

# WORSENING PATIENT-REPORTED OUTCOMES WITH INCREASING DISEASE SEVERITY IN ULCERATIVE COLITIS IN THE USA: THE NATIONAL HEALTH AND WELLNESS SURVEY

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## BACKGROUND

- Ulcerative colitis (UC), a form of inflammatory bowel disease (IBD), is a chronic inflammatory condition of the digestive tract.<sup>1</sup>
- UC symptoms include diarrhea, pain, fatigue, and weight loss,<sup>1</sup> which reduce overall quality of life.
- Although burdens associated with patients with UC have been examined,<sup>2,3</sup> few studies have examined the link between the severity of UC and patient-reported outcomes (PROs).

## OBJECTIVE

- To establish the relationship between ulcerative colitis (UC) severity and patient-reported health outcomes.

## METHODS

### Data Source

PRO data were taken from the 2019 US National Health and Wellness Survey (NHWS) (N=74,994)—a nationally representative, self-administered, internet-based questionnaire from a nationwide sample of adults (aged ≥18 years). NHWS respondents are recruited from an existing, general-purpose (i.e., not healthcare-specific) web-based consumer panel. A stratified random sampling procedure is used to ensure the demographic composition of the NHWS sample is representative of the US adult population (with respect to age, gender, and race/ethnicity).

### Sample

**Inclusion criteria:** aged ≥18 years, agreed to informed consent, US resident

- Mild UC (n=464)
  - Self-reported physician diagnosis of UC
  - Self-reported UC severity as “mild”
- Moderate/severe UC (n=233)
  - Self-reported physician diagnosis of UC
  - Self-reported UC severity as “moderate” or “severe”
- General population/no UC (NUC) (n=74,198)
  - Did not self-report physician diagnosis of UC

**Exclusion criteria:** Respondents with a self-reported diagnosis of both Crohn’s disease and UC (N=99) were excluded from all analyses to better assess the individual impact of ulcerative colitis on burden of illness.

### Measures

Demographics, Charlson Comorbidity Index (CCI), body mass index (BMI), and the Patient Activation Measure (PAM).<sup>4</sup> PAM assesses an individual’s knowledge, skill, and confidence in managing their health and healthcare.

### Health-related quality of life (HRQoL)

SF36v2<sup>5</sup>—a multipurpose, generic HRQoL instrument with 36 questions, which yield the following three summary scores to assess key aspects of HRQoL:

- Mental component summary (MCS) score
- Physical component summary (PCS) score
- Health state utility (SF-6D) score, which assesses overall HRQoL

EuroQoL 5-Dimension Health Questionnaire (EQ-5D)<sup>6</sup>—a self-report measure of health for clinical and economic appraisal with 2 summary scores:

- EQ-5D Health Utility Index
- EQ-5D Visual Analogue Scale (VAS) score

## RESULTS

- After inclusion/exclusion criteria were applied (**Figure 1**), we had a resultant cohort of N=74,198 (general population), N=464 (mild UC), and N=233 (moderate/severe UC).

- Mean age (**Table 1**) differed significantly between groups (NUC=47.6 vs. mild=51.4 vs. moderate/severe=43.8;  $p<0.001$ ).

- CCI differed significantly between groups (NUC=0.41 vs. mild=0.93 vs. moderate/severe=1.34,  $p<0.001$ ).

- Overall there were other significant differences between groups in race, ethnicity, health insurance, and BMI.

- Interestingly, PAM score, which measured patient engagement in managing their health, did not differ between groups.

### Measures (cont.)

#### Work productivity and activity impairment (WPAI)

The Work Productivity and Activity Impairment WPAI-GH<sup>7</sup> questionnaire yields the following four assessments:

- Absenteeism (% time missed work due to health in the last 7 days)
- Presenteeism (% impairment while at work in the last 7 days)
- Overall work impairment (combination of absenteeism and presenteeism)
- Activity impairment (% impairment in daily activities in the last 7 days)

#### Healthcare resource utilization (HCRU)

Healthcare utilization was defined as the number of traditional healthcare provider (HCP) visits (e.g., general internist, pulmonologist, gynecologist, psychologist, etc.), the number of emergency room (ER) visits, and the number of hospitalizations in the past six months.

#### Economic burden

Direct costs were estimated using self-reported HCRU visits imputed from the cost for an average ER visit, hospitalization, and physician visit using the most recent Medical Expenditure Panel Survey (MEPS) data available.<sup>8</sup>

Indirect costs were measured using the Human Capital Method,<sup>9</sup> which uses WPAI-reported absenteeism and presenteeism in combination with hourly wages from the Bureau of Labor Statistics<sup>10</sup> to estimate indirect costs.

### Statistical Analyses

#### Unmatched Bivariate Analyses

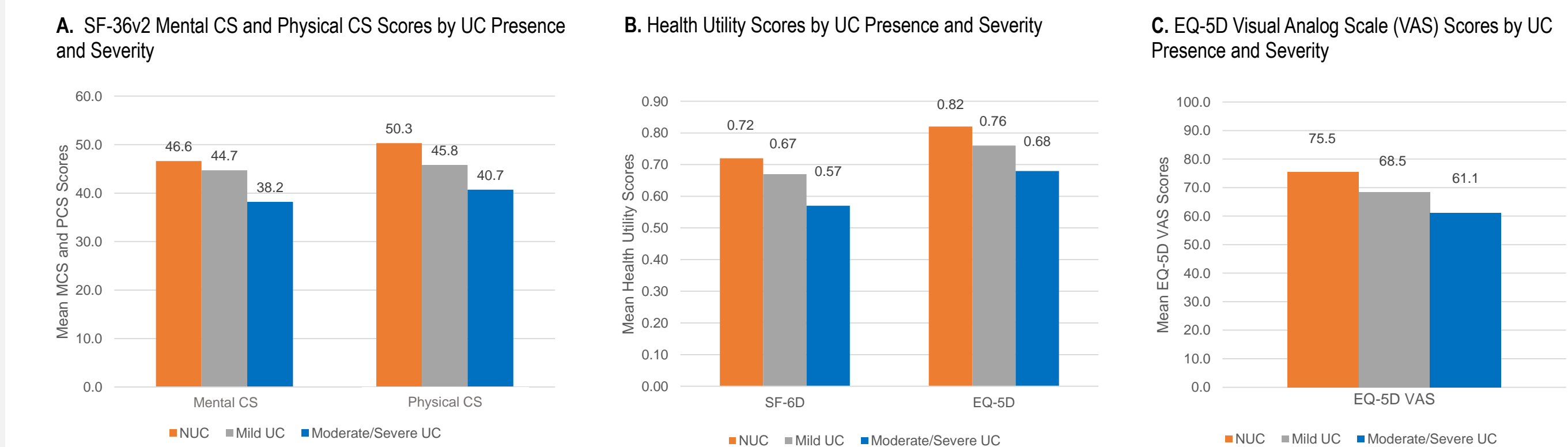
For categorical and continuous variables, chi-square tests and ANOVAs, respectively, were run to examine differences between UC groups (mild vs. moderate/severe vs. NUC). All tests were two-tailed; test results  $p<0.05$  were considered statistically significant. Means and proportions are reported for continuous and categorical variables, respectively.

## RESULTS (continued)

**Table 2. Demographic Characteristics by UC Disease Presence and Severity**

	General Population (NUC) n=74,198	Mild UC n=464	Moderate/Severe UC n=233	p value
<b>Age (years)</b>				
Mean ± Std Dev	47.55 ± 17.32 <sub>a</sub>	51.36 ± 16.91 <sub>b</sub>	43.76 ± 14.84 <sub>c</sub>	<b>&lt;0.001</b>
<b>Sex</b>				<b>0.405</b>
Male (%)	31,986 (43.1%) <sub>a</sub>	188 (40.5%) <sub>a</sub>	106 (45.5%) <sub>a</sub>	
Female (%)	42,212 (56.9%) <sub>a</sub>	276 (59.5%) <sub>a</sub>	127 (54.5%) <sub>a</sub>	
<b>Race/ethnicity</b>				<b>&lt;0.001</b>
African American (%)	8,272 (11.1%) <sub>a</sub>	29 (6.3%) <sub>b</sub>	13 (5.6%) <sub>b</sub>	
American Indian (%)	425 (0.6%) <sub>a</sub>	1 (0.2%) <sub>a</sub>	1 (0.4%) <sub>a</sub>	
Asian (%)	5,412 (7.3%) <sub>a</sub>	16 (3.4%) <sub>b</sub>	8 (3.4%) <sub>b</sub>	
Hispanic (%)	8,285 (11.2%) <sub>a</sub>	55 (11.9%) <sub>a</sub>	46 (19.7%) <sub>b</sub>	
Non-Hispanic White (%)	49,136 (66.2%) <sub>a</sub>	340 (73.3%) <sub>b</sub>	152 (65.2%) <sub>a</sub>	
Mixed (%)	1,719 (2.3%) <sub>a</sub>	12 (2.6%) <sub>a,b</sub>	11 (4.7%) <sub>b</sub>	
Other (%)	949 (1.3%) <sub>a</sub>	11 (2.4%) <sub>b</sub>	2 (0.9%) <sub>a,b</sub>	
<b>University education</b>				<b>0.054</b>
Less than University education (%)	36,840 (49.7%) <sub>a</sub>	206 (44.4%) <sub>b</sub>	109 (46.8%) <sub>a,b</sub>	
University education or higher (%)	37,358 (50.3%) <sub>a</sub>	258 (55.6%) <sub>b</sub>	124 (53.2%) <sub>a,b</sub>	
<b>Employed (FT/PT/SE)</b>				<b>0.228</b>
Not currently employed (%)	30,091 (40.6%) <sub>a</sub>	203 (43.8%) <sub>a</sub>	87 (37.3%) <sub>a</sub>	
Employed (%)	44,107 (59.4%) <sub>a</sub>	261 (56.3%) <sub>a</sub>	146 (62.7%) <sub>a</sub>	
<b>Health insurance</b>				<b>0.001</b>
No (%)	8,443 (11.4%) <sub>a</sub>	30 (6.5%) <sub>b</sub>	34 (14.6%) <sub>a</sub>	
Yes (%)	65,755 (88.6%) <sub>a</sub>	434 (93.5%) <sub>b</sub>	199 (85.4%) <sub>a</sub>	
<b>Charlson comorbidity index (CCI)</b>				<b>&lt;0.001</b>
Mean ± Std Dev	0.41 ± 0.99 <sub>a</sub>	0.93 ± 1.74 <sub>b</sub>	1.34 ± 2.05 <sub>c</sub>	
<b>Body mass index (BMI) category</b>				<b>&lt;0.001</b>
Underweight (%)	2,539 (3.4%) <sub>a</sub>	25 (5.4%) <sub>b</sub>	18 (7.7%) <sub>b</sub>	
Normal (%)	24,511 (33.0%) <sub>a</sub>	145 (31.3%) <sub>a</sub>	71 (30.5%) <sub>a</sub>	
Overweight (%)	21,748 (29.3%) <sub>a</sub>	124 (26.7%) <sub>a</sub>	73 (31.3%) <sub>a</sub>	
Obese (%)	21,703 (29.3%) <sub>a</sub>	143 (30.8%) <sub>a</sub>	49 (21.0%) <sub>b</sub>	
Decline to provide weight (%)	3,697 (5.0%) <sub>a</sub>	27 (5.8%) <sub>a,b</sub>	22 (9.4%) <sub>b</sub>	
<b>PAM score</b>				<b>0.477</b>
Mean ± Std Dev	62.94 ± 11.43 <sub>a</sub>	62.84 ± 11.70 <sub>a</sub>	61.95 ± 11.62 <sub>a</sub>	

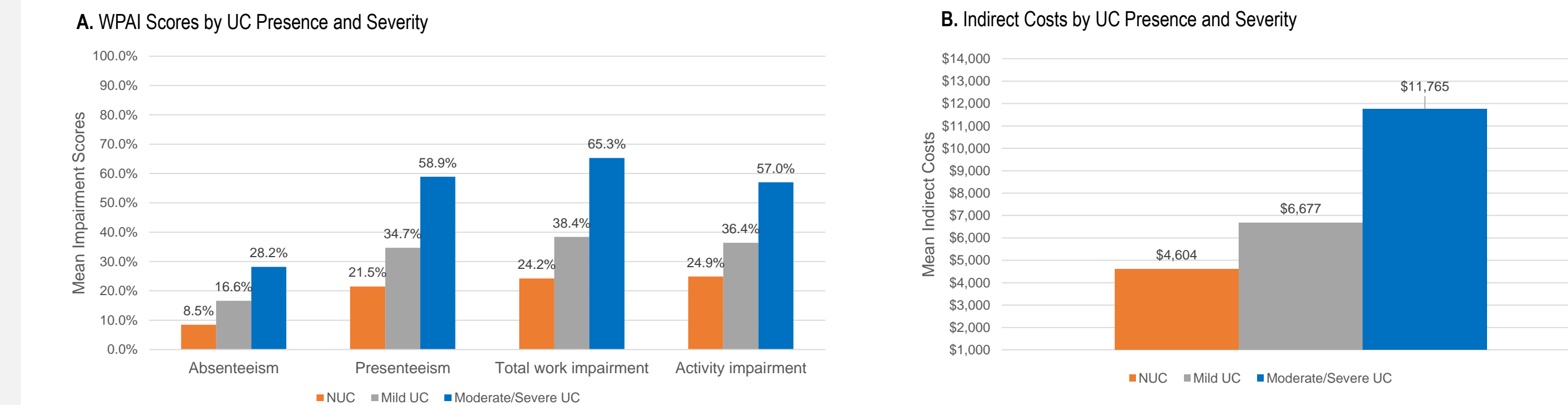
**Figure 2. UC Quality of Life Measures by Disease Severity**



NUC=no ulcerative colitis; UC=ulcerative colitis; VAS=visual analog scale  
\*Note: All pairwise comparisons/differences between groups are significant at  $p<0.05$ .

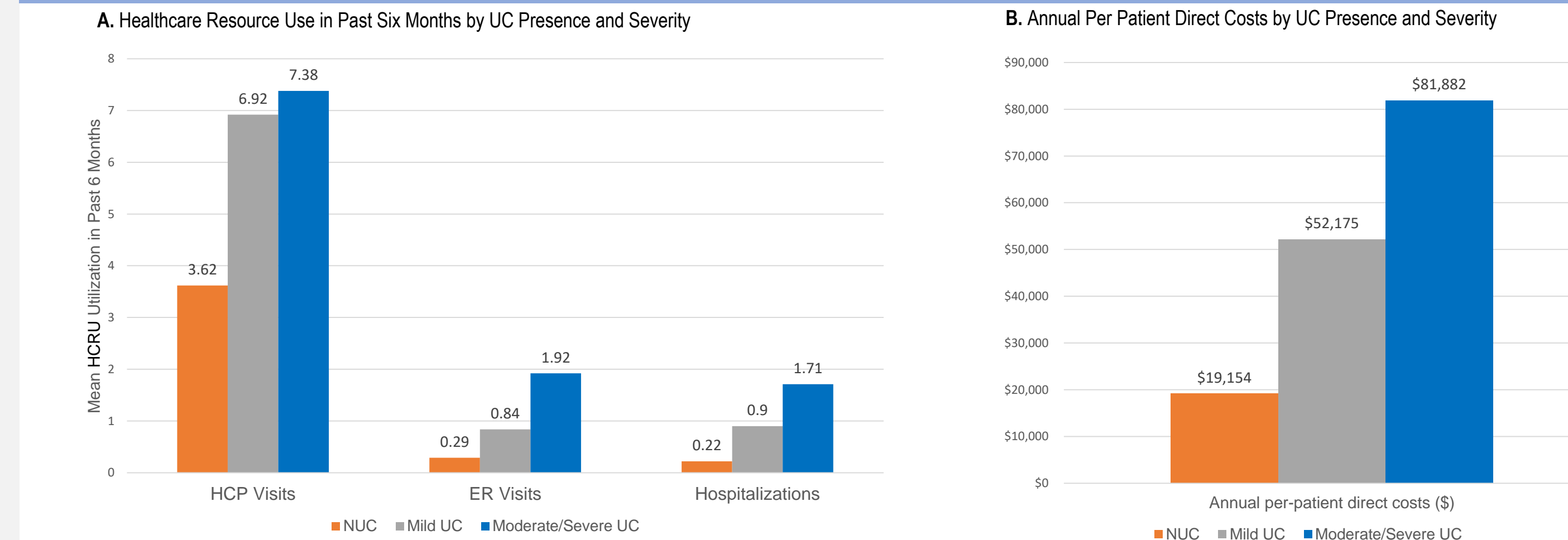
- Mental CS and Physical CS scores (**Figure 2A**) significantly decreased with disease presence and severity (NUC=46.6 vs. mild=44.7 vs. moderate/severe=38.2;  $p<0.001$ ) and (NUC=50.3 vs. mild=45.8 vs. moderate/severe=40.7;  $p<0.001$ ), respectively.
- SF-6D and EQ-5D utility scores significantly (**Figure 2B**) decreased with disease presence and severity (NUC=0.72 vs. mild=0.67 vs. moderate/severe=0.57;  $p<0.001$ ) and (NUC=0.82 vs. mild=0.76 vs. moderate/severe=0.68;  $p<0.001$ ), respectively.
- EQ-5D VAS score (**Figure 2C**) significantly decreased with disease presence and severity (NUC=75.5 vs. mild=68.5 vs. moderate/severe=61.1;  $p<0.001$ ).

**Figure 3. WPAI Scores and Resultant Indirect Costs by UC Disease Presence and Severity**



NUC=no ulcerative colitis; UC=ulcerative colitis; WPAI=work productivity and activity impairment – higher scores indicate greater impairment.  
Note: All pairwise comparisons/differences between groups are significant at  $p<0.05$ .

**Figure 4. HCRU and Costs by UC Disease Presence and Severity**



ER=emergency room; HCP=health care provider; HCRU=healthcare resource use; NUC=no ulcerative colitis; UC=ulcerative colitis.  
\*Note: All pairwise comparisons/differences between groups are significant at  $p<0.05$ .

- WPAI outcomes (**Figure 3A**) were poorer with disease presence and increasing disease severity. Resulting indirect costs (**Figure 3B**) were significantly higher with disease presence and increasing disease severity (NUC=\$4,604 vs. mild=\$6,677 vs. moderate/severe=\$11,765,  $p<0.001$ ).
- Mean HCP visits within the past 6 months (**Figure 4A**) significantly increased with disease presence and severity (NUC=3.6, mild=6.9, moderate/severe=7.4;  $p<0.001$ ). Similar trends were observed for mean ER visits (NUC=0.3, mild=0.8, moderate/severe=1.9;  $p<0.001$ ) and hospitalizations (NUC=0.2, mild=0.9, moderate/severe=1.7;  $p<0.001$ ) in the past 6 months. Annual per-patient mean direct costs (**Figure 4B**) significantly increased with disease presence and severity (NUC=\$19,154, mild=\$52,175, moderate/severe=\$81,882;  $p<0.001$ ).

## LIMITATIONS

- Data from the NHWS are self-reported and may be susceptible to methodological limitations common with self-reported data (i.e., recall bias). Variables (e.g., UC diagnosis) could not be independently verified via other data sources (e.g., electronic medical records, patients’ medical charts, etc.).
- Given the cross-sectional nature of these data, statements of causality cannot be inferred from the study results.

## CONCLUSIONS

- PROs worsened with UC disease severity. Patients with moderate/severe UC demonstrated significantly worse absenteeism, presenteeism, and lower scores on the SF-36v2, EQ-5D, and SF-6D than those with mild UC or without UC.
- Similarly, UC disease and its increased severity is associated with greater HRU and costs.
- Reduction of disease severity through management of UC may improve PROs and reduce HCRU and costs.

## REFERENCES

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