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Notice of Retraction and Replacement. Gander et al. Association Between Dialysis Facility Ownership and Access to Kidney Transplantation.

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To the Editor

We write to report a serious coding error that occurred with our Original Investigation titled "Association Between Dialysis Facility Ownership and Access to Kidney Transplantation," published in the September 10, 2019, issue of *JAMA*.[1]

This cohort study included 1 478 564 patients treated at 6511 US dialysis facilities. Adult patients with incident end-stage kidney disease from the US Renal Data System (2000–2016) were linked with facility ownership and characteristics to determine the association between dialysis facility ownership and placement on the deceased donor kidney transplantation waiting list, receipt of a living donor kidney transplant, or receipt of a deceased donor kidney transplant. Dialysis facility ownership was categorized as nonprofit small chains, nonprofit independent facilities, for-profit large chains (>1000 facilities), for-profit small chains (<1000 facilities), and for-profit independent facilities. We defined access to kidney transplantation as time from initiation of dialysis to placement on the deceased donor kidney transplantation waiting list, receipt of a living donor kidney transplant, or receipt of a deceased donor kidney transplant. We used cumulative incidence differences and multivariable regression models to assess the association between dialysis facility ownership and each outcome.

As we reported in the original article, 121 680 patients (8.2%) were placed on the deceased donor waiting list, 23 762 (1.6%) received a living donor kidney transplant, and 49 290 (3.3%) received a deceased donor kidney transplant during the study period. We also reported: "For-profit facilities had lower 5-year cumulative incidence differences for each outcome vs nonprofit facilities (deceased donor waiting list: −13.2% [95% CI, −13.4% to −13.0%]; receipt of a living donor kidney transplant: −2.3% [95% CI, −2.4% to −2.3%]; and receipt of a deceased donor kidney transplant: −4.3% [95% CI, −4.4% to −4.2%])."[1]

Following the publication, we were approached by a senior epidemiologist representing a for-profit large dialysis chain who was unable to reproduce our results. Through a series of exchanges and reviews of our publicly available analytic code, we identified a single line of code that had an error in a merge statement in SAS version 9.4 (SAS Institute Inc) in an early step of our study cohort creation when assigning the profit status of a dialysis facility to the time of the event. In the merge of the overall study cohort with a separate file that denoted wait listing, the column indicating the provider number of the dialysis facility from the wait list file overwrote the provider number of the dialysis facility in the study cohort file. Despite multiple analysts reviewing the code for the study, this particular code did not appear as an error. For analysts who code in other programming languages, such as R or Python, this particular merge procedure is handled differently and is not an error, but in SAS, there is no error or warning when the underlying data set has the same variable name

as the new data set in the merge. Unfortunately, this resulted in a misclassification of provider numbers of some of the dialysis facilities and assigned the provider number of the transplant center, rather than the dialysis facility, decreasing the number of observations that could be linked to the dialysis facility-level data.

Corrections to address the coding error affect all tables and figures in our article due to the increase in observations in the study population. These corrections result in a significant reduction in effect sizes. Among our corrected population of 1 585 947 patients in 6512 dialysis facilities, 230 202 (14.5%) were placed on the deceased donor waiting list, 39 767 (2.5%) received a living donor kidney transplant, and 88 431 (5.6%) received a deceased donor kidney transplant during the study period.

The 5-year cumulative incidence differences were attenuated and patients receiving dialysis at all for-profit facilities vs all nonprofit facilities had lower 5-year cumulative incidence of placement on the deceased donor kidney transplantation waiting list (cumulative incidence difference, −2.6% [95% CI, −2.8% to −2.4%]), receipt of a living donor kidney transplant (−0.9% [95% CI, −1.0% to −0.8%]), and receipt of a deceased donor kidney transplant (−1.4% [95% CI, −1.5% to −1.3%]). Patients treated at all for-profit facilities were less likely to be placed on the deceased donor kidney transplantation waiting list (hazard ratio [HR], 0.87 [95% CI, 0.86–0.88]), receive a living donor kidney transplant compared with patients treated at all nonprofit facilities (HR, 0.82 [95% CI, 0.80–0.84]), or receive a deceased donor kidney transplant (HR, 0.83 [95% CI, 0.81–0.84]) compared with patients in nonprofit dialysis facilities. However, our overall conclusions and interpretations of the study remain unchanged: that among US patients with end-stage kidney disease, receiving dialysis at for-profit facilities, compared with nonprofit facilities, is associated with a lower likelihood of accessing kidney transplantation.

We apologize to the journal and to the readers for this error. We appreciate the opportunity to correct the data in our study and have requested that our original investigation be retracted and replaced with these corrections. The replacement article includes an online supplement with a PDF copy of the corrected article with highlighted corrections and a PDF copy of the original article with the errors highlighted.

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