Factors Driving Disparities in Glucocorticoid Exposure among Children with SLE in the Childhood Arthritis and Rheumatology Research Alliance (CARRA) Registry

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Purpose

- Differential glucocorticoid exposure and toxicity may exacerbate racial and ethnic disparities in lupus-related organ damage and mortality
- We sought to examine relationships between race, social determinants of health, and glucocorticoid exposure in children with systemic lupus erythematosus (SLE) in the Childhood Arthritis and Rheumatology Research Alliance (CARRA) Registry

Methods

Design: Retrospective analysis of prospectively collected observational data
Data Source: Longitudinal data in the CARRA Registry (March 2017-December 2021) of children enrolled with a primary rheumatologic diagnosis of SLE and ≥1 visit

Exposures of interest:
- Self-identified race and/or ethnicity
- Census-tract ranked national area-level deprivation index (ADI)

Primary Outcomes:
- Time-averaged oral prednisone-equivalent dose (mg/day)
- Secondary Outcomes
  - Any prednisone use or dose increase between visits
  - Disease activity scores (SLEDAI-2K) over time

Covariates (at enrollment):
- Insurance status, age, sex
- Major organ involvement, cyclophosphamide or rituximab use, non-biologic DMARD use, disease duration, any secondary rheumatologic disease

Analysis:
- Multivariable adjusted linear regression model of time-averaged mean prednisone dose
- Multivariable adjusted logistic regression model of prednisone restarts/increases
- Linear mixed effects models of disease activity over time

Results

Table 1: Demographic and clinical characteristics of children with SLE in the CARRA Registry

<table>
<thead>
<tr>
<th>Age at enrollment (yrs.)</th>
<th>&lt;4</th>
<th>4-6</th>
<th>7-9</th>
<th>10-12</th>
<th>≥13</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (IQR)</td>
<td>10 (7.9, 12.7)</td>
<td>11 (9.1, 13.8)</td>
<td>11 (9.1, 13.8)</td>
<td>12 (10, 14)</td>
<td>13 (11, 15)</td>
<td>11 (10.8, 13.2)</td>
</tr>
</tbody>
</table>

- Adjusted for adjustment of insurance type and renal disease attenuation associated with both race and ADI with time-averaged prednisone dose (Table 2)

- Black children had higher unadjusted odds of prednisone dose increases between visits and higher cumulative prednisone dose use (OR 1.8 [ref. White], 95% CI [1.1, 2.9], p=0.022).

- Black children had higher disease activity vs. White children, adjusted for insurance, ADI and other individual-level factors (β 0.94, 95% CI [0.1, 1.78]).

Conclusions

- Public insurance and renal disease are independent predictors of higher cumulative mean prednisone dose.
- Compared to Non-Hispanic White children, Black children have higher disease activity over time, irrespective of renal disease, neighborhood-level disadvantage, or insurance level.

- In a racially and ethnically diverse cohort of children with SLE, public insurance and renal disease attenuate associations between Black race and neighborhood-level disadvantage with cumulative average prednisone burden

- Structural confounding due to unequal segregation of Black participants into high neighborhood disadvantage must be considered

- Other unmeasured social determinants may drive the association between Black race and neighborhood deprivation

Summary of Results

- Public insurance and renal disease are independent predictors of higher cumulative mean prednisone dose.
- Compared to Non-Hispanic White children, Black children have higher disease activity over time, irrespective of renal disease, neighborhood-level disadvantage, or insurance level.
- In a racially and ethnically diverse cohort of children with SLE, public insurance and renal disease attenuate associations between Black race and neighborhood-level disadvantage with cumulative average prednisone burden
- Structural confounding due to unequal segregation of Black participants into high neighborhood disadvantage must be considered
- Other unmeasured social determinants may drive the association between Black race and higher disease activity over time
- Understanding relationships between area and individual-level factors and racial disparities is needed to identify points of intervention to improve outcomes of SLE

Table 2: Factors associated with time-averaged mean prednisone dose among children with pSLE

- Adjusted for adjustment of insurance type and renal disease attenuation associated with both race and ADI with time-averaged prednisone dose (Table 2)

- Black children had higher unadjusted odds of prednisone dose increases between visits and higher cumulative prednisone dose use (OR 1.8 [ref. White], 95% CI [1.1, 2.9], p=0.022).

- Black children had higher disease activity vs. White children, adjusted for insurance, ADI and other individual-level factors (β 0.94, 95% CI [0.1, 1.78]).

- Compared to privately insured children, uninsured children had significantly higher disease activity, albeit the number of the uninsured was small.