Sarcoidosis: An Ill-afforded Disease

Sarcoidosis is a systemic inflammatory disorder of unknown origin. Its clinical course ranges from asymptomatic disease with spontaneous remission to chronic illness resulting in significant organ impairment and even death (1).

Socioeconomic status (SES) refers broadly to the "standing or class of an individual or group," typically measured singularly or as a composite of income, educational level, occupational class, wealth, and race (2). Throughout history, SES has been linked to differences in morbidity and mortality for nearly every known illness, with those of greater means generally enjoying better overall health than those in lower strata (3).

With few exceptions, SES has been associated with sarcoidosis risk. In the ACCESS (A Case Control Etiologic Study of Sarcoidosis) study, black race and low income were each associated with greater disease severity at presentation (4). Mining, construction, and agricultural occupations have been associated with up to fourfold increases in sarcoidosis risk (5, 6), and increased risk of sarcoidosis and "sarcoid-like" disease have been described in firefighters and 9/11 first-responders (7).

What is less clear are the mechanisms by which sarcoidosis effects SES. Previous studies have found that subjects with sarcoidosis experienced more illness-related sick days annually than those without sarcoidosis (8) and that sarcoidosis-related disability persisted for more than 5 years after diagnosis (9).

In this issue of the *Journal*, Harper and colleagues (pp. 955–964) further evaluate the relationship between household income and disease trajectory in a registry-based cohort of cases enrolled in the Foundation for Sarcoidosis Research–Sarcoidosis Advanced Registry for Cures (FSR_SARC) database (10, 11). Among their findings, they report that low-SES patients—defined as self-reported household income of <$35,000—had greatest negative impact on their financial status, and worse long-term outcomes, including steroid-associated illness.

Multiple factors mediate the effect of sarcoidosis on SES. An analysis of the Optum Healthcare database estimated the average individual cost of care for sarcoidosis to be in excess of $32,000 annually, with the top 5% of patients incurring costs exceeding $93,000 (12). Previous studies show that patients with "high-cost" sarcoidosis are more likely to receive care in the emergency department, be on prednisone (8), and experience more severe disease (13). These costs disproportionately affect patients with lower income, and economic recovery can be difficult because of sizable medical debt. In the years after the passage of the Affordable Care Act, approximately 67% of all bankruptcies were the result of medical illness or medical debt (14). The impact can be particularly severe for black patients, who frequently develop sarcoidosis approximately 10 years earlier than white patients (15) and potentially lose out on income and building wealth when the disease strikes during prime working years (16). The authors did not present social demographic data according to income, so it is not possible to know the racial composition of each stratum of SES. Nevertheless, black race was a significant predictor of impact of sarcoidosis on family finances in multivariate models.

The current study extends the literature by highlighting the financial vulnerability of middle-class Americans. Overall, the FSR_SARC cohort was white, female, and educated; 30% of cases reported a household income above $85,000 and 66% reported having private insurance. However, 46% of those in the middle stratum of SES ($35,000–85,000) reported that their finances were "greatly or severely affected," and 28% reported job loss due to the illness. An analysis of national bankruptcy data by Himmelstein and colleagues (17) showed that over 75% of medical debtors were ensured, demonstrating a major limitation of employer-based health coverage when prolonged illness leads to disability or job loss (14).

A persistent dilemma in clinical sarcoidosis is how best to treat the disease. Corticosteroids are considered the first line of therapy because of their rapid ability to effectively suppress granulomatous inflammation (18). However, their usage is associated with morbidities that significantly affect health care utilization and quality of life (19). In the current analysis, both low and middle income were associated with a 50% increased risk of developing a steroid-related comorbidity (e.g., obesity and sleep apnea). In addition, low income was associated with a threefold increased risk of using a wheelchair or walker, and a nearly twofold increased risk of supplemental oxygen use.

Once introduced to corticosteroids, lower SES can make it difficult to wean patients from intolerable doses, resulting in long-term use of an intended short-term therapy. Options to limit side effects include delayed initiation of therapy or introduction of steroid-sparing medications (e.g., methotrexate and infliximab) early in the disease course. However, for patients seeking rapid symptom improvement to maintain employment, these options are not effective. Moreover, insurance copayments may make multiple clinic visits to monitor therapy financially burdensome (14).

Harper and colleagues (10) employed a robust sample of registry-based cases of long duration; however, the FSR_SARC database does not represent the disease patterns observed in the United States where black women experience the highest incidence of sarcoidosis (12). Thus, it is possible that their analysis has greatly underestimated the burden of disease on low-SES sarcoidosis cases. Nevertheless, their analysis clearly emphasizes the financial

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vulnerability faced by middle-class patients who are also at risk of comorbidities and bankruptcy due to mounting medical debt.

The primary risk factor of the current study focused on self-reported household income, a variable with several limitations. Income varies according to geographic region and can be subject to short-term fluctuations (2). Furthermore, the association between income and health can be subject to reverse causality, where those with poor health suffer a loss of income (3). As the authors acknowledge, the cross-sectional nature of the study data makes it difficult to determine the temporal sequence of the observed association. Future studies should consider additional measures of SES, such as wealth, assets, and neighborhood SES. Longitudinal cohort studies (e.g., Black Women's Health Study and Nurses' Health Study) have collected data on one or more of these measures and could be a source for future analyses. Finally, researchers must incorporate SES measures in the evaluation of therapeutic interventions, as financial status can influence therapy effectiveness and adherence.

The challenge for clinicians is to rethink and reconfigure therapeutic approaches to the disease. This will require taking into account the economic impact of the diagnosis of sarcoidosis on all patients by inquiring about economic strain during routine care to steer patients toward important resources (e.g., social worker services) intended to improve patient circumstances. Finally, advocacy organizations, such as the Foundation for Sarcoidosis Research, must continue to impel lawmakers to create and maintain an equitable and comprehensive safety net system, including health insurance, for those impacted by sarcoidosis and other chronic illness.

Sarcoidosis takes its toll on the body in many ways. These data suggest that the disease impacts the lives of affected individuals and their families and is influenced by circumstances of social standing and income. It is clear that sarcoidosis is a diagnosis that patients and their families can ill afford. ■

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References

1. Iannuzzi MC, Rybicki BA, Teirstein AS. Sarcoidosis. *N Engl J Med* 2007; 357:2153–2165.
2. APA Task Force on Socioeconomic Status. Report of the APA Task Force on Socioeconomic Status. Washington, DC: American Psychological Association; 2007.
3. Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, *et al*. Socioeconomic status and health: the challenge of the gradient. *Am Psychol* 1994;49:15–24.
4. Rabin DL, Thompson B, Brown KM, Judson MA, Huang X, Lackland DT, *et al*. Sarcoidosis: social predictors of severity at presentation. *Eur Respir J* 2004;24:601–608.
5. Vihlborg P, Bryngelsson IL, Andersson L, Graff P. Risk of sarcoidosis and seropositive rheumatoid arthritis from occupational silica exposure in Swedish iron foundries: a retrospective cohort study. *BMJ Open* 2017;7:e016839.
6. Rafnsson V, Ingimarsson O, Hjalmarsson I, Gunnarsdottir H. Association between exposure to crystalline silica and risk of sarcoidosis. *Occup Environ Med* 1998;55:657–660.
7. Webber MP, Yip J, Zeig-Owens R, Moir W, Ungprasert P, Crowson CS, *et al*. Post-9/11 sarcoidosis in WTC-exposed firefighters and emergency medical service workers. *Respir Med* 2017;132:232–237.
8. Rice JB, White A, Lopez A, Conway A, Wagh A, Nelson WW, *et al*. Economic burden of sarcoidosis in a commercially-insured population in the United States. *J Med Econ* 2017;20:1048–1055.
9. Arkema EV, Eklund A, Grunewald J, Bruze G. Work ability before and after sarcoidosis diagnosis in Sweden. *Respir Med* 2018;144S:S7–S12.
10. Harper LJ, Gerke AK, Wang X-F, Ribeiro Neto ML, Baughman RP, Beyer K, *et al*. Income and other contributors to poor outcomes in U.S. patients with sarcoidosis. *Am J Respir Crit Care Med* 2020;201:955–964.
11. Serchuck L, Spitzer G, Rossman M, Baughman RP, Culver DA, Drent M, *et al*. The Foundation for Sarcoidosis Research Sarcoidosis Advanced Registry for Cures [abstract]. *Am J Respir Crit Care Med* 2016;193:A6184.
12. Baughman RP, Field S, Costabel U, Crystal RG, Culver DA, Drent M, *et al*. Sarcoidosis in America: analysis based on health care use. *Ann Am Thorac Soc* 2016;13:1244–1252.
13. Ligon CB, Judson MA. Impact of systemic corticosteroids on healthcare utilization in patients with sarcoidosis. *Am J Med Sci* 2011;341:196–201.
14. Himmelstein DU, Lawless RM, Thorne D, Foohey P, Woolhandler S. Medical bankruptcy: still common despite the Affordable Care Act. *Am J Public Health* 2019;109:431–433.
15. Rybicki BA, Maliarik MJ, Major M, Popovich J Jr, Iannuzzi MC. Epidemiology, demographics, and genetics of sarcoidosis. *Semin Respir Infect* 1998;13:166–173.
16. Gerke AK, Tang F, Cozier YC, Lash MT, Schappet J, Phillips E, *et al*. A web-based registry for patients with sarcoidosis. *Sarcoidosis Vasc Diffuse Lung Dis* 2017;34:26–34.
17. Himmelstein DU, Thorne D, Warren E, Woolhandler S. Medical bankruptcy in the United States, 2007: results of a national study. *Am J Med* 2009;122:741–746.
18. Gibson GJ, Prescott RJ, Muers MF, Middleton WG, Mitchell DN, Connolly CK, *et al*. British Thoracic Society sarcoidosis study: effects of long term corticosteroid treatment. *Thorax* 1996;51: 238–247.
19. Judson MA, Chaudhry H, Louis A, Lee K, Yucel R. The effect of corticosteroids on quality of life in a sarcoidosis clinic: the results of a propensity analysis. *Respir Med* 2015;109:526–531.