

Greetings, I am Dr Karl Nath, the Editor-in-Chief of *Mayo Clinic Proceedings*, and I am pleased to welcome you to the multimedia summary for the journal's December 2022 issue. There are three articles that have been selected as our Editor's Choice or Highlights articles this month.

The Editor's Choice this month is an Original Article entitled "Changes in Burnout and Satisfaction With Work-Life Integration in Physicians During the First 2 Years of the COVID-19 Pandemic." It is authored by Dr Tait D. Shanafelt from Stanford University in Palo Alto, California, and colleagues from Mayo Clinic, in Rochester, Minnesota, the University of Colorado School of Medicine, in Denver Colorado, and the American Medical Association, in Chicago, Illinois.

Shanafelt et al assessed the effects of the COVID-19 pandemic on physician burnout by surveying US physicians between December 2021 and January 2022, some 21 months after the beginning of the pandemic. For well over a decade preceding this survey, Shanafelt and colleagues have pioneered the study of physician burnout by recognizing and bringing this phenomenon to medical and public attention; by elucidating its characteristics, causes, and consequences; and by delineating novel strategies that may reduce the occurrence of burnout and the severity of its impact.

In their present study, these investigators drew upon their triennial surveys of physician burnout and satisfaction with work-life integration which they began in 2011. Their current survey, involving almost 2500 physicians, revealed that scores for emotional exhaustion and depersonalization markedly increased in the 2021 survey compared with 2020 and were higher than all of the prior triennial surveys, undertaken in 2020, 2017, 2014, and 2011.

For example, compared with the 2020 survey, mean scores for emotional exhaustion and depersonalization in the 2021 survey increased by more than 38% and 60%, respectively, while over this time-frame, the prevalence of physicians with at least one characteristic of burnout increased by approximately 25%. Satisfaction with work-life integration in 2021 significantly declined to approximately 30% from 46% in 2020. This marked increase in burnout and decrease in satisfaction with work-life integration markedly outstripped the increase in depression, 6.1% over this

time period, leading the authors to conclude that the increase in physician distress was work-related.

Practitioners in certain specialties - emergency medicine, general pediatrics, and family medicine – and female physicians were at a higher risk for burnout in 2021. Interestingly, a mild mitigation in burnout and an increase in satisfaction in work-life integration occurred at the overall physician population level in 2020 compared with 2017, which, as suggested by the authors, reflected, in part, a temporary amelioration, during the early days the pandemic, of some types of stressors that are known to underpin burnout for physicians outside the early pandemic hotspots.

However, as the COVID-19 pandemic widely and deeply enveloped the United States and the world, imposing its well-recognized stresses on, and exposing the deficiencies and fissures in, the delivery of health care in the United States, the result was the worsening burnout and the declining satisfaction in work-life integration as observed in the present study.

These alarming findings, as underscored by Shanafelt et al, have profound ramifications for US health care. One hopes that these findings do not reflect a new, heightened, essentially unyielding baseline level for physician burnout, but rather a modifiable level that will subside strikingly below its pre-pandemic levels, especially as the pandemic and its attendant burdens abate, and as initiatives to combat burnout prove increasingly effective.

Our first highlight this month is an Original Article entitled “Urinary Sodium-to-Potassium Ratio and Incident Chronic Kidney Disease: Results From the Korean Genome and Epidemiology Study.” It is authored by Dr Young Su Joo and colleagues from Yonsei University, in Seoul, Republic of Korea.

Increased sodium intake has long been linked to hypertension, and, less consistently so, to chronic kidney disease. Conversely, while hyperkalemia is to be avoided and/or treated because of its arrhythmogenic effects, there is clear evidence that increased dietary intake of potassium reduces the risk of cardiovascular disease, hypertension, and even chronic kidney disease This salutary effect of increased

dietary potassium intake may reflect, at least in part, the attendant increase in sodium excretion by the kidney.

In addition to assessing the effects of dietary intake of sodium and potassium, independent of each other, in such diseases, an evolving concept emphasizes that the relative dietary intake of each electrolyte, as reflected by the urinary sodium-to-potassium ratio, should also be considered.

Using data from the Korean Genome and Epidemiology Study, Joo et al studied whether urinary sodium-to-potassium ratio associates with incident chronic kidney disease. These investigators determined the urinary sodium-to-potassium ratio in participants with normal kidney function at the time of enrollment between June 1, 2001, and January 31, 2003, and evaluated the occurrence of chronic kidney disease during follow-up until December 31, 2016. The findings demonstrate that incident chronic kidney disease was significantly lower in participants whose urinary sodium-to-potassium ratio was in the lowest tertile compared with those with this ratio in the highest tertile. When the urinary sodium-to-potassium ratio was considered as a continuous variable, as this ratio increased, so did incident chronic kidney disease. In contrast, there was no significant association with either 24-hour urinary sodium excretion or 24-hour urinary potassium excretion. To explain these findings, the authors considered whether hypertension was the intermediary between urinary sodium-to-potassium ratio and chronic kidney disease. However, this appeared unlikely as the association between this ratio and chronic kidney disease persisted even after adjustment for hypertension, while the prevalence of hypertension was comparable across the three tertiles. Another possible explanation suggested by the authors relates to the previously described association between increased urinary sodium-to-potassium ratio and insulin resistance and between this ratio and obesity.

The authors emphasize the need for confirmatory studies, including in other ethnicities. These intriguing findings of Joo et al add to the growing evidence regarding the pathogenetic significance of the relative – and not just absolute - intake of these electrolytes.

Our Second Highlight this month is an Original Article entitled “Sudden Cardiac Death in Patients With Type 1 Versus Type 2 Diabetes.” It is authored by

Dr Faye Norby from the Smidt Heart Institute, at Cedars-Sinai Health System, in Los Angeles, California, and colleagues from the Kaiser Permanente Center for Health Research, in Portland, Oregon, and the Oregon Health and Science University, also in Portland, Oregon.

Norby et al undertook a prospective community-based study of sudden cardiac arrest in 2771 cases and 8313 matched controls, assessing the association of sudden cardiac arrest with both type 1 diabetes and type 2 diabetes. Significant differences exist in the pathogenesis of type 1 diabetes and type 2 diabetes, and in the rate at which and the severity with which complications develop in either condition; yet no data are currently available regarding the relative risk of sudden cardiac arrest in type 1 diabetes and type 2 diabetes.

The findings of Norby et al demonstrate that even after adjustment for relevant risk factors, there was a 1.5-fold higher odds for sudden cardiac arrest in patients with diabetes, and that the odds increased approximately 2.5-fold in type 1 diabetes compared with type 2 diabetes. The authors point out that type 1 diabetes and type 2 diabetes are associated with various conditions - obesity, hypertension, coronary artery disease, and heart failure - that predispose to sudden cardiac arrest. However, such conditions could not be implicated in the observed differences in type 1 diabetes and type 2 diabetes as their prevalence was similar in both groups.

Interestingly, the prevalence of chronic kidney disease, a condition that itself predisposes to sudden cardiac arrest, was greater in type 1 diabetes compared with either patients with type 2 diabetes or in those without diabetes, thereby raising the possibility that greater chronic kidney disease may underlie the higher risk for sudden cardiac arrest in type 1 diabetes. The authors also point out that the similar or increased prevalence of conditions, listed above, in type 1 diabetes, despite their younger age, speaks to the increased tempo with which such conditions develop in type 1 diabetes compared with type 2 diabetes.

Furthermore, this study demonstrated that patients with type 1 diabetes compared with type 2 diabetes were more likely to have an unwitnessed cardiac arrest, no attempts at resuscitation, and less survival. In addition to underscoring diabetes mellitus as a risk factor for sudden cardiac arrest and in uncovering the novel observation that the risk for sudden cardiac arrest is greater in patients with

type 1 diabetes compared with type 2 diabetes, these important findings disclose the relevance of the type of diabetes in strategies that aim to prevent sudden cardiac arrest.

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