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Commentary on “Awareness and Knowledge Among Internal Medicine Resident Trainees for Dose Adjustment of Analgesics and Neuropsychotropic Medications in CKD”

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Research highlights that there is a need to reinforce nephrology-specific education in medical trainees.¹ Similar to many internal medicine subspecialties, nephrology continues to evolve with respect to the treatment and management of complex patients—in this case, those who have reduced renal function and chronic kidney disease (CKD). The majority of patients with reduced renal function and CKD are cared for solely by physicians in primary care disciplines. As such, demands are high on internal medicine resident trainees to stay abreast of current medical trends and to develop a strong fund of knowledge for use when caring for patients.

In this issue of the *Southern Medical Journal*, the article by Rubenstein and colleagues² shows that internal medicine resident trainees have significant awareness and knowledge gaps regarding drug dosing for reduced renal function. The authors found that internal medicine residents are at high risk for being unaware of dosing requirements for analgesics and neuropsychotropic medications. These findings are based on a survey the authors developed and administered to 353 internal medicine residents. The knowledge gaps that they identified could translate into prescribing errors, adverse events, patient morbidity, and even mortality. Not unexpectedly, the authors found that residents with less training (postgraduate year 1) have up to a 4.6 times higher odds ($P < 0.05$) of incorrectly responding to questions about drug dosing compared with residents who are nearer to completing their residency (postgraduate year 3).² Even at a senior resident level, significant awareness and knowledge gaps remained, however.

Medical education must do a better job of providing residents at all levels training and skills, not only to be competent but also to excel as physicians. Renal dosing for commonly prescribed drugs is a critical skill set that cannot be overlooked. Although the authors posit some hypotheses as to why internal medicine residents may have low awareness and knowledge of renal drug dosing, the causes largely remain unidentified. Perhaps the sheer breadth of other learning that occurs during residency invokes a reliance on using alternative

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sources (eg, online or Web-based tools) to look up drug information that may be perceived as highly accessible and not worth memorizing. In addition, as the practice of medicine grows exponentially, it becomes more difficult to remain completely knowledgeable about all aspects of medications. Multidisciplinary care is becoming more prevalent, in part, to meet this challenge. Pharmacists are increasingly integrated into inpatient and outpatient care teams. Although the pharmacist is immensely valuable and contributes greatly to patient-centered care, there is a reliance on the pharmacist by the physician for drug-dosing information. In turn, this may reduce physicians' incentive to sharpen their own skills related to staying abreast of drug-dosing regimens. These reasons could provide some explanation as to why there was low drug-dosing awareness and knowledge identified in this study.

As the study points out, additional training and exposure to nephrology rotations in medical school and residency are associated with higher levels of awareness and knowledge in residents, thereby emphasizing that exposure to nephrology-specific education is critical for resident learning. Not only does it introduce the trainee to many aspects of kidney care but it also likely reinforces concepts related to commonly prescribed drug-dosing regimens for patients with CKD.

Of additional note is that Rubenstein and colleagues found that most residents were interested in receiving additional nephrology training ($n = 79$, or 22.4% of the entire sample) after having had an initial nephrology rotation, either during residency ($n = 96$, 27%) or during medical school ($n = 100$, 28%).² This suggests that an important positive association exists between nephrology-specific education and increased resident interest in nephrology. Reinforcing resident interest in nephrology is particularly important now, at a time when interest in nephrology subspecialty training is at an all-time low.³ Increasing resident exposure to nephrology by mandating nephrology rotations in training⁴ would not only improve resident knowledge about nephrology but it also could inspire a future generation of providers to consider nephrology as a career path. Either way, it appears that nephrology-specific education is a critical component of resident training. Without it, residents are at increased risk of having lesser knowledge and skills in one of the most critical components of care that a physician provides—prescribing medications appropriately, judiciously, and safely.

This study has limitations, several of which the authors point out, including limited generalizability, a focus on just a few classes of medications, and the fact that no online resources were made available to residents during the survey, which as stated above, also may indicate a heavy reliance on these resources at the expense of physician knowledge gains.

An important additional consideration is whether we can or should expect providers to completely memorize renal drug dosing. As far back at the 1950s, scientists asked whether there is an upper limit or threshold of data that humans can learn and apply.⁵ With repetition and focus we can begin to meet the needs of exponentially increasing medical data being available to us. It may be daunting and perhaps in some cases unrealistic to think physicians could or should practice without using other resources to aid them, including resources that

assist with drug dosing, such as online tools, and team-based care that includes other provider-colleagues (eg, pharmacists).⁵

The strengths of this study lie not only in primary outcomes observed but also in what is not at first glance readily apparent. A greater emphasis on incorporating or mandating nephrology rotations into the residency curriculum could help address knowledge gaps in residents and inspire a new generation to consider nephrology as a subspecialty in the future. Most important, this study brings to light that the most important resource for patients may not be the medications they are prescribed, but rather their well-trained physician who is prepared, competent, and fully ready to be engaged to provide the best possible care.

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