

December 2019

## Extraction Kinetics of Free Thyroxine with Therapeutic Plasma Exchange in the Treatment of Thyroid Storm in a Case of Antithyroid Induced Pancytopenia

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### Recommended Citation

Madan Paramasivan, A., Fingeret, A. L., Shunkwiler, S. M., , Goldner, W. S. Extraction Kinetics of Free Thyroxine with Therapeutic Plasma Exchange in the Treatment of Thyroid Storm in a Case of Antithyroid Induced Pancytopenia. *Graduate Medical Education Research Journal*. 2019 Dec 13; 1(1).  
<https://digitalcommons.unmc.edu/gmerj/vol1/iss1/25>

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## **Burnout in Pediatric Residents: When is Burnout Most Likely to Occur During an Inpatient Service Month and What Are its Associated Factors**

**Maria Skorey**, Valerie Rinehart, Kortany McCauley, Katie Greenwood, Hao Hsu

**Mentor:** Hao Hsu

**Program:** Pediatrics

**Background:** Burnout is characterized by emotional exhaustion (EE), depersonalization (DP), and a lack of personal accomplishment (PA). Data shows that those in medical training suffer from burnout, but neither the timing of burnout in a narrower timeframe nor its associations are known.

**Methods:** A single center prospective study was conducted to establish the prevalence of burnout in pediatric residents during an inpatient month and monitor the pattern of burnout progression throughout the month

and ascertain what factors may be associated with that burnout. Surveys assessing burnout, symptoms of depression, quality of life, fatigue, clinical and personal experiences were distributed to residents each week for five weeks during an inpatient service month.

**Results:** Mean values of EE had statistically significant worsening between the start and end of an inpatient month. Similarly, the prevalence of burnout increased from 71% to 83%. 71% of residents had positive screens for depression. 38% of residents had answered "yes" to the question "have you doubted your career choice in the last week."

**Conclusions:** A large majority of pediatric residents are burned out and increases during an inpatient rotation and trigger positive screens for depression while many question their career choice during an inpatient rotation. Intervention is warranted in this center and is currently underway. Future multi-center studies are needed to validate this data, as well as follow-up studies to evaluate the possible impact of current interventions at this center. ■

<https://doi.org/10.32873/unmc.dc.gmerj.1.1.023>

## **Adherence to Practice Guidelines for Treating Diabetic Foot Infections: An Opportunity for Syndromic Stewardship**

**Randy McCreery**, Scott Bergman, Trevor VanSchooneveld

**Mentor:** Trevor VanSchooneveld

**Program:** Infectious Disease

**Background:** Adherence to the Infectious Diseases Society of America (IDSA) guidelines for the treatment of diabetic foot infections (DFIs) has been associated with improved outcomes. Yet, compliance with these guidelines has been reported to be low. We initiated a quality improvement project aimed at improving guideline adherence for DFI management. Baseline results are reported here.

**Methods:** We reviewed all hospitalized primary DFIs newly initiated on antibiotics over 1 year (7/14-6/15). We collected demographics, DFI severity per IDSA guidelines, antibiotic use, and microbiology data. Guideline adherence for culturing and empiric antibiotic choice (based on severity) was assessed per IDSA guidelines. We

then created an institutional guideline and electronic order set with built-in clinical decision support. Educational lectures on DFI best practices were given to providers who commonly treat DFIs.

**Results:** 177 DFI admissions were identified: 40% severe (n=70), 47% moderate (n=84), 8% mild (n=14) and 5% with no evidence of infection (n=9). Demographics: mean age 58 years; 68% male, mean HgbA1c 8.6%, length of stay 6.9 days, three-year mortality 13%. Empiric antibiotic regimens were judged inappropriate in 36% (64/177) of cases. The most common reason for inappropriate antibiotic use was unnecessary coverage for *Pseudomonas aeruginosa* in 50% (54/107) of non-severe cases. In 28% (39/140) of cases with an ulcer, wound or skin breakdown, a superficial swab culture was obtained which is inappropriate. Only 33.3% (n=56) had a deep tissue culture obtained. In patients with

deep tissue cultures, methicillin-resistant *Staphylococcus aureus* (MRSA) was found in 11% (6/56) of cases but covered for empirically in 88% (50/56). *Pseudomonas* was found in 2% (1/56) of cases but covered for empirically in 73% (41/56).

**Conclusion:** MRSA and *Pseudomonas* are uncommon DFI pathogens yet are frequently treated empirically. Inappropriate antibiotic use is often due to empiric coverage for *Pseudomonas* in non-severe DFIs where it is a rare pathogen. Culture practices are also less than ideal with frequent superficial swabs and underutilization of deep cultures. Institutional guidelines were developed to specifically address these issues and data collection of the impact of this project is in process. ■

<https://doi.org/10.32873/unmc.dc.gmerj.1.1.024>

## **Extraction Kinetics of Free Thyroxine with Therapeutic Plasma Exchange in the Treatment of Thyroid Storm in a Case of Antithyroid Induced Pancytopenia**

**Ameena Madan Paramasivan**, Abbey L. Fingeret, Sara M. Shunkwiler, Whitney S. Goldner

**Mentor:** Whitney S. Goldner

**Program:** Diabetes, Endocrinology, and Metabolism

**Introduction:** Thyroid storm is a rare metabolic crisis associated with significant mortality. Therapeutic plasma exchange is suggested when there is a failure of conventional treatments for thyroid storm of any etiology. The efficacy of therapeutic plasma exchange is not clearly studied and currently there is no consensus available

on the exact percent reduction of Free Thyroxine (FT4) that can be anticipated with each session of plasma exchange. This case illustrates the extraction kinetics of FT4 with each session and over time.

**Case Presentation:** We report a case of a 66 year old Caucasian female with past medical history of Graves disease in remission, recurrent hospital admissions for atrial fibrillation, and recent initiation of amiodarone, who presented with heart failure exacerbation and thyroid storm. She

was started on methimazole but experienced acute pancytopenia and so the medication was discontinued. Glucocorticoids, lithium and cholestyramine were initiated but without improvement. Therapeutic plasma exchange was performed.

**Results & Discussion:** Patient underwent 4 sessions of plasma exchange. FT4 measurement before and 2 hours post plasma exchange showed approximately 15-33% reduction with each session. However, FT4 rose again prior to the next day of therapy but

not to pre plasma exchange levels. In spite of the rise between therapies, each treatment resulted in progressive decline in the overall FT4. Cumulatively, after 4 sessions, there was a 54% reduction in FT4 levels.

**Conclusions:** When primary synthesis of thyroid hormone is not interrupted because of intolerance to antithyroid medication, FT4 rises following each session of plasma exchange. This trend describes the extraction efficacy of FT4. ■

<https://doi.org/10.32873/unmc.dc.gmerj.1.1.025>

## Hepatitis B Vaccination in Advanced Chronic Kidney Disease: A Quality Improvement Project at a Veteran Affairs CKD Clinic

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**Mentor:** Ketki Tendulkar

**Program:** Nephrology

Hepatitis B vaccination is recommended in all patients with end stage renal disease (ESRD). However, only 50-60% of these patients achieve protective antibody levels if immunized after starting dialysis. Strategies to overcome this low seroconversion rate include a 6 month vaccination schedule starting earlier (CKD stage 4 and 5), to ensure immunity when patients progress to ESRD.

This was a Quality Improvement program to immunize pre-dialysis patients. Patients who were HBsAb negative were offered vaccination on a 6 month schedule (0, 1 and 6 months) with either Recombivax™ or Engerix™ and HBsAb titers were checked 2-3 months later. Titers  $\geq 12$  mIU/mL were indicative of immunity. Patients who did not

seroconvert were offered booster schedule of 3 higher strength (40 mcg) doses. Descriptive statistics were used to describe this cohort.

We screened 122 patients with CKD stage 4 and 5 (GFR  $< 29$  ml/min). These included 121 males and one female. The median age of this cohort was 68 years (range 38-92 years). During the 2 study-year period, 13 had improved GFR ( $>30$  ml/min) and hence were excluded from this analysis. Of the remaining 109 patients, 8 were seropositive at baseline. Nineteen patients progressed to ESRD, 5 were noncompliant, 12 refused vaccination, six patients had died and one was on hospice. Nineteen patients have started the original vaccination series, while 42 have not started yet. Only one patient (5.3%) achieved seroconversion, while 3 patients have started the booster series.

Logistic issues including lack of physician time in clinic, coordination with other visits, non-compliance with nursing injection appointments over a 6 month period were the main limitations in this project. Given the low seroconversion rate, albeit in a small cohort, studies should be conducted using a higher initial dose in patients with CKD. Another option would be to vaccinate patients with earlier stages of CKD to increase the rate of immunity should they progress to ESRD. We plan to increase awareness among patients and nursing staff about the importance of this vaccine. ■

<https://doi.org/10.32873/unmc.dc.gmerj.1.1.026>

## Pilot Project to Assess and Improve Neurosurgery Resident and Staff Perception and Feedback to Neurosurgery Residents for Self-Improvement Goal Formation

**Steven O Tenny**, Kyle P Schmidt, William Thorell

**Mentor:** William E Thorell

**Program:** Neurosurgery

**Background:** The Accreditation Council for Graduate Medical Education (ACGME) has pushed for more frequent and comprehensive feedback for residents during their training but there is scant evidence for how neurosurgery residents view the current feedback system as used to provide self-improvement information and goal formation.

**Objective:** We set forth to assess neurosurgery resident and staff perceptions of the current resident feedback system in providing Specific, Meaningful, Achievable, Realistic, and Timely (SMART) goals. We then wished to create a pilot project to improve the most unfavorably viewed aspect of the feedback system.

**Methods:** We conducted an anonymous survey of neurosurgery residents and staff at an academic medical institution to assess SMART goals for resident feedback and used the results to create a pilot intervention to address the least favorable viewed part. We conducted a post-intervention survey to see if perceptions had improved for the targeted intervention.

**Results:** Neurosurgery residents and staff completed an anonymous online survey indicating timeliness of feedback was the most significant concern for feedback for neurosurgery residents. A simple anonymous feedback form was created and distributed monthly to neurosurgery residents, staff and nurses with the results reported monthly to each resident for six months. In the post-intervention survey neurosurgery residents

and staff had changed from a negative to non-negative opinion on the timeliness of resident feedback ( $p=0.01$ ).

**Conclusion:** The required ACGME feedback methods may not be providing adequate feedback for goal formation for self-improvement for neurosurgery residents. Simple interventions, such as anonymous feedback questionnaires, can improve neurosurgery resident and staff perception of feedback to residents for self-improvement and goal formation. ■

<https://doi.org/10.32873/unmc.dc.gmerj.1.1.027>