Rocky Mountain ACP/AMA Internal Medicine – Banff

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Research Abstracts

CONFERENCE ABSTRACT AWARD: BEST CASE REPORT SUBMITTED IN THE RESIDENT CATEGORY

A Patient-Centered Approach to Initiation of Buprenorphine/Naloxone for Treatment of Opioid Use Disorder: A Case Report

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At least 2,458 Canadians died from an opioid-related overdose in 2016 and over 1,400 deaths are expected in British Columbia (BC) alone in 2017. Unfortunately, methadone and buprenorphine/naloxone, evidence-based medications with proven mortality benefit, remain under-utilized in part due to patient preference to taper off medications and unnecessary treatment burden. New BC guidelines call for buprenorphine/naloxone as first-line treatment for opioid use disorder (OUD) over methadone due to its favourable safety profile that allows take-home dosing.

A 46-year-old male with severe OUD presented to an outpatient addiction medicine clinic following recent hospitalization for complications of injection drug use in Vancouver, BC. While he recognized the risk of infection and overdose with ongoing drug use, the patient did not want to begin opioid agonist therapy and identified barriers including stigmatization, perceived loss of control, and pressure from family. The patient had been abstinent from opioids for four days and was experiencing intense cravings and mild withdrawal. A pill-in-pocket approach was proposed, and the patient was provided with a total of 8mg (4 x 2mg tablets) of buprenorphine/naloxone to be taken, if needed, as an alternative to illicit opioid use. This approach was enthusiastically accepted by the patient, who returned to clinic the following day after taking the

buprenorphine/naloxone at home. He was initiated on 16 mg buprenorphine/naloxone and remained engaged in care.

Novel strategies are required to engage and retain patients in opioid addiction treatment. For patients who remain ambivalent about initiation of opioid agonist therapy, a “pill-in-pocket” approach with buprenorphine/naloxone initiation is an acceptable, patient-centered option. This empowering approach can be offered to appropriate patients to maintain engagement in care.

CONFERENCE ABSTRACT AWARD: BEST RESEARCH ABSTRACT SUBMITTED IN THE RESIDENT CATEGORY

Outcomes After In-Hospital Cardiac Arrest In Patients With End-Stage COPD: A Retrospective Nationwide Analysis

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Background: A better understanding of the outcomes after cardiac arrest in patients with end-stage illnesses can help patients and families make decisions about resuscitation wishes. While there is some evidence that patients with COPD have worse outcomes following cardiac arrest,¹⁻³ the outcomes of patients with end-stage COPD (ESCPD) requiring home oxygen who suffer in-hospital cardiac arrest (IHCA) is not known.

Objective: We attempted to characterize the outcomes of ESCPD patient after IHCA on a national level.

Methods: The Nationwide Inpatient Sample (NIS) for the 2010-2014 years was utilized. Patients who suffered an

in-hospital cardiac arrest were isolated from the dataset. We compared patients with COPD requiring home oxygen (ESCPD group) to patients without COPD. A multivariate model predicting in-hospital mortality using demographic factors and the Elixhauser co-morbidity indices was created.

Results: A total of 37,312,324 hospital admissions were analyzed. There were 167,764 (0.4%) patients who suffered an in-hospital cardiac arrest. Of these, 21,786 (13.0%) had a diagnosis of COPD and 3,198 (1.9%) had ESCPD. Overall mortality for non-COPD patients was 57.9% compared to 69.0% for patients with ESCPD ($p < 0.01$). After controlling for baseline demographic factors and comorbidities, the presence of ESCPD was associated with a 1.59-fold increased odds of death (95% CI 1.46-1.72, $p < 0.01$)

Conclusion: Patients with ESCPD who suffer IHCA had significantly poorer outcomes. These findings need to be taken into account when counselling patients about their wishes for resuscitation with a life-limiting illness.

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CONFERENCE PRESENTATION AWARD: BEST CASE REPORT PRESENTED AT THE POSTER SESSION

Recurrent Spontaneous Pneumothorax – Looking for Zebras

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Mr. A. V. is a 63-year old gentleman who presented to the emergency department with a recurrent right spontaneous pneumothorax and interestingly, a positive family history as he mentioned his daughter had had one as well. This history raised the question of a genetic etiology and on careful physical exam, he was found to have multiple small skin

nodules on his face, chest and back, which could be consistent with fibrofolliculomas. His presentation was suggestive of a rare autosomal dominant inherited condition called Birt-Hogg-Dubé syndrome characterized by fibrofolliculomas on the face, head and upper torso, pulmonary cysts and pneumothorax, and risk of kidney cancers. Birt-Hogg-Dubé syndrome is caused by mutations in the FLCN gene found on chromosome 17p11, which is thought to have tumor suppressor properties. Due to this suspicion, he had a CT chest which demonstrated multiple small pulmonary cysts and a CT abdo/pelvis which identified a suspected left renal tumor measuring 6.7 × 6.5 × 8.2 cm. Mr. A.V. was referred to Urology for a left partial nephrectomy and pathology was consistent with a hybrid renal oncocytic tumor typical for Birt-Hogg-Dubé syndrome. His blood was also sent for genetic testing and FLCN sequence analysis identified the heterozygous c.619-1G>A mutation (a known disease-causing mutation consistent with a diagnosis of Birt-Hogg-Dubé syndrome.) His family was then referred on for further genetic screening, specifically for early detection of renal cancers.

CONFERENCE PRESENTATION AWARD: BEST RESEARCH ABSTRACT PRESENTED AT THE MEETING

Development and Assessment of a Simulation Based Curriculum to Prepare Junior Residents for Their Transition to the Senior Resident Role

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Background: An important milestone in the Internal Medicine training model is the transition from junior to senior resident, in the second year of training. This period is accompanied by a rapid increase in responsibility and expectations; often with little direction on how to excel in this new role. This study assessed the benefit of a simulation-based curriculum to assist residents in their transition to the senior role.

Methods: Our preliminary study involved a survey to determine the performance areas where residents struggle the most, during their transition to the senior resident role. Data was then used to design a curriculum. First year internal medicine residents at the University of Calgary were randomized to

standard curriculum (large group information session and Transitioning to Senior Resident Handout document) versus standard curriculum plus High-Fidelity Clinical Simulation Session. Surveys to assess the efficacy of the intervention were sent to resident participants and preceptors (blinded) who worked with residents during their first senior resident rotation. Two-sided t-tests were used to assess for statistical significance.

Results: Twenty-six residents were randomized; sixteen to the high-fidelity simulation group and ten to the standard curriculum. Three residents (12%) withdrew from the study. There was a statistically significant improvement ($p < 0.05$) in residents' self-assessed competency comparing pre- versus post-simulation session, for every topic area in the curriculum. However, there was no significant difference between the simulation vs standard curriculum groups in their post rotation self-assessment survey or in their post-rotation preceptor evaluations.

Conclusions: We identified a number of key leadership and clinical performance areas where new senior residents struggle to excel. Although residents who completed a high-fidelity simulation session felt their knowledge in the areas of the key performance deficiencies improved after completing simulation training, this did not ultimately translate to improved resident performance in the eyes of their preceptors. Additionally, when residents were asked to reflect on their performance during their first senior medicine block, there was no significant advantage to having completed a simulation training session.

CONFERENCE PRESENTATION AWARD: HONORABLE MENTION AT THE POSTER SESSION

Effectiveness of a Simple Intervention for Prevention of Catheter-Associated Urinary Tract Infections on a Medical Hospital Unit

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Background: Urinary tract infections are the most common nosocomial infection, constituting approximately 40% of all hospital-acquired infections. Of these urinary tract infections, 80% are as a result of urinary catheterization, defined as catheter associated urinary tract infections (CA-UTIs). This

quality improvement study was undertaken to examine the impact of the use of a simple intervention consisting of a daily reminder on the patient's medical binder in patients with indwelling urinary catheters on the duration of indwelling urinary catheters use and the incidence of CA-UTIs.

Methods: The trial used a pretest-posttest (pre-intervention/intervention) design with a control group and was conducted on 2 medicine units (Units 51 and 53) of the Grey Nuns Community Hospital, a community teaching hospital located in Edmonton, Alberta. During the intervention phase, a reminder sticker was placed in the charts of patients with urinary catheters to remind physicians whether to leave the catheter in place or to remove it.

Results: A total of 195 patients participated in this study with 112 on the control unit and 83 on the intervention unit. There was a decrease in the duration of indwelling catheter use on the intervention unit from 11.7 days down to 7.5 days ($p = 0.0028$). There was a decrease in the frequency of catheter-associated UTIs 17.5% to 4.6% but this was not statistically significant ($p = 0.0552$).

Conclusions: The implementation of a daily indwelling-urinary catheter reminder sticker in patient charts was associated with a significant reduction in the mean duration of indwelling catheter use with a trend towards a significant reduction in the rate of CA-UTIs.

Artifactual Hypoglycemia: A Terrible Fluster for Internists

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Hypoglycemia is not commonly observed in non-diabetics. Pseudo-hypoglycemia or artifactual hypoglycemia has been reported in the literature specifically associated with Raynaud's phenomenon, however, it is still not well recognized. The capillary blood glucose check can be misleading and may distract physicians from more pressing issues. We present a case of artifactual hypoglycemia in an elderly female with Raynaud's phenomenon and a new diagnosis of scleroderma, which led to over-investigation. Our aim through this case report is to provide an educational resource to Internists, and other Health Care Providers (HCPs) as early recognition of false hypoglycemia can reduce unnecessary testing and cost of care.

Atrial Standstill Secondary to Cardiac Amyloidosis as a Cause of Cryptogenic Stroke

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A 58-year-old female with a recent diagnosis of AL amyloidosis presented to the emergency department after being found down by her daughter with preserved consciousness, left-sided hemiparesis and left facial droop. Magnetic resonance imaging of the brain demonstrated multi-territory infarcts consistent with cardioembolic cerebrovascular accident (CVA). Electrocardiogram (ECG) consistently demonstrated normal sinus rhythm. A 48-hour Holter monitor done three months previous at the time of AL amyloidosis diagnosis had demonstrated no atrial dysrhythmia. Echocardiography at that time demonstrated mild left ventricular concentric hypertrophy with normal systolic function. Echocardiography performed this admission demonstrated substantial progression of concentric left ventricular hypertrophy suggestive of cardiac amyloidosis and no atrial thrombus. Real-time echocardiogram demonstrated atrial electromechanical dissociation as the mechanism for cardioembolic CVA, a finding that has rarely been reported in literature.

Cardiac involvement affects over half of all patients with AL amyloidosis. The spectrum of clinical manifestations of cardiac amyloidosis includes asymptomatic ECG findings, restrictive cardiomyopathy, rapidly progressing heart failure with preserved ejection fraction and sudden cardiac death. Cardiac involvement predisposes patients to cardioembolic stroke due to atrial dysrhythmia; however, CVA in patients with amyloidosis is common even in patients with sinus rhythm. Atrial electromechanical dissociation is the absence of blood flow across the mitral valve in late diastole despite electrical p-wave, also described as loss of the atrial kick. This occurs due to amyloid fibril deposition interrupting myocyte contraction despite adequate electrical conduction. The loss of atrial contraction predisposes patients to left atrial thrombus formation in a similar manner as atrial fibrillation, and can lead to CVA as was seen our case patient.

Cardiac amyloidosis is a common cause of mortality and morbidity in patients with AL amyloidosis. In addition to more familiar manifestations, cardiac amyloidosis may predispose to CVA even in patients with documented sinus rhythm due to electromechanical dissociation.

Adopting Recommendations from South Asian Community to Help Improve Their Understanding of Advance Care Planning Concept

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Background: Advance Care Planning (ACP) is a way to communicate one's wishes and preferences for healthcare in future. There is a significant cross-cultural variability to understand this concept. The South Asian Community group is the largest visible minority group in Canada. Patient and Community Engagement Research Program (PaCER) at the University of Calgary recently published perspectives of South Asian Community for ACP. Several recommendations for engagement strategies to elucidate this term further were brought forward by the community. Our aim through this project is to adopt few of these recommendations to help people understand this foreign concept.

Objective: To provide concise and relevant information about ACP to the community groups in their native language to improve understanding the aspects of Advance Care Planning.

Design: Community groups will be approached with the help of religious and community leaders. A bilingual speaker will deliver interactive sessions, aided by power point presentations and the use of narrative stories. A feedback survey at the end of every session will be conducted to help improve the presentation for the subsequent group. This interactive process will be used 3-4 times to develop an acceptable/effective session.

Conclusion: With the aid of these information sessions, we will be able to adopt at least 4 out of 7 recommendations by the community including; Recognize and build on community capacity; Inform the community through forums and seminars; Include religious leaders in ACP discussions, and Respect cultural norms.

Fever and Eschar in the Returning Traveler

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A 32-year-old female with no past medical history, on no medications, presented to the emergency department with a chief complaint of abrupt onset of general malaise, fever and tachycardia. Review of systems was negative, except for an area of redness over the right cheek bone with painful

regional lymph nodes. The redness had not spread, but a small area of central ulceration developed spontaneously that day. Six days prior to this presentation the patient returned from a two-week trip to Japan. There she ate raw fish, meat and egg products, bathed in hot springs, and did short hikes in forested areas. On exam, the patient was alert with a fever of 39.2, heart rate 145 and blood pressure 110/70. The only abnormal finding was a 5-cm erythematous, minimally tender patch over the right zygoma, with central ulceration and tender regional lymphadenopathy. Initial investigations showed mild thrombocytopenia and mild liver enzyme elevation. The patient was treated with ceftriaxone and intravenous fluids for cellulitis and discharged with an appointment at the antibiotic clinic the following day. On repeat assessment, a black eschar was clearly evident on the right cheek. The redness had not spread and initial blood cultures remained negative. Given the recent travel history to Japan, the eschar, and abnormal lab values, the patient was started on doxycycline for a presumptive diagnosis of scrub typhus. She responded quickly to therapy. Scrub typhus microimmunofluorescence serology at presentation and convalescence was negative, but given the limited differential diagnosis for eschar, combined with relevant geographic exposure, clinical presentation and response to therapy this was felt to be the most likely diagnosis. Scrub typhus is a zoonotic febrile illness caused by the bacterium *Orientia tsutsugamushi* and is transmitted by the larvae of several mite species. It is present in Japan, Asia and northern Australia.

Scanning the Medical Error Disclosure Landscape - A Global Perspective

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Background: Disclosure of an adverse event is an important element in managing the consequences of a medical error. There are ongoing efforts worldwide to minimize the occurrence of medical errors. However, the issue of honest disclosure of a medical error to the patient or their family has been relatively unattended. We have previously reported a non-punitive, “no-fault” model for reporting medical errors.

Methods: We reviewed and compared the various medical error disclosure initiatives in Canada and across the globe (USA, Australia, New Zealand, and United Kingdom) to analyze the progress made in this key area.

Results: Effective communication between health care providers, patients and their families throughout the disclosure process is integral in sustaining and developing the physician patient relationship. The majority of Canadian provinces have adopted some form of a disclosure policy. These Canadian provincial initiatives, though similar in content, remain isolated because of their non-mandatory nature and absence of federal or provincial laws on disclosure. The United States Joint Commission on Accreditation of Healthcare Organizations (JCAHO) mandated an open disclosure of any critical event during care to the patient or their families. In Australia, disclosure policy integrates the disclosure process with risk management analysis towards investigating the critical events. In New Zealand, in the incidence of an adverse event, patients are rehabilitated and compensated through a no-fault state funded compensation scheme. The designing of an error disclosure policy requires integration of various aspects including bioethics, physician-patient communication, quality of care, and team-based care delivery. The complexities of medical error disclosure to patients present ideal opportunities for medical educators to probe how learners are balancing the ethical complexities involved in error disclosure with other related fields.

Conclusion: In summary we suggest that a uniform policy centered on addressing errors in a non-punitive manner and respecting the patient’s right to an honest disclosure be implemented to enhance quality healthcare.

Evaluating the Quality of Electronic Discharge Summaries: A Patient’s Perspective

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Objective: This study seeks to evaluate the quality of information and readability of electronic discharge summaries for patients discharged from the medical teaching unit (MTU) at a single teaching hospital.

Methods: A random sample of all discharges from the MTU between Jan 2011 and Dec 2016 were reviewed by two independent researchers for clarity of patient instructions on 1) medication changes, 2) follow-up visits, and 3) lifestyle modifications. Readability of patient instructions was evaluated using the Flesch-Kincaid Reading Ease Score and Grade level.

Results: A total of 213 charts (representing 2% of N=10634) will be reviewed. Of the 78 reviewed to date, 71 (91%) were included; 7 were excluded (4 patients died, 2 were transferred to another facility, and 1 left against medical advice). In 51 patients, new medications were started, with rationale being provided in 39 cases (76%). Of the 13 patients (18%) who required outpatient laboratory investigations, the majority contained information on timing (N=11; 85%) and ordering physician (N=12; 92%). Family physicians were asked to follow 49 patients (69%) and follow-up timeframe was specified in 38 cases (78%). In only 32 cases (65%) was it clear what was to be followed-up. Of the 42 cases where specialist follow-up was required in 42 patients, 27 of these specialists were new to the patient. For these, phone number and addresses were provided in only 9 cases. Instructions on diet, activity level, suitability for driving were provided only for 20 patients (29%), 16 (23%), and 12 (17%), respectively. Only 12 patients (17%) were instructed on post-discharge warning signs/symptoms. Overall reading ease score was 47.2 ± 17.0 (difficult), at a median grade 10 level (IQR 6 to 10).

Conclusion: Patient instructions in discharge summary should improve on providing better specialists' contact information, lifestyle modification instructions, signs/symptoms to watch for, and readability.

#IMRP Wellness: Internal Medicine Wellness Initiative

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Introduction: Research has shown that doctors in training have a high rate of mental health problems secondary to occupational and personal risk factors¹. While burnout affects physicians by increasing suicidal ideations², motor vehicle incidents³ and substance abuse⁴, patient care is also poorly impacted due to increased medical errors⁵. The aim of our Wellness Initiative is to encourage mental health among residents from years 1 to 3 and implement a formal resiliency curriculum in the Calgary Internal Medicine Residency Program (IMRP).

Methods: The wellness committee is comprised of residents from years 1-3, chief residents and one staff member, with implementation of evidenced based formal and informal curriculum. The formal curriculum consists of mandatory academic half-day (AHD) lectures by experts in the area, ice-cream rounds on Medical Teaching Units, AHD lunches and mandatory wellness days. The informal curriculum involves

the Social Committee, physical events and Instagram Wellness challenge. To objectively measure the residents' subjective wellness and evaluate the effectiveness of our initiative, anonymous WHO-5 wellbeing index surveys were sent out every 4 months to all residents in our program.

Results: The survey results revealed average wellness of 53.3% $\pm$ 18.6 (n=72/102) in February 2017 (before interventions) compared to 50.9% $\pm$ 24.9 (n=64/102) in June 2017 (after some interventions; change not clinically significant).

Conclusion: More surveys administered over a longer period of time are required to see if the trend is improving with these interventions to account for seasonal biases (ex. end of year burnout in June, current rotations). By using a variety of different approaches (including social media, sports, social events, and lectures), we are likely to target a larger sample of residents. Incentives such as food and prizes are likely to attract higher participation. This is a small, but necessary step towards mentally healthier Internal Medicine residents at the University of Calgary.

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Initiation of Injectable Opioid Agonist Therapy for Treatment of Severe Opioid Use Disorder in the Hospital Setting: A Case Report

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A landmark clinical trial demonstrated that injectable opioid therapy (iOAT) decreases non-medical opioid use, mortality, criminal activity, incarceration, and treatment drop-out for individuals who have been refractory to treatment

with methadone. In Vancouver, British Columbia, patients receiving iOAT present to specialized clinics for medication administration two or three times daily. We present a case of a patient refractory to oral OAT with major medical consequences of untreated opioid use disorder (OUD) who stabilized on iOAT that was initiated in hospital.

A 32-year-old female with severe opioid use disorder (OUD) and type 1 diabetes was admitted to hospital with diabetic ketoacidosis (DKA). On presentation, she was critically ill, requiring aggressive resuscitation. She had been admitted with DKA multiple times and had multiple discharges against medical advice. She had been unable to manage her diabetes in the community due to untreated addiction. Her substance use history included attendance at residential treatment and multiple treatment attempts with methadone and buprenorphine/naloxone. During admission, injectable hydromorphone was initiated as next line treatment in accordance with local guidelines. While in hospital, hydromorphone was titrated to three times per day. The patient stabilized quickly, was well engaged in care, remained in hospital for the entire course of medical treatment, and did not report any illicit drug use. She was discharged to an outpatient iOAT primary care clinic.

Injectable OAT is an important therapeutic option that should be made available to those patients entrenched in opioid addiction who are refractory to oral treatment with severe medical comorbidities caused and exacerbated by untreated addiction. Inpatient initiation of iOAT facilitates engagement in care, trust in providers, and retention in hospital for medical stabilization.

Integration Of Feedback Into Clinical Practice By Resident Doctors

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Background: Resident doctors are regularly provided with feedback around clinical encounters. Yet, while studies have addressed what comprises effective feedback, how residents take suggestions and translate them into a change in clinical practice is not known. Our qualitative study explored how residents think about and use feedback with the aim of identifying areas for medical education intervention.

Methods: Residents from Royal College-accredited programs in Saskatchewan were invited to participate in individual, semi-structured interviews. Participants were asked 13 pre-defined questions around feedback from supervising physicians. Responses were audio recorded, transcribed, then reviewed by thematic analysis. Recruitment was concluded at thematic saturation.

Results: Twenty resident doctors (15 medical-, 5 surgical-related) were interviewed. A dominant theme was the importance of feedback credibility. Residents weighed suggestions based on personal values, supervising physician factors, and qualities inherent to the feedback itself. If the feedback was considered sufficiently credible, residents reportedly used feedback in a variety of ways. This included immediate reflection and integration of suggestions into one's clinical approach, or retrospectively recalling feedback after the next clinical event to ensure all pertinent points were addressed. There was no consistent approach by which residents evaluated the success of their use of feedback, though trial and error was most often described.

Conclusions: Dominant patterns for thinking about and utilizing feedback exist. These vary widely between residents, which must be acknowledged in approaches to post-graduate medical education. Future studies should determine if particular patterns are more effective in certain clinical scenarios and, if so, whether those patterns can be taught. Our study also emphasizes the importance of maximizing resident-perceived credibility of feedback, as only 'credible' suggestions are likely to alter clinical practice.

Acute Cholestatic Liver Injury NYD, Even after Biopsy?!

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Secondary hemophagocytic lymphohistiocytosis (HLH), generally triggered by infections, malignancy and autoimmune diseases in adults, is a rare syndrome characterized by excessive autoimmune activation. Commonly affecting the liver, the clinical presentation is non-specific, and can easily be misdiagnosed as another condition even with biopsy. We present a case of a 69-year-old female who presented with a one week history of cholestatic liver injury after having a course of amoxicillin and clavulanic acid (Clavulin). Her past medical history was significant for autoimmune diseases, including antisyntetase syndrome and anti-MPO vasculitis.

Imaging and laboratory investigations for autoimmune and infective causes of her liver injury were only significant for a markedly elevated ferritin level. Hence, she underwent a liver biopsy demonstrating cholestasis and bile duct injury consistent with Clavulin induced liver injury. Despite a prolonged course of treatment including high dose prednisone for this generally self-limiting condition, she had progressive worsening of her liver function manifested by rising bilirubin and PTT levels. Therefore, she underwent a second liver biopsy that unfortunately resulted in hemorrhagic shock and death. Posthumous biopsy demonstrated patchy sinusoidal histiocytosis and hemophagocytosis with an autopsy showing splenomegaly. Along with her previous investigations, she fulfilled the diagnostic criteria of HLH. Overall, this case highlights the high index of suspicion required in order to obtain the appropriate investigations to make the difficult diagnosis of HLH. The prompt diagnosis is critical as untreated HLH carries an extremely guarded prognosis with most cases succumbing to their condition within a few months.

Evaluating Patient Satisfaction of Electronic Discharge Summaries: A Mixed-Method Study

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Background: Discharge summaries contain important information for both the patients and their healthcare providers. Information intended for the physicians may not be of use to the patient. This qualitative study aims to evaluate patient satisfaction with their discharge summaries at a single academic center's medical teaching unit (MTU).

Methods: From May to July 2017, surveys were distributed to a convenience sample of MTU patients upon discharge from a single unit, once they had received their discharge summaries. Patients rated their satisfaction related to the summaries using a 5-point Likert scale, where 1 = very dissatisfied and 5 = very satisfied. Patients were also invited to participate in a semi-structured interview to further evaluate their overall experience with their discharge summaries. Interviews were transcribed verbatim and thematic analysis with an inductive approach to coding was performed independently by two researchers.

Results: A total of 78 surveys and 19 interviews were completed. Based on survey responses, mean overall satisfaction was high [$4.46 \pm$ standard deviation (SD) 1.14]. Patients were most satisfied with information regarding follow-up imaging (4.74 ± 0.61) and whom they should see in follow-up (4.57 ± 1.06). Patients were least satisfied with information regarding driving restrictions (4.34 ± 1.14) and activity level (4.37 ± 1.16). A number of themes were identified based on interview transcript review. Satisfaction with the discharge summaries primarily related to their use as references either for the future or for others. A number of patients valued the discharge summaries for their comprehensiveness and their role in educating patients about their diagnoses. A number of issues were raised regarding readability (such as font size and use of medical jargon) and information discrepancies.

Conclusion: Although patients were overall satisfied with their discharge summaries, there are a number of areas for improvement.

Mortality Prediction after Transcatheter Treatment of Failed Bioprosthetic Aortic Valves Utilizing Various International Scoring Systems: Insights from the Valve-In-Valve International Data Registry (VIVID)

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Background: The Transcatheter Aortic Valve Implantation (TAVI) procedure has been commonly used to insert new bioprosthetic valves inside old degenerated surgically implanted aortic valves in high risk or inoperable patients. The 3 scoring systems currently being used to assess postprocedural overall mortality in this patient population are: Logistic EuroSCORE (LES), EuroSCORE (ES) II, and Society of Thoracic Surgeons (STS).

Objective: The purpose of this study is to analyze the accuracy of LES, ES II, and STS in estimating all-cause mortality after the relatively newly-employed transcatheter aortic valve-in-valve implantations, which has never been conducted in the literature before.

Methods: Using the Valve-in-Valve International Data (VIVID) registry, a total of 1,550 patients from about 110 centers globally were enrolled in the current study to compare the real-life observed 30-day and 1-year overall mortalities vs. respective predicted mortalities calculated by all 3 risk scores. Accuracy of prediction models were assessed based on calibration and discrimination of models.

Results: Observed mortalities at 30 days was 5.3%, while average expected mortality by LES was 29.49 (± 17.2), ES II was 14.59 (± 8.6) and STS was 9.61 (± 8.51). All 3 risk scores overestimated 30-day mortality with OEMR being 0.176 (95% CI 0.138-0.214), 0.342 (95% CI 0.264-0.419) and 0.536 (95% CI 0.421-0.651) respectively. 30-day mortality ROC curves demonstrated that ES II had the largest AUC of 0.722, followed by STS with AUC of 0.704 and lastly by LES with AUC of 0.698. U-statistics did not show a statistical difference between all 3 curves.

Conclusion: ES II is not the supreme scoring system for ViV procedures, but has shown the highest mortality predictability compared to LES and STS, and therefore, is recommended for current use. A combination approach of ES II and LES with predetermined cutoff points could represent the best clinical approach.

Multiple Sclerosis Dysautonomia Masking Severe Hyperthyroidism of Graves' Disease

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The diagnosis of Graves' Disease is made through a combination of clinical findings and laboratory results. Internist rely on the accuracy and precision of laboratory assays to confirm diagnosis, initiate treatment and follow response. Even with advances in laboratory medicine, false results can occur. A commonly used immunoassay that test thyroid hormones and thyroid antibodies rely on the high affinity streptavidin-biotin interaction. This methodology is susceptible to high dietary or pharmaceutical intake of biotin resulting in a misdiagnosis of Graves' Disease.

We describe a case of a 42-year-old gentleman who has a history of multiple sclerosis (MS) taking high doses of biotin (600 mg PO daily) for its potential benefit on MS symptom progression. Due to profound fatigue, he was screened for non-MS related causes and was found to have biochemical hyperthyroidism, with fully suppressed TSH, extremely high free T4 and TSH receptor antibodies. Since he is known to

have extensive dysautonomia thought to be masking his tachycardia, he was initiated on methimazole despite a lack of clinical hyperthyroidism. Iodine uptake scan reported a homogeneous global uptake of tracer, with normal overall activity, most consistent with Graves' disease. The low uptake values were attributed to incomplete methimazole withdrawal. However, oral biotin (mg range) interferes with assays that employ a biotin-streptavidin binding interaction that results in both falsely high and low results that collectively suggest thyrotoxicosis secondary to Graves' disease. Discontinuation of the offending agent led to the resolution of his laboratory abnormalities.

In addition, biotin interference can implicate a multitude of assays that utilize the same basic chemical principles including other hormones, BNP, ferritin, and cancers markers. Therefore, all clinicians who routinely utilize these tests should be educated regarding possible biotin interactions to promote safety and avoid adverse events.

Improving Resident Confidence: A Simulated Night On-Call

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The on-call experience is frequently identified as a stressor during the transition from student to resident. This is likely due to a lack of clinical experience and fatigue associated with changing work schedules. Simulation is becoming a common means of increasing trainees' exposure to common medical situations and therefore improving confidence and preparedness amongst residents. The objective of this study was to determine if an on-call simulation experience improves resident confidence and decreases anxiety.

Incoming first year internal medicine residents were asked to participate in the study. A subset of residents participated in the 12 hour on-call simulation prior to their first independent on-call shift. They completed a questionnaire on anxiety (STAI-6) and then completed 5 different patient simulations including a GI bleed, chest pain, shortness of breath, delirium and pronouncing a patient's death. The sessions were supervised by senior internal medicine residents who debriefed with the

participants at the end of the mock shift. The participants completed the same anxiety questionnaire just prior to their first call shift. Another subset of residents (controls) only completed the questionnaire before their first call shift.

A total of 14 residents participated in the simulation sessions with 23 residents serving as controls. A t-test was performed comparing the responses on the questionnaire of those residents who participated in the simulation to those residents who did not. There was a statistically significant improvement in residents' confidence between the two groups ($p=0.016$).

The results demonstrate a correlation between exposure to simulation training and improvement in resident confidence. Though no significant difference was found in anxiety levels between the two groups of residents, there was a trend towards improved scores in the experimental group. Qualitative feedback from residents also indicated the simulation to be a worthwhile educational experience, highlighting the debrief session as particularly beneficial.

Self-Feeding Frenzy Leading To Multi-Organ Failure

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Introduction: Hemophagocytic lymphohistiocytosis (HLH) is a life-threatening disorder characterized by severe systemic inflammation. Primary HLH has a genetic basis and is more prevalent in children; secondary (or acquired) HLH is more common in adults and triggered by infection, malignancy, drug exposures, or autoimmune disease. We describe a case of acquired HLH with severe multi-organ failure in the setting of acute *Mycoplasma pneumoniae* infection and herpes simplex virus type 1 (HSV-1) reactivation.

Case Presentation: A 56-year-old female smoker with asthma presented following a 2-week course of progressive cough. She was diagnosed with left-lower lobe pneumonia and treated with moxifloxacin, prednisone, and bronchodilators. On day 4 she developed hypoxemic respiratory failure and required intubation. She subsequently developed atrial fibrillation, type 2 myocardial infarction, anuric acute kidney injury, bicytopenia (anemia; thrombocytopenia), acute liver failure, and hemolytic anemia with severe ferritinemia (ferritin was elevated at 44,811 ng/ml). Triglycerides were three times the

upper limit of normal. Intravenous immunoglobulin was administered; broad-spectrum antimicrobials were started. Infectious work-up revealed acute *Mycoplasma pneumoniae*; viral culture and serology confirmed HSV-1 re-activation. Bone marrow revealed hemophagocytic macrophages with intact hematopoietic elements in their cytoplasm. Brain MRI revealed cerebral edema and necrosis in keeping with HLH. Cerebrospinal fluid sent for flow cytometry did not demonstrate lymphoid phenotypic abnormality. With fevers, bicytopenia, hypertriglyceridemia, marrow hemophagocytosis, and ferritinemia the patient met HLH-94 and HLH-2004 criteria. Etoposide and hydrocortisone were started per HLH-94 protocol; intrathecal methotrexate was added given CNS involvement. Unfortunately, severe multi-organ failure persisted and treatment was ultimately withdrawn.

Discussion: Hemophagocytic lymphohistiocytosis is characterized by a severe inflammatory state with high mortality. In its acquired form, immune activation leads to cytokine storm with resultant systemic manifestations. Established protocols aiming to suppress cytokine activity have achieved moderate success. Newer treatments are forthcoming; however, further investigation is warranted to enable novel therapies and maximize patient outcomes.

“Bong Lung” Multi-Focal Necrotizing Pseudomonas Pneumonia Associated with Marijuana Usage in an Immunocompetent Adult: A Case Report

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With legalization of marijuana at the forefront of Canadian politics, careful consideration must be paid to common and rare health effects of marijuana smoking.

We present a previously healthy 30-year-old Caucasian male admitted to internal medicine with a two-week history of dyspnea, productive cough, fever and chills. His clinical history was significant for daily marijuana usage via water pipe, also known as a “bong”, which was regularly also used by a friend with known cystic fibrosis (CF). Initial investigations showed a white blood cell count of $43.1 \times 10^9/L$, and *Candida albicans*, *Aspergillus fumigatus* and pan-sensitive *Pseudomonas aeruginosa* were isolated from expectorated sputum cultures.

Imaging revealed multiple cavitary lesions through bilateral mid and upper lungs zones, with the largest measuring 8.1×5 cm. Initially, he was treated empirically with ceftriaxone and azithromycin, but was broadened to piperacillin-tazobactam and vancomycin for increasing oxygen requirements. Despite this, he continued to worsen clinically. Pulmonary recommended bronchoscopy and bronchoalveolar lavage for one of the worst rapidly developing necrotizing pneumoniae they had ever seen, revealing >10E5 colony-forming units/mL of *Pseudomonas aeruginosa* in both upper lobes. Repeat susceptibility testing revealed resistance to carbapenems, piperacillin-tazobactam and ciprofloxacin. The unusual nature and severity of his infection prompted investigations for immune suppressing conditions, which remain negative. He was treated with voriconazole, meropenem and tobramycin for a total of six weeks. Following treatment, he remains stable with no supplemental oxygen requirements.

Many case reports describe pulmonary infection and pneumothoraces associated with marijuana use among immunosuppressed patients. While transmission of *pseudomonas*, a water-associated pathogen, between CF patients is common, immunocompetent social contacts are not thought to be at risk of cross infection. To our knowledge, this is the first case of multi-focal, multi-drug resistant necrotizing *pseudomonas* pneumonia in an immune-competent patient associated with marijuana use via bong.

Characterization of Current CCS Perioperative Guideline Uptake in a Single Pre-admission Clinic

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Background: New guidelines for pre-operative cardiac risk assessment were published by the Canadian Cardiovascular Society (CCS) in 2016. Recommendations were based on systematic reviews of related topics and the results of a large, multi-centered prospective cohort study. The recommendations included pre-operative measurement of a serum brain natriuretic peptide (BNP) in select, high-risk patients, and serial troponins post-operatively in patients with an elevated BNP or in whom a BNP was never measured. The impact of

these new recommendations on workload and patient flow through pre-operative and post-operative care is unclear but important. Concerns within our institution regarding whether or not this would change the post-operative patient load for the inpatient general internal medicine consult team, whether coordination of pre-operative measurement and post-operative management would be feasible, and how care for these patients would change, has limited widespread acceptance of these new guidelines.

Methods: Over a four-week period, every patient who was seen by a general internist for an outpatient pre-operative assessment at a large quaternary hospital was included. Data on surgery type, Revised Cardiac Risk Index (RCRI) score, medications, if a NT-proBNP or hs-troponin was ordered, and in-hospital course was collected.

Results: In this four-week period, there were 540 non-emergent surgeries at the FMC, of which 239 patients were referred for pre-operative assessment by a general internist. The average age of referred patients was 61.5 years (range 21-98 years). Of the surgeries, 184 had a planned overnight admission. The median RCRI score was 1.

Fifty-six percent of patients seen met CCS guideline criteria for a pre-operative BNP measurement, of which 41.8% or 56 eligible patients had a BNP measured. Thirty-five patients who had a BNP measured (63%) had a value below the cut-off recommended by the CCS guidelines for further assessment, while 14 (25%) had an elevated BNP and required post-operative troponins. Eighty-eight patients (36.8%) met criteria for post-operative troponin measurement. Fourteen patients total had post-operative myocardial injury after non-cardiac surgery (MINS); this represents 5.6% of the total patients assessed and 15.9% of the patients who had post-operative monitoring. Data assessing the extent to which MINS identification led to management changes and 30-day outcomes for this cohort are currently being collected.

Conclusions: Of the patients deemed high-risk for MINS by the CCS guideline algorithm, about 16% had a post-operative event. This is in keeping with previous published MINS rates from the VISION trial. The overall clinical and economic impact of these guidelines will be assessed when data collection is complete.