Simulated Rheumatology Clinic: Bridging Basic Science and Clinical Application

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Background

- Basic science education is traditionally delivered separately from clinical skills instruction.
- The need for curricular integration in the preclinical years is now well recognized.[1]
- Simulation offers learners opportunities for active engagement with basic science knowledge in relevant clinical contexts, thereby enhancing knowledge acquisition.[2]
- The objective of this study was to develop and evaluate a simulated clinic activity on rheumatologic diseases for preclinical medical students. This activity was designed to provide opportunities for basic and clinical science integration.

Methods

- 136 2nd-year medical students, Rheumatology block, November 2018
- Small groups (3 - 4 students) rotate through 3, 20-minute standardized patient encounters
  - Joint pain, +ANA
  - Rash, weakness, +ANA
  - Rash, fatigue
- Images of key clinical findings provided upon student request
- Small group discussion (10 min) to formulate differential diagnosis and diagnostic testing
- Large-group debrief with Rheumatology content expert
- Online, voluntary learner evaluation survey

Learner Quotes

"Very useful in forming differential diagnoses since many rheum diseases have overlapping features."

"Highlighted the importance of lab values and patient history"

"It is most helpful when there is a classic illness script being presented as it helps to cement the 'classic patient' in my mind."

Results

Table. Results of learner evaluation survey (n = 25, 18% response rate)

Relevance	**Extremely or quite relevant (% responses)**
How relevant was the content of this learning activity to your role as a future physician?	88%
Instructional Design	**Yes (% responses)**
Small-group format appropriate for learning content presented?	100%
Pace and duration appropriate for learning content presented?	100%
Effectiveness for meeting learning objectives	**Extremely or quite effective (% responses)**
Effectiveness for reviewing and applying learning content from the Rheumatology course	92%
Effectiveness for practicing history taking skills	100%
Effectiveness for practicing physical exam skills	100%
Effectiveness for practicing differential diagnosis formation skills	96%
Effectiveness for practicing creating a diagnostic plan	100%
Overall effectiveness of simulated clinic activity (Scale: 10 = excellent; 1 = poor)	**Weighted average** 8.95

Discussion and Future Directions

- Simulated rheumatology clinic was well received by learners.
- Effective for reinforcing and applying basic science concepts from the Rheumatology curriculum
- Effective strategy for basic & clinical science integration
- Future directions include evaluating higher-order learning outcomes

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Gender and Racial Disparities in Randomized Controlled Trials of Fibromyalgia: A Quantitative Analysis

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BACKGROUND

- Fibromyalgia is a chronic pain syndrome characterized by widespread musculoskeletal pain, mood disorders, fatigue, and cognitive and sleep disturbance.
- Mainstay treatments include tricyclic antidepressants, selective serotonin/serotonin norepinephrine reuptake inhibitors, and antiepileptic drugs.
- The purpose of this study was to examine whether or not gender and racial disparities exist in the context of research subjects recruited for clinical studies performed on the only three FDA approved medications for fibromyalgia.

METHODS

- The PubMed database was searched for clinical trials studying duloxetine (DLX), milnacipran (MLN), or pregabalin (PRG) for the treatment of fibromyalgia.
- Studies with randomized, double blind, placebo controlled design involving any of the above medications as monotherapy and reporting on gender and ethnic demographic parameters published over the last 10 years were included.
- Ethnic backgrounds were grouped into Caucasian or White, African American, Hispanic, Asian, and Other.

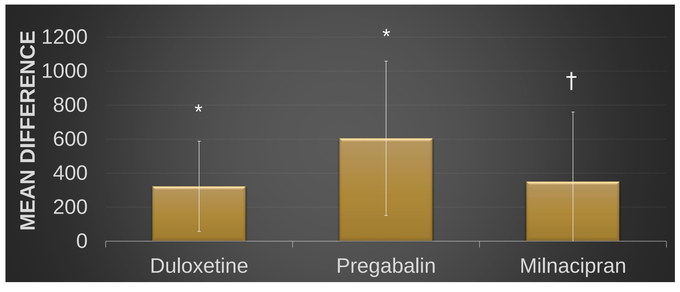

Figure 1: Statistically significant overrepresentation of Caucasian or White research subjects in comparison to all other ethnic groups as determined by paired t-tests (* denotes p<0.005, † denotes p<0.05).

RESULTS

- A total of 28 studies met inclusion criteria.
- Paired t-tests demonstrated a female gender preponderance of research participants for all of the DLX, MLN, and PRG treatment groups analyzed separately ($p<0.05$ each) and collectively ($p<0.001$).
- White or Caucasian was the predominant ethnic group across all treatment groups analyzed separately (86.4±6.1% DLX, 89.2±6.2% PRG, and 87.3±8.1% MLN) or collectively (87.6±6.7%).
- There were no statistically significant differences between group means across all treatment groups as determined by one-way ANOVA for White or Caucasian ($F(2,25)=1.57$, $p=0.23$), African American ($F(2,25)=2.71$, $p=0.09$), Asian ($F(2,25)=0.64$, $p=0.54$), or all ethnic groups combined ($F(2,25)=1.6$, $p=0.22$); as was the case for studies conducted within ($F(2,22)=1.79$, $p=0.19$) or outside ($F(1,3)=0.1$, $p=0.77$) the USA.
- Nonetheless, a statistically significant difference was observed by one-way ANOVA for the Hispanic ethnic group ($F(2,25)=5.19$, $p<0.05$).
- Paired t-tests revealed a statistically significant overrepresentation of Caucasian or White research subjects (489.25±432.70) in comparison to African American (17±23.39, $t(27)=6.06$, $p<0.001$), Hispanic (21.29±35.43, $t(27)=5.78$, $p<0.001$), Asian (2.93±10.51, $t(27)=5.95$, $p<0.001$), or all other ethnic groups examined collectively (67.32±60.03, $t(27)=5.76$, $p<0.001$).
- A similar pattern of Caucasian or White subject overrepresentation in comparison to all other ethnic groups was found on subgroup analysis for all of the DLX (mean(diff)=322.20±265.27, $t(9)=3.83$, $p<0.005$), PRG (mean(diff)=604.56±453.60, $t(8)=3.40$, $p<0.005$), and MLN (mean(diff)=350.11±408.85, $t(8)=2.57$, $p<0.05$) treatment groups respectively.

CONCLUSIONS

- Evidence of widespread gender and racial disparities amongst subjects recruited for clinical trials of various pharmacologic agents for fibromyalgia exist.
- Whereas female preponderance for fibromyalgia is believed to reflect a true gender predilection of this disorder more research is needed to determine whether or not racial disparities observed indeed reflect on the nature of the disease.

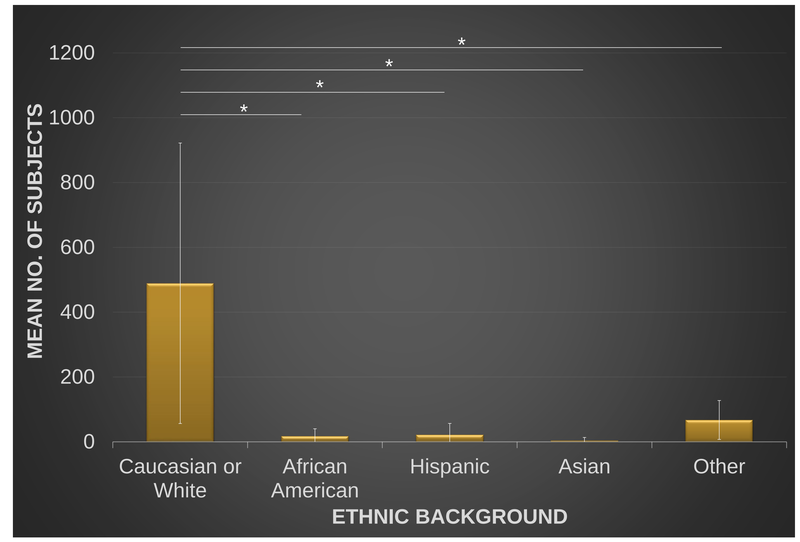

Figure 2: Statistically significant overrepresentation of Caucasian or White research subjects in comparison to African American, Hispanic, Asian, and all other ethnic groups remaining as determined by paired t-tests (* denotes p<0.001).

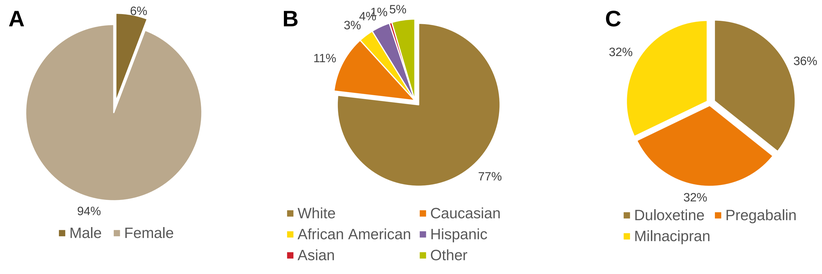

Figure 3: Demographic representation of research participants by gender (A) and ethnic background (B); and classification of included studies by medication

Insidious Weakness and Mild Creatinine Kinase Elevations: Recognizing Inclusion Body Myositis for the Internist

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INTRODUCTION

- Idiopathic Inflammatory Myopathies (IIMs) include inclusion body myositis (IBM), dermatomyositis (DM), and polymyositis (PM).
- Incidence is 2-8 cases/million annually.[1,2]
- Subacute symptoms cause delay in diagnosis.
- Early recognition by Internists of IIMs, especially IBM, can expedite diagnosis leading to improved patient outcomes.[3]

CASE REPORT

- A 66-year-old female with hypertension, presumed NAFLD, follicular adenoma s/p hemithyroidectomy presented with a 2-year history of progressive weakness of her lower extremities and new difficultly ascending stairs.
- Initial labs revealed an elevated CK (1371) and mildly elevated transaminases.
- New medication Ezetimibe was discontinued due to myalgias.
- Given her worsening symptoms, she was referred to Rheumatology.
- She had proximal muscles myalgias, intermittent dysphagia after her thyroid surgery, intentional 30-pound weight loss, and negative malignancy screen.
- On exam, she had asymmetric mild proximal and distal weakness.
- Electromyogram (EMG) showed fibrillations and sharp waves consistent with a chronic myopathy involving both proximal and distal muscle groups.
- Muscle biopsy revealed lymphocytic inflammatory infiltrate within the endomysium but no rimmed vacuoles.
- Further testing noted an elevated aldolase of 9.8 U/L and a positive anti-cN-1A antibody.
- Based on her clinical symptoms, EMG studies, and laboratory results, she was diagnosed with inclusion body myositis.

Table 1: Comparative Features of Dermatomyositis, Polymyositis, and Inclusion Body Myositis[2,4,5]

	DERMATOMYOSITIS	POLYMYOSITIS	INCLUSION BODY MYOSITIS
DEMOGRAPHICS	Bimodal, age 5-15, 45-65, Female > Male	Age 50-60, Female > male	Age > 50, Male > Female
ONSET	Subacute over 3-6 months	Subacute over 3-6 months	**Insidious, usually over > 6 months**
MUSCLE INVOLVEMENT	Proximal, symmetric	Proximal, symmetric	Proximal and **distal, asymmetric**
SKIN MANIFESTATIONS	Heliotrope rash, Gottron's papules, V-sign, Shawl sign, Holster sign	None	None
OTHER ORGAN INVOLVEMENT	ILD (>10%), esophageal, cardiac conduction abnormalities, malignancy ~15%	ILD (>10%), esophageal, cardiac conduction abnormalities, malignancy ~5%	**None**
CK LEVEL	Variable, generally >10x ULN	Variable, generally >10x ULN	**Usually mild, < 10x ULN**
EMG	Myopathic	Myopathic	Myopathic and **neuropathic**
HISTOPATHOLOGIC FINDINGS ON MUSCLE BIOPSY	CD4+ T cell perifascicular inflammation and atrophy, MHC class II antigen expression	CD8+ T cell endomysial infiltrates, MHC class I antigen expression	CD8+ T cell endomysial infiltrates, MHC class I antigen expression; **Red-rimmed vacuoles**
AUTO-ANTIBODIES	Diverse - Myositis antibody panel	Diverse - Myositis antibody panel	**Anti-cN-1A**
TREATMENT	Corticosteroids, Immunosuppressive agents	Corticosteroids, Immunosuppressive agents	**Physical, Occupational and Speech Therapy**

DISCUSSION

- Progressive weakness and elevated CK should prompt the Internist to consider IIMs.
- DM and PM have symmetric proximal muscle weakness and highly elevated CK levels.
- DM has classic rashes (table 1)[2,4]
- IBM has insidious onset, asymmetric pattern of weakness, and mild elevation of CKs.[2,5]
- EMGs in IBM show both myopathic and neuropathic changes
- In IBM, muscle biopsies show red-rimmed vacuoles and inclusions[2,5] Biopsies early in IBM may have absent vacuoles, identical to PM.
- IBM has unique auto-antibodies (Anti-cN-1A)
- Clinical history, EMG findings, and myositis autoantibody panels can distinguish IBM from PM when histopathological findings do not.
- IBM rarely has other organ involvement or malignancy associations.[2]
- IBM does not respond to corticosteroids or immunosuppression.[2,5] Treatment focuses on optimizing strength and function.[2,3,5]

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Nurse-guided Web-based Cognitive Behavioral Therapy for Chronic Musculoskeletal Pain: A Feasibility Study

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BACKGROUND

- Pain accounts for greater than 40% of all symptom-related outpatient visits totaling over 100 million outpatient encounters worth hundreds of billions of dollars annually in the U.S alone.
- Face-to-face and internet-delivered web-based cognitive behavioral therapy (CBT) have proven safe and effective in managing chronic musculoskeletal pain (CMP), demonstrating clinically significant improvements in pain-related disability and severity.
- Nonetheless, the effect size for CBT in CMP has been small partly due to low compliance or engagement by study participants.
- The purpose of this study was to evaluate the effectiveness of nurse-guided web-based CBT in the outpatient setting for management of CMP.

METHODS

- Sixty subjects with CMP were recruited from the internal medicine resident clinic and rheumatology clinics at Wake Forest Baptist Medical Center.
- Subjects were randomized to web-based self-guided CBT with six phone-based nurse support calls (nurse support arm, n=30) vs. web-based self-guided CBT alone (control, n=30).
- The purpose of the phone calls was to encourage completion of the eight learning modules within the web-based CBT program.
- The nurse support calls were made from baseline to week 8. All participants had access to the CBT program from baseline to week 16.
- Outcome measures were collected at baseline, week 8, and week 16.

RESULTS

- All subjects had comparable baseline characteristics including duration of pain ≥ 1 year, # of painful body sites (≥3 vs. <3), BPI pain intensity, interference, and global pain severity scores (range 0-10), PROMIS measures, PHQ-8 depression scores (≥ 10), and pain catastrophizing scores.
- Twenty (66.7%) in the treatment group vs 19 (63.3%) of patients in the control group completed the study. The proportion of subjects who completed ≥ 6 learning modules were 17 (56.7%) in the treatment group vs. 18 (62.1%) in the control group.
- Using ANCOVA of week 8 and 16 outcome measures, the two groups reported statistically significant improvements from baseline in BPI pain intensity (-1.2 [-1.7, -0.6]*; -1.3 [-1.8, -0.8]*), BPI pain interference (-1.3 [-2.0, -0.7]*; -1.7 [-2.3, -1.0]*), and BPI global pain severity (-1.2 [-1.7, -0.8]*; -1.5 [-1.9, -1.0]*) scores.
- However, there were no significant differences between the two groups in all outcome measures, except for PROMIS sleep disturbance that favored the nurse support group over the control group (50.5 [1.3] vs 54.3 [1.3]; P=0.039).

	Nurse support group (n=30)	Control group (n=30)	P values	All subjects (n=60)
Age in years	52.3 (14.9)	51.8 (20.5)	0.908	52.1 (17.8)
Gender, % female	26 (86.7)	23 (76.7)	0.506	49 (81.7)
Duration of pain ≥ 1 years (%)	29 (96.7)	26 (86.7)	0.353	55 (91.7)
≥3 body sites	28 (93.3)	29 (96.7)	>0.999	57 (95.0)
PHQ-8 depression (score ≥ 10)	5 (16.7)	7 (23.3)	0.748	12 (20.0)
BPI pain intensity (range 0-10)†	5.0 (3.8, 6.0)	5.5 (4.8, 6.3)	0.112	5.3 (4.3, 6.1)
BPI pain interference (range 0-10)†	4.5 (3.0, 6.1)	5.4 (3.7, 6.6)	0.152	4.9 (3.4, 6.6)
BPI global pain severity (range 0-10)†	4.5 (4.3, 5.5)	5.5 (4.6, 6.4)	0.041	5.0 (4.3, 6.1)
PCS total (range 0-52)†	15 (8, 24)	16 (9, 25)	0.763	15 (8, 25)

Table 1: Baseline characteristics of study subjects

CONCLUSIONS

- In this pilot study, the nurse support phone calls did not offer any benefits beyond those observed with self-guided web-based CBT program.
- Given the small sample size contributing to a study power of 58%, type 2 error may have explained these findings. Going forward, larger pragmatic clinic trials are needed to generate effective, scalable, and accessible psychoeducational treatments for CMP.

PRIMARY OUTCOMES (Δ from baseline)	Nurse support group (n=30)	Control group (n=30)	P values
BPI global pain severity*	3.8 (0.2) -1.2 (-1.7, -0.8)*	3.8 (0.2) -1.5 (-1.9, -1.0)*	0.770
BPI pain intensity*	4.0 (0.2) -1.2 (-1.7, -0.6)*	4.2 (0.2) -1.3 (-1.8, -0.8)*	0.542
BPI pain interference*	3.5 (0.3) -1.3 (-2.0, -0.7)*	3.5 (0.3) -1.7 (-2.3, -1.0)*	0.924
PROMIS physical function*	40.6 (0.7) 3.3 (1.8, 4.7)*	40.1 (0.7) 2.9 (1.4, 4.4)*	0.641

Table 2: Results of primary outcome analysis
*BPI global pain severity is the average of BPI pain intensity and BPI pain interference scores. Results are also given as mean (95% confidence interval) for change from baseline, with * indicating a significant non-zero change.

SECONDARY OUTCOMES	Nurse support group (n=30)	Control group (n=30)	P values
PROMIS fatigue	51.5 (1.3)	53.4 (1.4)	0.316
PROMIS sleep disturbance	50.5 (1.3)	54.3 (1.3)	0.039*
PROMIS sleep related impairment	42.0 (1.2)	39.2 (1.1)	0.090
PROMIS social	48.0 (0.9)	47.4 (0.9)	0.680
PROMIS pain intensity	4.4 (0.3)	4.7 (0.2)	0.476
PROMIS pain interference	57.4 (0.9)	57.3 (0.9)	0.889
PROMIS pain behavior	57.7 (0.6)	56.7 (0.6)	0.236

Table 3: Results of secondary outcome analysis