoba. We conducted a study to determine whether this policy change successfully reduced CK testing in emergency departments (EDs) across Manitoba.

Objectives: The aim of this study is to evaluate the effectiveness of a multifaceted passive intervention approach in reducing unnecessary testing on a provincial healthcare level through systemic policy change and the dissemination of knowledge mediated by written documentation with an accompanying poster.

Methods: A retrospective study was conducted to help evaluate the question posed in this study. Data was collected using the Diagnostic Services Manitoba Laboratory Information Management System database. The total number of CK and hsTn tests ordered in all EDs across Manitoba were collected. As surrogates for total ED presentations and CK ordered for non-ACS indications, total number of CBCs and myoglobin tests were obtained. Data was collected 5-months (March 1 to July 31, 2020) prior to the policy change and 5-months (September 1 to January 31, 2021) following the policy change, which occurred in August 2020. Hypothesis testing was done with Chi square testing, with significance defined as p<0.05.

Results: Prior to the policy change 88792 CBCs, 33079 hsTn, 2826 Myoglobin, and 20035 CK tests were ordered among all provincial EDs during the study period. Urban teaching hospitals ordered CK concurrently with hsTn 15.8% of the time, while it was ordered concurrently 33.1% of the time in peripheral EDs. Following the policy change, there was no difference in CBCs, hsTn, or myoglobins ordered, but there was a significant reduction in CK tests ordered (20035 vs 11840, p<0.0001). There was a 54% relative reduction in CK use across the province following the policy change, (22.6% vs 12.2%; p<0.0001). Individually, urban teaching hospitals decreased CK testing to 10.2%, while peripheral EDs decreased their CK testing to 15.3%. Based on a cost of $4/test, the 54% relative reduction in CK testing was estimated to result in a >$31000 in cost-savings over the course of a year.

Conclusion: The results of this study suggest that passive intervention through public health policy change is effective in reducing unnecessary testing across an entire health region.
THE IMPACT OF VIRTUAL SMALL GROUP MEDIATED ECG SESSIONS ON THE COMPETENCY OF ECG INTERPRETATION AMONG MEDICAL STUDENTS
Mao T1, Kass M1
1Department of Internal Medicine, University of Manitoba, Winnipeg, Manitoba

Introduction: The ability to competently interpret ECG abnormalities is a critical skill for patient care. Medical students learn how to interpret ECGs as part of their core training. It has been shown that medical students have limited competency in interpreting ECGs. Several studies assessed various teaching methods for improving ECG competency, the majority are led by attending physicians and focus on immediate short term results, as well they target medical students in the middle or end of their clinical training. However, it remains unknown if additional teaching can improve ECG interpretation skills prior to assuming clinical responsibility in clerkship.

Objectives: The primary objective was to evaluate the efficacy of small group ECG teaching sessions as a method for improving medical students’ competency in ECG interpretation. The secondary objective was to evaluate the efficacy of small group ECG teaching sessions on improving medical students’ ability to correctly identify life threatening ECGs.

Methods: A single center randomized study was conducted over the course of 8-months to answer the questions posed in this study. A total of 26 second year medical students were enrolled in the study from the Manitoba College of Medicine. The intervention group (n=13) received three ECG teaching through ZOOM. Each small group session was 1-hour long, occurring two months apart. The teaching sessions taught in a step wise fashion from basic to advance ECG interpretation. The control group (n=13) did not receive any formal ECG teaching. All participants completed four tests: baseline and an ECG test two months after each small group session. All participants complete a questionnaire at the start and finish of the study to help identify confounding variables. Data was analyzed using PRISM, a Student T-test will be used to compare the difference in test scores between the two groups.

Results: At baseline both cohorts have similar tests scores (mean 47% versus 47%, p = 0.99). Overall students in the intervention group demonstrated improvement in ECG interpretation compared to the control group. In particular, the intervention group performed better at basic ECG interpretation and identifying life threatening conditions such as STEMI compared to the control group (mean 50% vs 28% answered correct respectively, p<0.02). In addition, the intervention group trended towards better performance in interpreting advanced rhythms such as various SVT but did not reach statistical significance. The most common misinterpreted ECGs include STEMI, pericarditis, complete heart block, AVNRT, atrial tachycardia and multifocal atrial

Conclusion: The results of this study suggest that virtual small group teaching sessions has efficacy in improving student’s ability to interpret life threatening ECGs, which is a valuable clinical skillset.
MASS-MEDIA AND TARGETED EDUCATION INTERVENTIONS TO MINIMIZE DELAY TO HOSPITAL IN PATIENTS WITH CHEST PAIN: A SYSTEMATIC REVIEW

Marshall K1, Ren H1, Avery L2, Grierson R1,2, Ducas J1,2, and Liu S1.
1 University of Manitoba, Winnipeg MB, Canada
2 Winnipeg Regional Health Authority, Winnipeg MB, Canada
3 Emergency Response Services, Shared Health Manitoba, Winnipeg MB, Canada

Background: Despite many improvements in percutaneous coronary intervention (PCI) and hospital systems of care, delay in seeking medical attention remains a significant barrier to timely reperfusion in acute coronary syndromes (ACS). Though previous studies have examined the risk factors associated with prolonged delays in accessing care, the data on education interventions to mitigate these factors is mixed.

Objective: The aim of this systematic review is to examine the overall efficacy and methods of intervention available to minimize these delays.

Methods: We searched EMBASE, PubMED and MEDLINE from their inception to January 2021. Studies examining the association between either education intervention or mass media campaigns and delays in care (both patient delay and/or healthcare system delay) in ACS were included. Two independent reviewers performed level 1 screening of 6256 abstracts, which resulted in 95 studies for level 2 screening. After full manuscript review, these studies were then tailored to 26 studies with 17 companion articles for final data extraction.

Results: In total, 20 studies used public media campaigns, 5 of which targeted only high-risk populations and 1 used a combination of both strategies. The key messages of these interventions were to appropriately identify ACS symptoms, and to call emergency medical services (EMS) for timely access to care. The majority of studies examined the effect on patient delays in care (n=15) as an outcome, of which 80% were effective. The use of EMS in the setting of potential ACS was examined in 14 studies, and this was increased in 64% of studies after the intervention. There were also two studies that demonstrated decreased infarct size and mortality post-intervention. Several studies examined patient knowledge outcomes alone (n=4). In all studies examined, educational elements and mass media interventions relied heavily on print materials, radio and television. There was little to no presence of internet-based resources or social media.

Conclusion: Despite significant heterogeneity, there is evidence to support the efficacy of education interventions to reduce delay in accessing care for patients with chest pain. The use of similar methods using an internet-based platform is an interesting possibility that has not yet been explored in the current body of literature.
INTRODUCTION: Breast cancer is the most common type of cancer and the second leading cause of cancer-related death in Canadian women. Metastatic breast cancer (MBC) is considered incurable, with a 5-year survival rate of 29%. Overexpression and/or amplification of HER2 occurs in 15-20% of breast cancers. The outcomes for HER2-positive MBC patients have improved with HER2-directed therapies and a subset of patients experience durable, long-term responses. It is unclear whether some patients can discontinue systemic therapy and may ultimately be cured of this disease.

OBJECTIVES: To describe the patient characteristics, treatment, and outcomes of long-term survivors, diagnosed with HER2-positive de novo MBC who received systemic treatment in Manitoba from 2008 to 2018.

METHODS: Patients were identified using the Manitoba Cancer Registry. All patients ≥18 years of age who were diagnosed with de novo HER2-positive MBC and treated with HER2-directed therapy from 2008 to 2018 were included in this retrospective chart review. Overall survival was defined as time from diagnosis of metastatic disease to death. Patients were censored at the date of their last follow-up. Our study focused on those patients with survival times ≥24 months. Median overall survival (OS) was assessed using Kaplan-Meier method.

RESULTS: Of 96 patients diagnosed with de novo HER2-positive MBC, 44 (45.8%) were long-term survivors and described hereafter. The median age at diagnosis was 54 years (39-85 years) and all patients were female. Twenty patients (45.5%) had triple positive (ER+/PR+/HER2+) disease. The median number of sites of metastatic disease was 1 (range, 1-3), with bone being the most common site in 27 (61.4%) patients. The most common 1st line systemic therapy received was docetaxel/trastuzumab/pertuzumab (18 patients, 40.9%), followed by docetaxel/trastuzumab (15 patients, 34.1%). Nine (20.4%) patients had a complete response to 1st line therapy, while 13 (29.5%) had a partial response, 21 (44.7%) stable disease and 1 (2.3%) disease progression. The median time on 1st line HER2-directed therapy was 24.0 months (range, 3.5-85.2 months). Of the patients with ER/PR positive disease, 18 received endocrine therapy concurrent with HER2-directed therapy. Twenty one (65.9%) patients received subsequent lines of systemic therapy. The median overall survival was 109.1 months. There were 17 (38.6%) patients that survived ≥5 years.

CONCLUSION: There is a proportion of patients with de novo HER2-positive MBC who receive systemic treatment and experience long-term survival. It is unclear if and when HER2-targeted therapy can be discontinued safely in this group of patients. Future directions of this project include an analysis of features which may predict for durable treatment response and long-term survival.
LOOP DIURETIC RESISTANCE PREDICTION MODEL
Mercier J1, Tangri N1,2
1 Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2 Seven Oaks Hospital Chronic Disease Innovation Centre, Seven Oaks General Hospital, Winnipeg, MB, Canada

Introduction: Loop diuretics are frequently used in hospitalized patients with volume overload. Unfortunately, some patients do not respond as expected and require either escalating doses (which can be limited by toxicity) or augmentation of therapy, most commonly with a thiazide-like diuretic. Escalation of therapy has risks of renal injury.

Objectives: To develop a prediction model using common variables that can predict who is likely to be diuretic resistant and allow clinicians to diurese more aggressively early on.

Methods: Data were extracted from two large independent ICU databases in the United States: MIMIC-III (‘Medical Information Mart for Intensive Care’, approximately 50,000 hospital admissions to critical care units between 2001 and 2012 at the Beth Israel Deaconess Medical Center in Boston, Massachusetts) and eICU (approximately 200,000 admissions monitored by Philips Healthcare across the United States between 2014 and 2015). Variables with >20% missing data were excluded. Data imputation was performed on the remaining variables in the eICU dataset. Diuretic resistance was defined using urine output per 40mg IV furosemide equivalent dose with a cut-off of 1400 mL/dose used. Train and test datasets were created from the eICU database. Machine Learning using extreme gradient boosted trees (XGBoost) with hyperparameter tuning using Bayesian optimization was performed on those datasets. Final variables were chosen by feature importance score. Multiple models were created and incorporated into a final ensemble model which was subsequently applied to the MIMIC-III dataset as a means of external validation. Model parameters such as Area Under Receiver Operated Curve (AUC), sensitivity (Sn), specificity (Sp), positive/negative predictive values (PPV/NPV), and positive/negative likelihood ratios (LR+, LR-) were obtained.

Results: A total of 11,652 unique patients over 13,001 admissions met the inclusion criteria from the eICU database. This produced 30,868 individual days of analyses from which approximately 52% met the definition for diuretic resistance. With regards to the MIMIC database, a total of 4,480 unique patients over 5,059 admissions met the inclusion criteria which resulted in 12,671 individual days of analyses. From these, approximately 50% met the definition of diuretic resistance. Preliminary modeling was performed using a combination of 21 routinely available laboratory measurements, vital signs, and patient demographic information. Train and test from the eICU database and validation on the MIMIC dataset had the following characteristics, respectively: AUC 0.778, 0.717, and 0.714; Sn 72.6%, 67.9%, and 81.1%; Sp 67.9%, 62.5%, and 47.7%; PPV 71.2%, 66.8%, and 60.9%; NPV 69.4%, 63.7%, and 71.5%; LR+ 2.26, 1.81, and 1.55; LR- 0.404, 0.513, and 0.396.

Conclusions: The preliminary findings showed that the discriminative capability of a Machine Learning-derived loop diuretic resistance prediction model was modest and may aid in clinical decision making to identify patients in whom an earlier aggressive diuretic regimen may be of benefit. Ongoing model tuning will hopefully increase model performance.
IMPACT OF BOTULINUM TOXIN INJECTION ON PAIN AND CAREGIVER BURDEN IN PERSONAL CARE HOME RESIDENTS WITH HYPERTONIA, A RETROSPECTIVE COHORT ANALYSIS
Nicholas Miller MD, 1 Karen Ethans MD, FRCPC, 1 Rachel Hamm BPT,2 Alan Casey MD, FRCPC,1 Loring Chuchmach MSc 3
1 University of Manitoba, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Winnipeg, Manitoba, Canada
2 Community Therapy Services, Winnipeg, Manitoba, Canada
3 University of Manitoba, Centre for Healthcare Innovation, Winnipeg, Manitoba, Canada

Introduction: Hypertonia leads to medical complications, further reduction of independence, reduced quality of life, increased pain and increased caregiver burden in patients living in personal care homes (PCH). Hypertonia includes conditions such as spasticity and paratonia, which can be difficult to differentiate in PCH patients. Botulinum toxin is an evidence-based treatment of specific hypertonic conditions among other patient populations. Despite a high prevalence, there is limited evidence for treatment of hypertonia in PCH patients.

Objectives: To evaluate the effect of botulinum toxin treatment for unspecified hypertonia on pain and caregiver burden in PCH patients. The Caregiver Burden Scale (CBS) and Pain Assessment in Advanced Dementia Scale (PAINAD) were used as primary outcome measures.

Methods: Charts from a spasticity management clinic were retrospectively reviewed to identify PCH patients treated with botulinum toxin between the years 2016 to 2020. CBS and PAINAD scales were routinely recorded clinical outcomes in these patients. Participant age, gender, limb(s) treated, pre-treatment CBS and PAINAD score, and post-treatment CBS and PAINAD score were extracted from the patient records. Etiology and subtype of hypertonia was not analyzed. Wilcoxon signed-rank test was used for data comparison using SPSS software.

Results: 101 patients residing in PCH received at least one treatment with botulinum toxin. After exclusions, 71 patients were included in analysis. All exclusions were due to incomplete record of CBS or PAINAD score. The median pre-treatment CBS score was 9 (maximum score is 16), while the median pre-treatment PAINAD score was 7 (maximum score is 10). The median length of time between pre-treatment and post-treatment data collection was 3 months. Post-treatment, CBS improved to 4 (p< 0.001) and PAINAD improved to 1 (p< 0.001).

Conclusion: Botulinum treatment is effective in reducing caregiver burden and pain in patients with hypertonia living in PCH.
RISKS OF MELANOMA AND NON-MELANOMA SKIN CANCERS PRE- AND POST-IBD DIAGNOSIS
Mariam Narous1, Zoann Nugent2,3, Harminder Singh1,2,3, and Charles N. Bernstein1,2,3
1Department of Internal Medicine, 2Community Health Sciences, 3IBD Clinical and Research Center, University of Manitoba, Winnipeg, MB

Background: Inflammatory bowel disease (IBD) has been shown to be associated with an increased risk of non-melanoma skin cancers (NMSC), specifically squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), with the use of immunosuppressants such as thiopurines and tumor necrosis factor inhibitors (anti-TNFα). Increased incidence of melanoma in this population has also been reported, although reports are inconsistent. Patients with IBD may be at increased risk of skin cancers due to the immunosuppressive medications used to treat the disease, the underlying immune dysfunction of IBD, or a combination of both factors. Singh and colleagues previously demonstrated a higher baseline risk of NMSC in IBD patients not yet exposed to immunosuppressive medications, as compared to controls. However, there is no literature exploring skin cancers prior to formal IBD diagnosis, data that could potentially suggest inherent impaired immunity in patients with IBD.

Objectives: (1) To compare risks of NMSC and melanoma preceding and following a diagnosis of IBD, (2) To evaluate the effect of thiopurines, anti-TNFα, or both on risk of skin cancer in IBD, and (3) To further explore the effects of drug censoring on risks of NMSC and melanoma post-IBD diagnosis in a nested case-control analysis.

Methods: This is a retrospective, historical cohort-based study using population-based data sources. Individuals with IBD diagnosed between 1987 and 2018 were identified from the University of Manitoba IBD Epidemiology Database (UMIBDED), as well as, the Manitoba Cancer Registry, and matched with randomly selected controls based on age, sex, and postal area of residence on the date of IBD diagnosis (index date). Groups were followed from the index date until a diagnosis of a skin cancer, death, migration from the province, or the end of the study (Dec 31, 2018), whichever came first. Logistic and Cox regression analysis was performed to calculate the odds ratios and hazard ratios of skin cancers among individuals with IBD pre- and post-diagnosis respectively, adjusting for frequency of ambulatory care visits and socioeconomic status.

Results: Subjects diagnosed with IBD diagnosed between 1987 and 2018 (Table 2) were more likely to have had a diagnosis of BCC pre-dating their diagnosis with IBD (OR 1.50, 95% CI 1.24-1.81). Risks of SCC, other non-melanoma skin cancers, or melanoma prior to IBD diagnosis were not significantly increased. In comparison, there was a significant risk of developing BCC across all IBD groups (HR 1.60, 95% CI 1.45-1.76 for IBD; HR 1.71, 95% CI 1.48-1.98 for CD; HR 1.50, 95% CI 1.31-1.72 for UC) post-IBD diagnosis. In addition, the risk of developing SCC post-IBD diagnosis was significantly increased. There was no association between melanoma and IBD. Thiopurines or anti-TNFs increase the risk of BCC in IBD (HR 1.51, 95% CI 1.11-2.03 and HR 1.69, 95% CI 1.06-2.70, respectively), with anti-TNFα effect driven by CD. A similar pattern is observed with significantly higher risk of melanoma in CD in the setting of thiopurines or anti-TNFα. Thiopurines were also found to increase the risk of SCC in both CD and UC. Anti-TNFα alone do not increase the risk of SCC in IBD. Nested case control analysis confirmed a higher baseline risk of BCC in patient with IBD with censoring of both thiopurines and anti-TNFα. Similarly, censoring of both medications produced no effect on risk of SCC in IBD corroborating the absence of a baseline SCC risk in IBD.

Conclusions: Preceding a formal diagnosis of IBD, risk of BCC is higher than non-IBD controls. In comparison, NMSC risk is also raised post-IBD diagnosis in both Crohn's disease (CD) and ulcerative colitis (UC). IBD is not associated with a significant risk of melanoma higher than the general population, although risk of melanoma did increase in patients exposed to thiopurines or anti-TNFα when compared to those non-exposed. Our study suggests possible inherent immune impairment in patients with IBD even preceding their diagnosis, with further risks of skin cancers post-IBD diagnosis in the setting of immunosuppressant use.
WHO IS FIT TO DRIVE HOME? A LOCAL REVIEW OF PHYSICIAN ADHERENCE WITH MANDATORY REPORTING OF MEDICALLY UNFIT DRIVERS

Wheeler J1, Fultz B1, Navarro C1

1Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, Canada

Introduction: Physicians in Canada have a statutory requirement to report drivers who may be physically unfit to drive. The Canadian Medical Association’s “Driver’s Guide – 9th edition” is a resource for Canadian physicians that outlines specific conditions for which there is a statutory requirement to report medically unfit drivers to driver licensing authorities. This statutory requirement exists in all Canadian provinces and territories. In Manitoba, the requirement is mandatory, not discretionary. However, despite this mandatory reporting, physician adherence to statutory reporting requirements is uncertain. To our knowledge, there is no data on the rate of local physician adherence with statutory reporting requirements.

Objectives: To review local physician adherence with mandatory motor vehicle licensing notification requirements for patients at time of discharge from internal medicine that (1) had a condition that warranted mandatory notification of driver of licensing and (2) whether or not notification of driver licensing was documented in the medical chart. As a secondary objective,

Methods: A retrospective review of patient discharges from the internal medicine clinical teaching units at the Health Sciences Centre was performed. For each discharge reviewed, it was determined whether or not there was an indication for notification to motor licensing authorities that the patient may be unfit to drive. The Canadian Medical Association’s “Driver’s Guide: Determining medical fitness to operate motor vehicles” (9th edition) was used to determine if a patient had an accepted indication for mandatory reporting. Once an indication for reporting was determined, a chart review was performed to see if there was any documentation of official notification to driver licensing. In Manitoba, this is done via the Manitoba Public Insurance’s “Report to the Registrar of Motor Vehicles Concerning the Disease or Disability of Person” pursuant to Section 157 (1) of The Highway Traffic Act. It was also determined if there was any direct notification to patients, such as a physician documentation of verbal notification to the patient that they may be unfit to drive. Thus, for each patient chart, records were made on (1) whether or not there was an indication for reporting and what this was, (2) whether or not official notification to licensing authorities was documented, and (3) whether physician notification to the patient that the patient may be unfit to drive was documented.

Results:

Conclusions:
PREVALENCE OF OBESITY AND BODY MASS INDEX IN CANADA AMONG A RURAL-URBAN CONTINUUM: A CROSS-SECTIONAL STUDY – THE CANADIAN LONGITUDINAL STUDY ON AGING

Quan S1, Menec V2, O’Connell M3, Cloutier D4, Newall N5, Tate R2, St. John P1
1. Faculty of Medicine, University of Manitoba, Winnipeg, MB, Canada
2. Department of Community Health Sciences, University of Manitoba, Winnipeg, MB, Canada
3. Department of Psychology, University of Saskatchewan, Saskatoon, SK, Canada
4. Department of Geography, University of Victoria, Victoria, BC, Canada
5. Department of Psychology, Brandon University, Brandon, MB, Canada

Supervisor: Dr. Phil St. John

Introduction: Obesity is an important public health concern in both urban and rural settings, but large studies of rural-urban differences of obesity are lacking. This is especially important in Canada, where rural regions are heterogeneous in terms of health status and access to healthcare services. Therefore, it is beneficial to examine rurality on a gradient rather than as a strict binary “urban vs. rural” categorization.

Objective: To compare obesity and body mass index (BMI) across a rural-urban spectrum in Canada.

Methods: A cross-sectional analysis of BMI and rurality among Canadians aged 45-85 years was conducted using data from the Canadian Longitudinal Study and Aging (CLSA), a national sample representative of community dwelling residents. Body-mass index (in kg/m²) was calculated using self-reported weight and height. Rurality was identified in the CLSA based on residential postal codes, which were divided into 4 categories: urban, peri-urban, mixed, and rural. Logistic regression models were constructed to calculate adjusted odds ratios (aOR) with 95%CI between obesity (BMI ≥ 30 kg/m²) and rurality; adjusting for age, sex, province, marital status, number of residents in household, and household income. Multiple linear regression with 95% confidence intervals (95%CI) was used to compare mean BMI across rurality, adjusting for the same confounders.

Results: 21,126 Canadian residents aged 45 to 85, surveyed between 2010 and 2015, were included in our analyses. Among Canadians, 26.8% were obese. Obesity was less prevalent among urban communities (25.2%) than rural (30.3%, p<0.0001), mixed (28.7%, p<0.0001), or peri-urban communities (28.1%, p<0.0001). When compared to urban, the aOR (95%CI) for obesity was 1.09 (1.00, 1.20) in rural regions; and 1.20 (1.08, 1.35) in peri-urban settings. In areas of mixed urban and rural residence, the aOR was 1.12 (0.99, 1.27). The mean BMI in our weighted sample were: rural 28.2 kg/m², mixed 28.0 kg/m², peri-urban 27.8 kg/m², and urban 27.4 kg/m² (p<0.0001 for comparisons across geographic areas). When compared to urban regions, adjusted mean BMI (95%CI) was higher by 0.32 kg/m², (0.11, 0.53) in rural regions, 0.40 kg/m² (0.10, 0.69) in peri-urban settings, and 0.62 kg/m² (0.36, 0.88) in mixed settings.

Conclusion: 1 in 4 Canadian adults are obese. Living in a non-urban setting was an independent risk factor for higher BMI and obesity. Further studies are required to examine reasons for why rural-urban differences in obesity are present in Canada.
THE NEGATIVE IMPACT OF T-CELL MEDIATED REJECTION ON RENAL ALLOGRAFT SURVIVAL IN THE MODERN ERA
Rampersad C1, Balshaw R2, Gibson IW3,4, Ho J1,3,5, Shaw J1, Karpinski M1, Goldberg A6, Birk P6, Rush DN1,3, Nickerson PW1,3,5, Wiebe C1,3,5
1Department of Medicine, University of Manitoba
2George and Fay Yee Centre for Healthcare Innovation, University of Manitoba
3Shared Health Services Manitoba
4Department of Pathology, University of Manitoba
5Department of Immunology, University of Manitoba
6Department of Pediatrics and Child Health, University of Manitoba

Introduction: The prevalence and long-term impact of T-cell mediated rejection (TCMR) is poorly defined in the modern era of tacrolimus/mycophenolate-based maintenance therapy.

Objectives: To address this question, we studied a consecutive cohort of kidney transplant recipients maintained on Tac, MPA, and prednisone and with long-term follow-up to describe: (i) the prevalence of a first TCMR event, (ii) the prevalence of a second TCMR event on a subsequent biopsy, (iii) the risk factors for a first or second TCMR event, and (iv) the correlation of these TCMR events with key transplant outcomes including de novo DSA development, death-censored graft loss, and all-cause graft loss.

Methods: This single-center observational study evaluated 775 consecutive kidney transplant recipients from 2001-2019 with serial histology and correlated TCMR events with the risk of graft loss. The impacts of delayed graft function (DGF) and alloimmune events (first TCMR, second TCMR, and antibody-mediated rejection (ABMR)) were added as time-dependent covariates in a sequence of proportional hazards models to avoid immortal time bias.

Results: A ~30% incidence of a first Banff Borderline or greater TCMR detected on for-cause (17%) or surveillance (13%) biopsies, persistent (37.4%) or subsequent (26.3%) TCMR occurred in 64% of recipients on follow-up biopsies. Alloimmune risk categories based on HLA-DR/DQ single molecule eplet molecular mismatch correlated with the number of TCMR events (p=0.002) and Banff TCMR grade (p=0.007). Both a first and second TCMR event correlated with death-censored and all-cause graft loss when adjusted for baseline covariates and other significant time-dependent covariates such as DGF and ABMR.

Conclusion: Therefore, a substantial portion of kidney transplant recipients, especially those with intermediate and high HLA-DR/DQ molecular mismatch scores, remain under-immunosuppressed, which in turn identifies the need for novel agents that can more effectively prevent or treat TCMR.
IMPACT OF AGE, POLYPHARMACY, AND COMORBIDITY ON PATIENT REPORTED OUTCOME TRAJECTORY IN PATIENTS TREATED FOR LATE-STAGE CANCER
Hongru Ren1, Pascal Lambert2, Emily Rimmer1,2, Kathleen Decker2, Jen Bravo2, Phil St. John1, Donna Turner2, Piotr Czaykowski1,2, David E Dawe1,2
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2CancerCare Manitoba, Winnipeg, MB, Canada

Introduction: Patients with late stage (III or IV) cancer are often significantly burdened by symptoms such as pain, fatigue, anorexia, and shortness of breath. The measurement of these patient reported outcomes are important to understanding and reducing the symptoms that a patient with cancer might experience. The Edmonton Symptom Assessment System (ESAS) is a commonly used patient reported outcome assessment tool measuring symptom burden and quality of life. Use of the ESAS is associated with improved survival and functioning. Many patients diagnosed in the late stages also have advanced age, other comorbidities, and polypharmacy which might impact treatment related changes in symptom burden and quality of life.

Objectives: (1) To determine different trajectories of patient reported outcomes in a cohort of patients who completed serial measures of the ESAS. (2) To develop a regression model to determine whether cancer type, age, comorbidity, medication count, and time to treatment independently predict high versus low symptom burden.

Methods: We completed a retrospective cohort study of adult patients in Manitoba with Multiple myeloma, stage III or IV: non-Hodgkin’s lymphoma, breast cancer, lung cancer, colorectal cancer, prostate cancer or ovarian cancer diagnosed from January 1, 2004 to December 31, 2015. Only patients with completed serial ESAS measures over the first six months of receiving systemic therapy were included. The cohort was created using data extracted from the Manitoba Health Population Registry (MHPR), Medical Claims Database, Hospital Discharge Abstracts Database, the Manitoba Cancer Registry (MCR), the CancerCare Manitoba electronic medical record (ARIA), the Drug Program Information Network (DPIN), and Statistics Canada Census data. The ESAS responses were summed, and a trajectory analysis separated patients by trajectory of symptom burden. A multivariable logistic regression was used to determine predictors of symptom burden. Measures of comorbidity used were the Resource Utilization Band (RUB) and the Charlson Comorbidity Index (CCI).

Results: Of the 2674 patients included in this study, 52.5% were female, their mean age was 63.1 years (SD 11.9), and most had colorectal cancer (36.9%). The median number of prescribed medications were 4 (Q1=1, Q3=7). The majority of patients (56.5%) had a Resource Utilization Band of 3 (moderate user) but 63.6% had a Charlson Comorbidity Index of 0. The trajectory analysis revealed two groups, those with high symptom burden versus those with low symptom burden. Only higher medication count (HR 0.32, 0.24-0.44 per 10 medications, p<0.0001), time to treatment (early spline HR 1.37, 1.10-1.71 and late spline HR 0.63, 0.45-0.87, p=0.019), and cancer type (p<0.0001) were predictive of lower symptom burden. Estimated survival in patients with high symptom burden was shorter than lower symptom burden.

Conclusions: Cancer type, polypharmacy, and time to treatment, but not age or comorbidity, were shown to be significant predictors of symptom burden in patients with late-stage cancer. This may help healthcare teams consider earlier referral for assistance with symptom management.
Introduction: The lifetime prevalence of low back pain (LBP) is reported to be as high as 84%. Non-specific low back pain (NSLBP) can be defined as not having a specific cause. Studies report up to 85% of patients who present to primary care with LBP have NSLBP. NSLBP is treated conservatively with lifestyle education and exercise. Due to the high prevalence of LBP an intervention with a wide reach is appropriate. Accordingly, internet usage has become a ubiquitous method of sharing ideas and information. A great body of evidence has suggested positive outcomes in reported RCT’s of internet interventions across a wide range of clinical outcomes. This pilot study aimed to create an economic internet intervention in hopes to better inform larger powered studies aimed at improving self-management of NSLBP.

Objective: To illustrate the development and pilot evaluation of an internet-based intervention aimed to improve self-management of NLBP. We attempted to identify any associations of improved pain or function that may be better characterized with future larger powered studies. Qualitative survey data was collected to improve future intervention content and delivery.

Methods: 10 patients affected by NSLBP used our internet intervention that was created exclusively for this project, for a period of 3 months, under monitoring via telephone and email follow ups. Evaluation was undertaken by administering questionnaires at baseline and the end of the intervention. There was no control group. Statistical analyses were performed using statistical analysis software.

Results: The pilot study was not powered to test the effectiveness of the internet intervention for self-management of NSLBP. There were no associations of improved pain (p=0.53) or function (p=0.09). There was an attrition rate of 50%. It is not uncommon to see attrition rates of up to 40-50% in internet interventions. Due to the COVID-19 pandemic the data collected was confounded. Significant life changes were reported by most patients such as loss or change of occupation. Qualitative outcome data suggested the desire for an improved audiovisual experience. All participants found the information useful and easy to understand.

Conclusion: Research under a pandemic is a strong confounding variable that impacted our ability to inform future studies. Internet interventions should have a more dynamic audiovisual interface to improve participant experience. Future studies require a large sample size to account for large attrition rates of internet interventions.
Introduction: Dynamic testing to assess the hypothalamic-pituitary-adrenal axis is a key component in confirming the diagnosis of adrenal insufficiency (AI). Recognizing AI or hypocortisolism is essential to ensure lifesaving hormone replacement treatment with glucocorticoids is initiated. Conversely, unneeded exogenous glucocorticoids can have significant negative side effects. To determine if AI is truly present an adrenocorticotropic hormone (ACTH) stimulation test can be performed. A synthetic analogue of ACTH is used to stimulate cortisol production from the adrenal glands. Serial measurements of serum cortisol assess the adrenal response. The local cut-off value for sufficient versus insufficient adrenal cortisol production has changed in the last decade. Prior to 2016, the immunoassay used yielded higher values of measured cortisol due to the cross reactivity of the assay with steroid molecules other than cortisol. The introduction of a newer generation immunoassay which uses monoclonal antibodies, and is more selective for cortisol, yields lower cortisol measurements. Therefore, the cut-off value and the clinical interpretation of this test has needed to be readjusted.

Objectives: (1) Compare the incidence of patients meeting the AI cut-off criteria before and after the new cortisol assay were introduced. (2) Assess the clinical impact of the new assay on AI diagnosis for patients tested in the Endocrinology Clinical Investigation unit in Winnipeg.

Methods: Laboratory data from ACTH stimulation tests performed from 2010-2020 was reviewed. A focused chart review was performed to understand the clinical implications of a change in assay and cut-off value in the diagnosis of AI.

Results: Initial results show a significant increase in both the usage of ACTH stimulation tests and the incidence of adrenal insufficiency in recent years, which is not explained simply by the change in assay.

Conclusion: This project provides a descriptive analysis of how ACTH stimulation tests have changed over time. Furthermore, we share findings of a focused chart review which helps understand the clinical implications of a lower cut-off in the diagnosis of adrenal insufficiency.
Introduction: Chronic Obstructive Pulmonary Disease (COPD) exacerbation continues to be a very common reason for admission to hospital. Pulmonary rehabilitation has been shown to significantly improve the quality of life of patients with moderate to severe COPD. Pulmonary rehab also reduces the rate of hospital readmissions for COPD exacerbations which would reduce the substantial financial cost on our healthcare system. However, the rates of referral to pulmonary rehabilitation have historically been low.

Objective: We are currently undertaking a Quality Improvement (QI) project to improve referral rates to pulmonary rehabilitation for COPD patients.

Methods: The referral rate data for the project is based on regular chart reviews for adults admitted to one of the medicine inpatient units at Health Sciences Centre (HSC) with an admitting diagnosis of COPD exacerbation. The initial phase of the project involves (1) establishing a baseline referral rate, (2) assessing demographics of the patients currently referred, (3) interviewing attendings, residents, charge nurses and unit clerks for the inpatient units regarding barriers for referral. The second phase involves (1) using the baseline information collected to design potential solutions for improving referral rates, and (2) implementation of potential solutions. The second phase of the QI project is iterative and follows a Plan-Do-Study-Act format until target goal is reached. The last phase of the project involves (1) presentation and discussion of the results with the different stakeholders and (2) incorporation of proposed solutions into the day-to-day workings of the medicine units.

Results: Although the final results of the study are currently unavailable, we are aiming to achieve referral rates for patients, admitted with COPD exacerbations, to be persistently higher than 90% by June 2021.

Conclusion: Rates of referral for COPD patients to pulmonary rehabilitation have been historically very low and this is not congruent with the current COPD management guidelines. The referral rates from inpatient units can be improved with a combination of solutions incorporated into the discharge planning.
Introduction: Meningitis classically presents with a symptom triad of neck stiffness, fever, and altered mental status that requires swift diagnosis and treatment to avoid complications including residual neurologic impairment, seizures, poor functional outcomes, and death. When patients do not present with these classic findings, there can be delays in diagnosis and treatment. Previous chart reviews and audits in other centers have shown that the variation in the time to lumbar puncture, imaging and antibiotics can greatly influence patient outcomes. A retrospective analysis of patients who had presented with meningitis to Health Sciences Centre was completed to examine strengths and shortcomings in meningitis management.

Objectives: (1) To characterize the population of patients diagnosed with meningitis in Manitoba including their age, sex, and medical comorbidities. (2) To examine the clinical presentation of patients admitted with meningitis. (3) To audit the management of meningitis in Health Sciences Centre through metrics such as time to diagnosis, lumbar puncture, and neuroimaging, time and choice of antibiotic therapy and complications including intensive care admission, disseminated infection, and seizures among others.

Methods: Adults ≥18 years of age who presented to Health Sciences Center between 2007-2020, coded in the Internal Medicine and/or Intensive Care Unit databases with the most responsible diagnosis of meningitis were included for chart screening. Upon further reviewing their charts patients were included who presented with symptoms consistent with meningitis and had objective cerebrospinal fluid (CSF) findings associated with meningitis including positive cultures and elevated leukocytes in the CSF. Data collected on included patients consisted of patient demographics, presenting symptoms, diagnosis and management of meningitis and any complications that arose during admission.

Results: Completion of data entry and analysis is currently underway and preliminary results are reported here. The average age of patients presenting with meningitis was 44 and there was no significant difference between the number of male and female participants. 40.0% of patients originally presented to a rural community hospital outside of Winnipeg prior to transfer to HSC. The most commonly presenting symptoms included fever (80% of reviewed patients), headache (70%), and altered LOC (52.5%). 15% of patients presented with the classic triad of neck stiffness, altered mental status, and fever. Time to diagnosis varied greatly between less than 1 hour and over 50 hours. The diagnosis was made clinically in 75% of patients and required LP for diagnosis in 25% of patients.

Conclusion: At present time our results are preliminary and do not include all charts to be reviewed. Complete data entry and analysis will be required to draw conclusions.
FEASIBILITY OF A FAMILY LIASON VOLUNTEER INITIATIVE TO SUPPORT CRITICALLY ILL INTENSIVE CARE UNIT (ICU) PATIENTS AND THEIR FAMILIES DURING COVID-19 VISITOR RESTRICTIONS

Sorokopud-Jones, M1, Van Ginkel, R2, Kredentser, M3, Olafson, K1, Vazquez Grande, G1.
Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
Department of Family Medicine, University of Manitoba, Winnipeg, MB, Canada
Department of Clinical Health Psychology, University of Manitoba, Winnipeg, MB, Canada

Introduction: Critical illness imposes significant stress on both patients and families. In March 2020, in response to the COVID-19 pandemic, stringent visitor restrictions were implemented in Manitoba hospitals. In collaboration with University of Manitoba medical students, the Critical Care Program developed the Family Liaison Initiative (FLI) to help deliver patient and family centered care during visitor restrictions. Medical students volunteered as Family Liaisons (FLs), using videoconferencing to facilitate virtual visits, medical updates, and goals of care discussions between patients, families, and the medical team. FLs also screened for distress, offered online resources, and completed a patient dignity form.

Objective: To assess the feasibility of the FL Initiative in 4 Winnipeg ICUs during periods of visitor restrictions (April 21- July 31 2020).

Methods: All ICU patients and/or their families were invited to use a FL. FLs developed a communication strategy with families and screened for distress. FLs completed a patient dignity form that was displayed in the patient room. All FL interventions were recorded. Use of FL services during different levels of visitor restrictions were compared. To understand the impact of visitor restrictions on staff workload and stress, ICU staff working during restrictions were emailed a voluntary quality improvement survey.

Results: From April 21 - July 31 2020 there were 793 ICU admissions across the 4 ICUs. 487 admissions (61.4%) had FL involvement. Admissions with FL involvement were older (Mean 60.1 years vs. 56.5 years, p=0.004) and had longer ICU lengths of stay (Mean 6.2 days vs 2.7 days, p<0.0001). Patients participating in the program had higher ICU survival (85% vs 77%, p=0.003). Of admissions with FL involvement, 96.3% were screened for distress, 46.4% were emailed resources, 53.6% had a dignity form completed, 54.4% had virtual visits with family, and 33.7% had medical information conferences. 60.8% of the patients who used virtual visits were admitted during strict restrictions. Of 181 ICU staff who completed the survey, 50.8% reported their workload was decreased due to visitor restrictions and 46.9% associated visitor restrictions with decreased work-related stress.

Conclusions: The FLI succeeded in supporting over half of ICU patients and families admitted. Participating patients were older, with longer LOS and increased survival compared to non-participants. Increased mortality and shorter stays may reflect higher acuity illness in non-participants, precluding FL from offering services. Most virtual visits occurred during strict visitor restrictions. Staff reported decreased stress and workload with visitor restrictions, this may suggest the presence of visitors adds to the demands of ICU staff. Given the high workload of ICU staff, even when visitor restrictions are lifted there may be a role for a dedicated ICU family communicator to decrease ICU staff work-related stress.
SEVERE DISTRIBUTIVE SHOCK, NEUTROPHILIC DERMATOSIS, AND KOUNIS SYNDROME (ALLERGIC CORONARY VASOSPASM) ARISING FROM AZATHIOPRINE HYPERSENSIVITY SYNDROME

Samuel Su1, Yu Ming Wang1, Karver Zaborniak2, Sate Hamza3, Davinder S. Jassal1,4,6, Marcus Blouw7

1Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, Canada
2Department of Allergy and Clinical Immunology, University of Manitoba, Winnipeg, Manitoba, Canada
3Department of Pathology, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada.
4Institute of Cardiovascular Sciences, St. Boniface Hospital, University of Manitoba, Winnipeg, Manitoba, Canada.
5Section of Cardiology, Department of Internal Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada.
6Department of Radiology, St. Boniface Hospital, University of Manitoba, Winnipeg, Manitoba, Canada.
7Department of Internal Medicine, Section of Critical Care, Health Sciences Centre, Winnipeg, MB, Canada.

Introduction: Azathioprine is a purine synthesis inhibitor that is used as an immunosuppressive therapy in many immune-mediated conditions like rheumatoid arthritis, systemic lupus erythematosus, and inflammatory bowel disease. Azathioprine hypersensitivity syndrome, which is thought to be a type III or IV hypersensitivity reaction to the drug occurring in approximately 2% of cases, is characterized by a range of adverse effects from fever, hypotension, abdominal pain, arthralgias, erythematous cutaneous eruption, acute renal failure, neutrophilia and even more rarely, distributive shock. Allergic coronary vasospasm (Kounis syndrome) has been described as a reaction to several allergens but has never been associated with azathioprine or its hypersensitivity syndrome.

Case Summary: We describe a case of azathioprine hypersensitivity syndrome in a patient with Crohn’s disease, which then progressed into severe distributive shock and biopsy-proven neutrophilic dermatosis. The same patient was exposed to a rechallenging dose of azathioprine which resulted in Kounis syndrome (type II) with elevated cardiac enzymes and transient ST elevation. Clinical improvement was seen after stopping azathioprine.

Conclusion: In patients receiving azathioprine, azathioprine hypersensitivity syndrome, distributive shock, neutrophilic dermatosis, and Kounis syndrome should be recognized as potential adverse events.
Introduction: Iron deficiency anemia (IDA) is common in the inflammatory bowel disease (IBD) population. Current evidence-based guidelines suggest iron replacement therapy in IBD patients with IDA. IV iron has been demonstrated to be more effective to oral iron replacement in the IBD population, and this is thought to be related to poor tolerability, absorption, and effects on the gut microbiome. Studies have not directly compared the response of IV iron between patients with Ulcerative colitis (UC) and Crohn’s disease (CD).

Objectives: (1) To compare the increase in serum hemoglobin and ferritin following IV iron therapy between patients with UC and CD. (2) To determine factors associated with response to IV iron (other than disease type), including age, sex, IBD therapies, abdominal surgeries, and IBD characteristics.

Methods: In a retrospective chart review, we evaluated 536 IV iron infusions (iron sucrose) in 117 IBD patients prescribed by a single gastroenterologist between 2012-2020, and collected data on IBD type, age, sex, medications (IBD therapies, NSAIDs, ASA, oral iron), abdominal surgeries, and IBD characteristics. Statistical analysis was performed with SPSS.

Results: Most IV iron infusions were given to patients with Crohn’s disease (77% of infusions, 68% of patients). Most infusions were given as a series of multiple iron infusions (84%), rather than a single infusion. Patients with UC had a greater increase in serum ferritin than those with CD (mean difference ± SE of 13.2 ± 5.6 µg/L, p = 0.02). There was not a significant difference in the increase in serum hemoglobin between UC (6.5 ± 1.0 g/L) and CD (4.9 ± 2.1 g/L), p = 0.62.

Conclusions: Patients with UC responded better to IV iron therapy in terms of serum ferritin, and in a sample size of IV iron infusions prescribed by an IBD specialist, this was associated with less IV iron infusions being prescribed in UC than CD. In summary, patients with CD may require greater doses of IV iron therapy than those with UC.
**Introduction:** Transfusion of Red Blood Cells (RBCs) can improve oxygen carrying capacity in anemic individuals but carry potential adverse events, which include alloimmunization, acute respiratory syndromes, allergic reactions and infectious risks. The “Using Blood Wisely” campaign by Choosing Wisely Canada has targeted inappropriate RBC transfusions and this has led to improved transfusion rates in hospitalized patients in Manitoba, which has historically demonstrated higher per capita rates. In addition to the above risks, women of child bearing age (<45 years age) are at increased risk of developing hemolytic disease of the fetus and newborn from unnecessary RBC transfusions. Matching transfusions in Manitoba to the Rh(D) and Kell antigen has led to lower rates of alloimmunization against these antibodies but other clinically significant antibodies can occur. Outside of acute emergent hemorrhagic contexts, a restrictive transfusion strategy would be appropriate in this group since younger patients are more likely to tolerate anemia without significant symptoms and in women of child-bearing age, iron deficiency anemia is very common and easily remediable.

**Objectives:** The objectives of this project are as follows: (1) to determine how many women aged 45 and younger in Manitoba are receiving blood transfusions and to further determine how many of these women have had appropriate anemia work up prior to blood transfusion. (2) To implement a quality improvement intervention to minimize the number of women receiving inappropriate blood transfusions.

**Methods:** At the time of this abstract submission, REB conditional approval has been granted pending protocol clarifications. As such, the following methods may be changed in the future. A retrospective database analysis will quantify the magnitude of transfusions in women in Manitoba ages 18-45 from January 2016 – December 2020 using the Canadian Blood Services database (Traceline). Each transfusion will then by matched with relevant lab information in the Dynacare and Shared Health databases for each patient that received RBCs to determine the extent of anemia workup up to 30 days prior to the transfusion. The data will be merged and analyzed to quantify the percent of these women that have been investigated appropriately for anemia and the percent that are iron deficient at the time of transfusion. Following this analysis, a quality intervention will be implemented that will incorporate real time screening of transfusion requests for this population with recommendations for diagnostic workup and/or alternate intervention for stable anemia.

**Results:** At the time of abstract submission, this study was pending data collection and analysis.

**Conclusions:** To be determined once the above results are obtained. We however hypothesize that there are women in Manitoba receiving inappropriate blood transfusions which will warrant implementing a quality improvement intervention to minimize inappropriate blood cell transfusions and prevent the harms associated with such transfusions.
PATIENT NAVIGATORS FOR CHRONIC KIDNEY DISEASE AND KIDNEY FAILURE: A SYSTEMATIC REVIEW
Ali Taha¹, Yasmin Iman¹, Jay Hingwala¹², David Collister MD, PhD¹²
¹Chronic Disease Innovation Center, Winnipeg MB, Canada
²University of Manitoba, Department of Medicine, Section of Nephrology

Objective: To determine whether the implementation of a patient navigator in the clinical environment would significantly impact and improve clinical outcomes for patients with chronic kidney disease and kidney failure, and to describe the characteristics and implementation of patient navigators across renal programs and institutions.

Methods: This was a systematic review in which we developed a protocol that considered the population, intervention, comparison and outcomes in the articles that were screened. In collaboration with a medical librarian, original research articles were pulled for screening from various databases. Following the PRISMA guidelines, two reviewers independently screened the articles and identified those which met the inclusion criteria.

Results: After screening a total of 3371 citations, 17 articles met the inclusion criteria. The patient navigators in the studies were found to come from various healthcare backgrounds such as; nurses, social workers, medical interpreters, researchers and also included friends/family and non-medical individuals. Additionally, it was noted that patient navigators were predominantly given an educator or a counselling role. Patient navigators were used in most renal patient populations, including peritoneal dialysis, intermittent hemodialysis, renal transplant patients, and in patients with chronic kidney disease, but have not been used in the setting of home hemodialysis patients. It was found that the implementation of a patient navigator improved the processes of care for different clinical fields via education and addressing barriers to care. Furthermore, it was identified that screening rates increased, adherence to protocols and medication increased, alongside increased patient knowledge in regard to navigation and understanding of the healthcare system for the patients participating in the studies. However, many of the studies did not show a significant effect of patient navigators on outcomes.

Conclusion: Despite the positive correlation of patient navigator implementation and some improved health outcomes for patients, there was heterogeneity in the included studies and many were at a high risk of bias. Further high-quality randomized control trials need to be done to solidify these research findings as well as to determine standardized implementation procedures for cost effectiveness and outcomes.
Introduction: Health disparities are recognized in systemic lupus erythematosus (SLE), where vulnerable patients have both an increased incidence of lupus and worse outcomes. Lupus nephritis (LN) remains one of the most feared complications of SLE and remains a major risk factor for mortality in lupus. Lupus nephritis is characterized by impaired renal function, proteinuria, urinary casts, hematuria and/or pyuria. The gold standard for diagnosis is the renal biopsy. Higher frequencies of nephritis in non-white ethnic groups have been well described. In addition to more frequent development of nephritis, there is evidence that non-white patients develop nephritis earlier in their disease course and progress more rapidly to end-stage renal disease (ESRD). Lupus nephritis development and progression can be impacted by delays in diagnosis and treatment; there is little information on ethnic differences in renal biopsy classification in lupus nephritis.

Objectives: (1) Determine the (updated) frequency of LN and development of ESRD in HSC Rheumatology Clinic Lupus patients. (2) Determine the (updated) mortality in HSC Rheumatology Clinic Lupus patients. (3) Determine the ISN/RSP renal biopsy class, activity, and chronicity index for HSC Rheumatology Clinic Lupus patients. (4) Determine the interaction between vulnerable population factors and renal biopsy findings on progression to ESRD and overall mortality in lupus patients.

Methods: This is a retrospective cohort design study including all SLE patients seen at the University of Manitoba Arthritis Centre (UMAC) since 2003, which is >450 SLE patients. Data on sociodemographics and disease incidence, damage and treatment will be extracted from the clinic EMR and incorporated into the UMAC database. Renal biopsy data will be acquired through the records of Dr. Ian Gibson, HSC pathology, who has been archiving renal biopsies since 2002. Since nephrology care and rheumatology care are centered in Winnipeg this will capture essentially all renal biopsies in HSC Rheumatology Clinic SLE patients. We will use survival analysis to determine: i. for LN patients, time from diagnosis to ESRD, and ii. for all patients time from diagnosis of SLE to death. Patients will be censored at the date of last known follow-up visit or healthcare contact. Kaplan-Meier survival curves will be constructed for the association of vulnerable populations (ethnicity, low income, low educational attainment, and proximity to rheumatology care) and renal biopsy findings with the two outcome variables, death and ESRD; log-rank and Breslow tests will be used to test for differences. Cox proportional hazards regression models will be used to determine differences in the survival time for the two outcome variables, adjusted for the important covariates above, and additional potential covariates as determined by univariate analyses.

Results: Data collection and analysis is ongoing.

Conclusions: Data collection and analysis is ongoing.
SLEEP DISTURBANCE AND TRAVEL INTERRUPTION PRIOR TO COLONOSCOPY

Tse C1, Nugent Z1, Singh H1 (Manitoba Investigators) AND BCLEAN INVESTIGATORS1
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada

Introduction: There continues to be reluctance to use split-dose bowel preparation regimens for morning colonoscopies by many patients and practices due to concern of effect on the sleep experience and travel interruptions, which is assumed to be less with the day before bowel preparations. There are limited data on sleep experience and bowel movement kinetics among patients using different preparations for colonoscopy.

Objectives: To investigate sleep and travel experiences with different bowel preparation regimens in a substudy of patients enrolled in a randomized multicenter Canadian clinical trial of different bowel preparation and diet regimens, The Bowel Cleansing National Initiative (BCLEAN).

Methods: Patients scheduled to have a colonoscopy in the morning between 7:30AM and 10:30AM were randomized to a) 4L single dose polyethylene glycol (PEG) given in the evening before, b) 2L split-dose PEG (+ bisacodyl 15 mg), or c) 4L split-dose PEG. Patients scheduled to undergo a colonoscopy between 10:30AM and 4:30PM were randomized to a) 2L single dose PEG (+ bisacodyl 15 mg) in the morning, b) 2L split-dose PEG (+ bisacodyl 15 mg), or c) 4L split-dose PEG. Participants recorded information on bowel movements kinetics, sleep, and travel to the endoscopy unit. Continuous and categorical variables were compared between groups using a Kruskal-Wallis test, or Chi-square test, respectively. Statistical significance was set at the p=0.05 level, analyses were intention-to-treat.

Results: 641 individuals were included, with more women in the afternoon groups, but no imbalance in age among the groups. Patients undergoing early AM colonoscopies reported the most awakenings in the night when assigned to 4L single dose day before PEG and the highest reduction in sleep hours when assigned to 4L split-dose PEG. There were no significant between-group differences in urgent bowel movements, fecal incontinence episodes, or travel interruptions. Overall, 17% of those travelling more than an hour had to stop for a bowel movement during the travel to the endoscopy, with no significant difference between 4L single dose PEG day before (17%) and 4L split-dose PEG (21%) preparations for patients having an early morning colonoscopy.

Conclusions: Day before and split-dose high volume PEG regimens for morning colonoscopies scheduled before 10:30 AM lead to greater sleep disturbance when compared to split-dose low volume PEG as well as afternoon colonoscopies with high or low volume split-dose PEG or same-day low volume PEG regimens. However, the choice of regimens does not influence reports of urgent bowel movements, fecal incontinence episodes, or travel interruptions regardless of the scheduled colonoscopy time. Our study results suggest use of 4 L day before PEG for morning colonoscopy should be discouraged.
TIME TRENDS AND PREDICTORS FOR SURGICAL EXCISION OF LARGE COLORECTAL POLYPS IN MANITOBA
Tse C1, Helewa RM2, Johnson G2, Coneys G1, Dolovich C1, Singh H1
1Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
2Department of Surgery, Section of General Surgery, University of Manitoba, Winnipeg, MB, Canada

Introduction: Colorectal cancer (CRC) is the third most diagnosed cancer in Canada. Most arise from precursor colorectal polyps. Detection followed by endoscopic or surgical excision of large colorectal polyps is the key to prevention of CRC. Previous research suggests endoscopic removal of polyps is associated with lower morbidity, mortality and is more cost-effective compared to oncological surgical resection. Given new guidelines from Japan and Europe on advanced endoscopic techniques for larger polyps, and the lack thereof from Canadian guidelines, the characteristics of those with large polyps currently referred for surgery is important to analyze to assess for potential barriers to endoscopic removal. Furthermore, time trends of endoscopic vs. surgical resection of colorectal polyps in Canada has not been well characterized.

Objectives: (1) To determine the time trends in the last decade of the number of patients who have undergone surgical excisions for benign polyps and (2) comparing the characteristic of large polyps ≥2cm, patient characteristics and referral patterns in surgically versus endoscopically resected polyps.

Methods: Manual chart reviews were done for patients who underwent surgical excision of benign polyps and CRC at St. Boniface from 2007-2020. Endoscopic data was extracted for 2019 and 2020 from EndoVault, for patients who had large polyps. Pathology was collected through a chart review for all patients and patients with surgical management were identified. Analysis was done with T-test and Fisher's exact test for continuous variables and categorical variables respectively.

Results: The overall time trend for surgical excision for benign polyps appear to be steady over the last decade with the range of 35-58 (2.6-4.2%) patients going for surgery each year (2007 and 2020 were excluded as those did not include a full collection year). EndoVault extracted data showed in the last 2 years (2019 to 2020) 362 patients who had >2 cm polyps of which 23 (6.35%) underwent surgery. Endoscopic polyp size (range 20-100mm) and number of polyps found on endoscopy was not associated with surgical resection (p=0.10, p=0.32). Surveillance endoscopies (n=8, 47.06%, p=0.03) and sessile polyps (n=13, 76.47%, p=0.03) were associated with surgical resection. Most polyps referred for surgery were simply characterized as unresectable with no further details on the recommended polyp characteristics documented. 10 (58.82%) of the benign polyps that went for surgery had an initial attempted endoscopic resection with 2 of these being referred to a therapeutic endoscopist. 4 (23.53%) of the surgically resected polyps had an advanced therapeutic endoscopist involved in their care. Only 3 (13.04%) of all large polyps surgically resected was adenocarcinoma on final pathology.

Conclusion: The results of this study show a steady rate of patients with benign polyps going for surgery in Winnipeg. Sessile polyps were more likely to be surgically resected likely representing the difficulty of resection, interestingly polyp size was not associated with surgical resection. This data also shows that referral prior to surgery to an advanced therapeutic endoscopist is underutilized and may subject patients to unnecessary surgery. We are assessing rate of resection among polyps, where exact size is not reported, but are reported to be “large”. Pathways for assessment of “unresectable polyps” are being developed.
MOLECULAR ASSESSMENT OF BIOPSIES FROM PATIENTS WITH ULCERATIVE COLITIS REVEALS HETEROGENEITY IN CLINICAL DISEASE ACTIVITY

Jeffery M. Venner1, Katelynn S. Madill-Thomsen2, Philip F. Halloran2, Brendan P. Halloran2

1University of Manitoba, Winnipeg, Manitoba
2University of Alberta, Edmonton, Alberta

Introduction: Ulcerative colitis (UC) is a chronic inflammatory condition affecting the colonic epithelium. Disease mechanisms in UC are poorly understood, and current clinical and histology assessment lacks the granularity to correlate strongly with response to therapy.

Objective: To use an established microarray approach to elucidate the molecules and transcript sets most strongly associated the endoscopic Mayo score (a standardized clinical assessment tool of UC disease activity), and to explore the molecular heterogeneity in the endoscopic Mayo score using unsupervised analysis.

Methods: 128 UC colon biopsies were collected at the University of Alberta Hospital (Edmonton, AB) and Cedars-Sinai Hospital (Los Angeles, CA) during standard of care colonoscopy and processed using Affymetrix microarrays. Principal component analysis (PCA) and archetypal analysis (AA) visualized relationships between biopsies and previously annotated and published transcript sets (that represent biological processes). AA assigned each biopsy to one of three groups, and scores to each biopsy relating it to all three groups.

Results: Spearman correlations were highest between the endoscopic Mayo score and the injury-repair-associated transcripts (IRRAT, 0.64, \( P=4.7 \times 10^{-16} \)), immunoglobulin transcripts highly associated with chronic injury and fibrosis (IGT, 0.63, \( P=3.0 \times 10^{-15} \)), endothelial transcripts (ENDAT, 0.61, \( P=1.8 \times 10^{-14} \)), and parenchymal dedifferentiation, i.e. epithelial solute carrier loss (CT2, -0.60, \( P=6.5 \times 10^{-14} \)). Spearman correlations were weaker between the endoscopic Mayo score and T cell-associated transcripts (QCAT, 0.40, \( P=3.2 \times 10^{-6} \)) and IFNG-inducible transcripts (GRIT, 0.48, \( P=8.4 \times 10^{-9} \)).

PCA separated injury from no injury in PC1. T cell transcripts (QCATs), interferon-gamma inducible transcripts (GRITs) and targets of biologics (IL12, TNFA, ITGA4/B7) separated from injury transcripts in PC2.

We assigned three AA groups and visualized biopsies in PCA. Group 1 (N=44) biopsies had little parenchymal dedifferentiation and low expression of injury-associated transcripts. Groups 2 (N=44) and 3 (N=40) had increased expression of injury-associated transcript sets and parenchymal dedifferentiation compared to Group 1. Although Group 3 was endoscopically similar to Group 1 \( (P>0.05) \), Group 3 showed elevated injury-associated transcript set expression (e.g. IRRATs) and increased parenchymal dedifferentiation (CT2).

Conclusion: The endoscopic Mayo score, a clinical assessment tool for disease activity, is highly correlated to the parenchymal response-to-wounding. Assessment of UC biopsies using AA and previously annotated transcript sets reveals two groups of biopsies that are endoscopically similar though one group has increased molecular abnormalities, thus revealing heterogeneity unrelated to the Mayo score. A molecular system based around PCA and AA could enhance UC disease assessment by allowing for quantitation and qualification of injury in biopsies obtained at endoscopy, i.e. a level of resolution beyond conventional endoscopic scoring.
Introduction: Dual antiplatelet therapy (DAPT) with ASA and a P2Y12 inhibitor has become a mainstay of therapy in acute coronary syndrome (ACS). Although ticagrelor was demonstrated to be superior to clopidogrel in the PLATO trial, North American patients did not demonstrate mortality benefit. A recent observational study of 13,897 patients from Alberta who had undergone percutaneous coronary intervention (PCI) for ACS revealed that there was no difference in mortality or incidence of major adverse cardiovascular events (MACE) between patients prescribed ticagrelor compared to clopidogrel when adjusted for age and comorbidities, but there was an increase in major bleeding in patients receiving ticagrelor. It is important to evaluate the efficacy of these P2Y12 inhibitors in the real-world setting.

Methods: We conducted a retrospective cohort study of all patients who were diagnosed with ACS and underwent PCI in a single Canadian province from January 1, 2015 to December 31, 2017. Baseline characteristics including comorbidities, medications, and bleeding risk were obtained. Propensity matching and stabilized inverse probability treatment weighting (IPTW) were used to compare patients who received ticagrelor as opposed to clopidogrel. The primary outcome was occurrence of MACE at 12 months, defined as death, nonfatal MI, or unplanned revascularization. Secondary outcomes included all-cause mortality, major bleeding, stroke, and any-cause hospitalization.

Results: A total of 3575 patients who underwent PCI for ACS were included. 1380 received clopidogrel and 2195 received ticagrelor. Patients who received clopidogrel were older and significantly more likely to have comorbidities including hypertension, chronic obstructive pulmonary disease, peripheral vascular disease, chronic kidney disease, previous ACS, previous bleeding, and HAS-BLED score \( \geq 2 \). In 1229 propensity-score-matched pairs, there were no differences between patients given ticagrelor compared to clopidogrel in MACE (HR 0.91; 0.74-1.12 p=0.39), all-cause mortality (HR 1.00; 0.62-1.62, p=1.00), major bleeding (HR 0.85;0.44-1.64 p=0.62), or stroke (HR 0.50; 0.15-1.66, p=0.256). There was a statistically significant reduction in hospitalizations among patients treated with ticagrelor (HR 0.86; 0.71-0.99, p<0.01). The stabilized IPTW showed comparable results.

Conclusion: In a contemporary real-world cohort of ACS patients managed with PCI, ticagrelor use is associated with reduced hospitalization, but no MACE or mortality benefit in 12 months from their index PCI. These results suggest that a personalized approach to DAPT, taking into account comorbidities, ischemic, and bleeding risk may be preferable to routine use of ticagrelor in ACS patients. Analyzing data from a larger ACS patient cohort treated with PCI may help identify patient subgroups that may benefit most from use of ticagrelor as the P2Y12 inhibitor of choice.

Disclosure: First author’s role includes study design, data analysis, and manuscript preparation. Primary supervisor is Dr. Ashish Shah.
QUALITY ASSESSMENT OF PROVINCIAL SCREENING PROGRAM FOR LYNCH SYNDROME IN MANITOBA

Winter R2, Stone J.1,2, Singh H.1,2, Rothenmund H.3, Khan D.3, Klein J.3
1 Department of Gastroenterology, University of Manitoba, Winnipeg MB, Canada
2 Department of Internal Medicine, University of Manitoba, Winnipeg MB, Canada
3 Department of Genetics, University of Manitoba, Winnipeg MB, Canada

Introduction: Colorectal cancer (CRC) is a leading cause of morbidity and mortality in Canada, with up to 5-10% of cases being hereditary. The most common inherited genetic disorder predisposing to CRC, Lynch Syndrome (LS), is associated with microsatellite instability (MSI) in DNA mismatch repair (MMR) genes. In October 2013, Manitoba launched a universal LS screening program. The program includes screening of colorectal biopsy and resections for cases ≤70 years. Testing occurs with immunohistochemistry for all 4 MMR proteins, with reflex testing of BRAF V600E where indicated. Screen positive pathology reports are copied to Genetics for germline testing. To date, Manitoba’s screening program has not yet been evaluated. As a model program, systematic evaluation is essential so that further refinements may be implemented.

Objectives: This quality assessment project aims to evaluate the efficacy of Manitoba’s universal screening program for LS. Furthermore, we aim to identify the frequency with which the affected individuals undergo genetic testing, and proportion of first-degree relatives accessing genetic services.

Methods: Pathology databases were searched to identify individuals diagnosed with CRC since 2018. Pathology reports were reviewed for MMR-IHC results to determine the proportion of eligible specimens screened, completion of appropriate reflex tests, and proportion of abnormal reports copied to Genetics for follow up. The volume of patients who accepted a Genetics appointment and how many proceeded with germline testing, the number of patients who have been confirmed to have a diagnosis of LS, and the number of patients with MMR-deficient tumor but no confirmation of LS by germline testing were also reviewed. Descriptive analysis were performed, reporting proportions and 95% confidence intervals, and logistic regression analysis to assess for potential independent predictors (such as age, sex, socioeconomic status of patients, biopsy vs. excision, pathologist site of practice, endometrial vs. colon cancer).

Results: A total of 2482 of colorectal biopsy and resection specimens between March 2018 to December 2020 were analyzed. MMR testing was completed on 1037 specimens, with 21% of these tests being inappropriate. MMR was missed on a total of 568 additional samples that met criteria for testing. 138 cases from a total of 524 abnormal pathology reports (26%) were copied to Genetics, with 44% of these patients accepting a genetics appointment. During the screening program review period, 13 new cases of Lynch Syndrome were diagnosed.

Conclusions: Lynch Syndrome is a common inherited disorder predisposing to colorectal cancer, with a large portion of MMR testing being either inappropriate or missed in eligible patients in Manitoba. Only a quarter of patients with abnormal pathology results were referred to genetics, with an even smaller subset in Manitoba following throughout with further appointments and germline testing. Further strategies to educate providers on appropriate testing practise and referrals for genetics counselling is required to improve the pickup rate for Lynch Syndrome in the province.
DETERMINING THE ASSOCIATION BETWEEN METABOLIC ACIDOSIS AND
OSTEOPOROSIS IN MANITOBAN CKD PATIENTS
Zhu A¹, Tangri N¹,2
¹Department of Internal Medicine, University of Manitoba, Winnipeg, MB, Canada
²Seven Oaks General Hospital, Chronic Disease Innovation Centre, Winnipeg, MB, Canada

Introduction: Metabolic acidosis is a common complication of advanced chronic kidney disease (CKD). Based on in vitro studies, it is known to be associated with increased bone demineralization. While osteoporosis and increased fracture risk are highly prevalent in CKD, the role of metabolic acidosis in this phenomenon has not been delineated in clinical studies.

Objectives: The purpose of the study is to examine the relationship between metabolic acidosis, osteoporosis, and fracture risk in CKD patients. The objectives are: 1) To determine whether serum bicarbonate is associated with bone mineral density (BMD) in cross-sectional analysis; 2) To determine whether metabolic acidosis is associated with trabecular bone score (TBS) in cross-sectional analysis; 3) To determine whether metabolic acidosis is associated with fracture risk in longitudinal analyses, after adjusting for the Fracture Risk Assessment Tool (FRAX) score and TBS.

Methods: We will perform a retrospective study of adults in Manitoba who have had a dual-energy X-ray absorptiometry (DXA) scan, as well as a GFR <60 ml/min/1.73 m² and serum bicarbonate value measured within 1 year of the date of the scan. Several linked health databases at the Manitoba Centre for Health Policy will be used to collect baseline characteristics, fracture history, lab values, BMD values, and trabecular bone scores. The study population will be divided into 2 groups based on serum bicarbonate values (approximated by total CO₂): 1) with metabolic acidosis (12 ≤ total CO₂ < 22); and 2) without metabolic acidosis (total CO₂ ≥22). Continuous variables will be compared using analysis of variance (ANOVA), while categorical variables will be compared using the Chi-square test. Cox proportional hazards models will be used to test for the association between metabolic acidosis and the outcomes of interest (BMD, TBS, FRAX score, incident fracture within 5 years). We will also conduct Cox proportional hazards models on the patients stratified in groups by eGFR in order to determine whether an association between metabolic acidosis and outcomes persists, regardless of kidney function. Models will subsequently be adjusted for various confounding variables as determined from previous work examining fracture risk in CKD.

Results: Pending completion of data collection/analysis.

Conclusions: No conclusions can be made yet, as completion of data collection/analysis is pending. Given the higher mortality rate (3-fold increase) and healthcare costs associated with osteoporotic fractures in CKD patients, it is important to delineate the role of metabolic acidosis in the development of osteoporosis, as it would be a treatable and modifiable risk factor.
HIGH RESOLUTION DATA MODIFIES INTENSIVE CARE UNIT DIALYSIS OUTCOME PREDICTIONS AS COMPARED WITH LOW RESOLUTION ADMINISTRATIVE DATA SET

Ziegler J, Rush BNM, Gottlieb ER, Celi LA, de la Hoz MAA

1Department of Internal Medicine, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada
2Division of Renal Medicine, Department of Medicine, Brigham and Women’s Hospital, Boston, Massachusetts, United States of America
3Harvard Medical School, Boston, Massachusetts, United States
4Institute for Medical Engineering and Science, Massachusetts Institute of Technology, Cambridge, Massachusetts, United States of America
5Department of Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts, United States of America
6Department of Biostatistics, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, United States of America
7Department of Anesthesia, Critical Care and Pain Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, United States of America
8Big Data Department, Fundacion Progreso y Salud, Regional Ministry of Health of Andalucia

Introduction: Administrative databases have allowed for the analysis of large amounts of healthcare data and have been responsible for numerous practice-changing studies. However, administrative databases were often created with the intent of gathering data for financial, health policy or administrative use, and therefore lack clinical information. More recently, the widespread use of electronic health records (EHRs) has provided access to large amounts of clinical data. Databases such as the eICU Collaborative Research Database (eICU) integrate clinical data from EHRs and bedside monitoring linearly over time into comprehensive datasets. Compared to administrative databases and disease registries, these newer highly granular clinical datasets offer several advantages, including availability of detailed clinical information for machine learning and the ability to adjust for potential confounders in statistical models.

Objectives: The purpose of this study is to compare the analysis of the same clinical research question using a comparable cohort of patients in a low resolution administrative database and high resolution EHR database. This will allow for the comparison in the ability to adjust for confounding using important clinical variables between the two databases.

Methods: The Nationwide Inpatient Sample (NIS), a large representative multi-center US national database was selected for the low-resolution model cohort. The eICU Collaborative Research Database, a large multi-center database capturing inpatient admissions to tele-ICUs in the US was selected for the high-resolution model. A parallel cohort of patients admitted to the ICU with sepsis and requiring mechanical ventilation, and stratified by dialysis use was extracted from each database. The baseline characteristics of patients from both cohorts were compared to ensure that the cohorts from each database were comparable. The low resolution variables included patient and hospital demographics. The high resolution variables included patient lab values, vital signs, and vasopressor and inotrope use. Multivariate logistic regression models predicting mortality in patients by dialysis use status, were performed for low resolution variables and high resolution variables.

Results: In the low-resolution model, after controlling for the covariates that are available, dialysis use was associated with an increased mortality (eICU: OR 2.07, 95% CI 1.75-2.44, p<0.01; NIS: OR 1.40, 95% CI 1.36-1.45, p<0.01). In the high-resolution model, after the addition of the additional clinical covariates, the effect of dialysis on mortality was no longer significant (OR 1.04, 95% CI 0.85-1.28, p=0.64).

Conclusions: The results of this experiment show that the addition of high-resolution clinical variables to statistical models significantly improves the ability to control for important confounders that are not available in administrative datasets. This suggests that the results from prior studies using low-resolution data may be inaccurate and may need to be repeated using detailed clinical data.
RIFAMPIN COMBINATION THERAPY FOR STAPHYLOCOCCAL PROSTHETIC JOINT INFECTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS
Ziegler J1, Johnson G2, Askin N3, Rabbani R4,5, Keynan Y1 and Abou-Setta A4,5
1Department of Internal Medicine, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, Canada
2Department of Surgery, Section of General Surgery, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada
3Neil John Maclean Health Sciences Library, University of Manitoba, Winnipeg, Canada
4Department of Community Health Sciences, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada
5George and Fay Yee Centre for Healthcare Innovation, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada;

Introduction: Staphylococcal prosthetic joint infections are an important cause of morbidity in patients after joint arthroplasty and are challenging to eradicate due to the ability of Staphylococcal species to form biofilms on the implants. Due to its ability to penetrate biofilms, rifampin has been used as an adjunctive agent with anti-Staphylococcal antibiotics to increase clinical cure when the prosthetic material is retained.

Objective: The purpose of this systematic review is to identify, critically-appraise and summarize the evidence on the efficacy and safety of rifampin combination therapy in adults with Staphylococcal PJIs.

Methods: We searched Medline, Scopus, Central and EMBASE, as well as clinicaltrials.gov up to February 12, 2021. Inclusion criteria included randomized control trials of adult patients receiving combination therapy with rifampin for treatment of retained PJIs with Staphylococcus species. The risk ratio (RR) and 95% confidence intervals (CI) of treatment failure and safety outcomes were obtained.

Results: Two randomized control trials were included in the pooled analysis. A total of 51 patients were randomized to the rifampin group, and 47 patients were in the control group. There was no difference in treatment failure between the rifampin and control groups (RR 0.53, 95%CI 0.24 to 1.17, I² 10%). There was also no difference in adverse events between the two groups (RR 1.89, 95%CI 0.59 to 6.05). Only one episode of hepatic failure was reported. The two trials differed significantly in terms of antimicrobial therapy, rifampin dose and duration of therapy.

Conclusions: There is a paucity of clinical trials evaluating the efficacy of rifampin combination therapy in Staphylococcal PJIs. The results of the pooled analysis from RCT data do not support the use of combination therapy. However, further clinical trials are required with larger sample sizes to definitively determine the efficacy of adjunctive rifampin use in the treatment of Staphylococcal PJIs.