Authors have nothing to disclose with regard to commercial support.

EFFECTS OF BLOOD TRANSFUSIONS ON TRANSCATHETER AORTIC VALVE REPLACEMENT OUTCOMES

To the Editor:

Kolte and colleagues¹ report the results of a propensity score-matched study of hospitalizations for transcatheter aortic valve replacement in the National Inpatient Sample that matched hospitalizations with red blood cell (RBC) transfusions with hospitalizations without transfusions. They used *International Classification of Diseases, Ninth Revision* procedure codes to identify transfusions, and they cited 26.4% to 83% sensitivity and 97.5% to 100% specificity for these procedure codes.

Of the numbers provided for sensitivity, the high end (83%) derives from a single-center case-control study of 716 records.² Other studies of varying sizes report much lower values, as described by Kolte and colleagues.¹ A more recent study by Howard and colleagues,³ which validated billing records of 12,091 patients in 53 community hospitals, refined these numbers, describing 71.6% sensitivity and 92.6% specificity.³

In addition, Kolte and colleagues¹ identified a 17.3% transfusion rate in the transcatheter aortic valve replacement records from the National Inpatient Sample. Data from the Society of Thoracic Surgeons and American College of Cardiology Transcatheter Valve Therapy registry⁴ demonstrate an overall transfusion rate of 30.1% during the same period (2012-2015) studied by Kolte and colleagues.¹ Together, these figures suggest a systemic undercoding of transfusions in the National Inpatient Sample, which introduces a substantial degree of unreliability into the process of propensity score matching.

Kolte and colleagues¹ describe an undeniably important trend in the perioperative management of patients undergoing transcatheter aortic valve replacement: a decline in hospitalizations requiring RBC transfusion,

which is a worthy effort known to be associated with reduced complications and improved outcomes in cardiac surgery.⁵ Uncertainty regarding the validity of the *International Classification of Diseases, Ninth Revision* coding for RBC transfusion, however, highlights the potential weakness of administrative database use for clinical research into secondary procedures and diagnoses.

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REPLY: ANALYSIS OF ADMINISTRATIVE CLAIMS DATA PROVIDES VALID AND MEANINGFUL CONCLUSIONS DESPITE ITS IMPERFECTIONS

Reply to the Editor:

We thank Mullan and colleagues¹ for their interest in our article.² They question the validity of the *International Classification of Diseases, Ninth Edition, Clinical Modification (ICD-9-CM)* procedure codes for red blood cell (RBC) transfusion and reference the study by Howard and associates,³ which demonstrated a sensitivity of 71.6% (95% confidence interval, 60.4%-82.8%) and a specificity of 92.6% (95% confidence interval, 88.3%-97.0%) of *ICD-9-CM* codes for measuring transfusion. A key finding of that study, however, was that when 9 (out of 69) hospitals with claims-based transfusion rates of less than 10% were excluded, the sensitivity rates improved to 80.7% (95% confidence interval, 74.4%-87.1%).³ The modesty of the overall sensitivity of billing codes for transfusion is thus due to nonreporting or

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underreporting by a small proportion of hospitals, rather than to “systemic undercoding of transfusions” as concluded by Mullan and colleagues.¹ Although excluding hospitals with low transfusion rates may improve sensitivity, because there is substantial variability in transfusion rates across hospitals, doing so may result in loss of valid data.^{3,4}

Further, the lower transfusion rates (17.3%) in our study compared with those in the Society of Thoracic Surgeons and American College of Cardiology (STS/ACC) Transcatheter Valve Therapy (TVT) Registry (30.1%) during the same period may also be due to important differences in the study populations.^{2,5} We excluded records of patients with RBC transfusion before the day of transcatheter aortic valve replacement (TAVR) and those for whom TAVR was not performed on day 0 or 1 of admission (21.1% of all TAVR procedures).² The latter group likely includes hospitalized patients who underwent nonelective TAVR and were thus more likely to receive RBC transfusion.⁶ On the other hand, the STS/ACC TVT Registry does not include TAVR procedures performed as part of investigational device exemption trials, and previous studies have shown lower rates of transfusion in clinical trial populations.^{7,8}

Finally, the results of our current study using the National Inpatient Sample (NIS) database² are consistent with findings from a single-center study⁹ as well as the STS/ACC TVT Registry,¹⁰ both of which also demonstrated that RBC transfusion was associated with worse outcomes in patients undergoing TAVR. Thus, despite the modest sensitivity of ICD-9-CM codes for RBC transfusion, we believe that the results of our propensity-matched analysis with the NIS database are reliable and provide important insights into the association between RBC transfusion and outcomes in patients undergoing TAVR. Prospective studies are needed to confirm our findings and to determine the utility of and optimal threshold for RBC transfusion in patients undergoing TAVR, especially among those with overt bleeding.

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**REPLY: “SENSITIVITY”
AND “SPECIFICITY”
REDUCTION OF BLOOD
TRANSFUSION AFTER
TRANSCATHETER
AORTIC VALVE
REPLACEMENT: IS**

THAT ALL THAT MATTERS?

Reply to the Editor:

Administrative data are readily available, inexpensive, and potentially very useful sources of clinical information; however, the accuracy of these data might represent an issue. With regard to blood transfusion, the most optimistic studies reported the *International Classification of Diseases, Ninth Edition* procedure codes to have a sensitivity and specificity of 83% and 100%, respectively; others described a 71.6% sensitivity and 92.6% specificity.^{1,2}

Mullan and colleagues³ properly highlighted this potential weakness of administrative database regarding the validity of the *International Classification of Diseases, Ninth Edition* coding for RBC transfusion and suggested a systematic undercoding of transfusion in the National Inpatients Sample (NIS) databases. We do agree with