

Taurolidine and Heparin Lock Product Lowers CRBSI Risk

A newly approved taurolidine and heparin lock solution reduces the risk of catheter-related bloodstream infection (CRBSI) in patients undergoing hemodialysis with a central venous catheter (CVC), as demonstrated by a pivotal trial in *CJASN*.

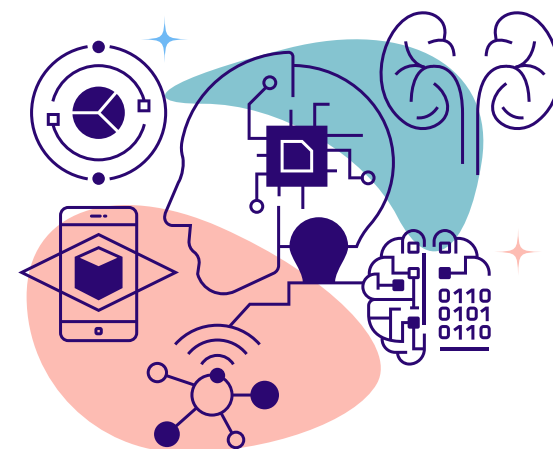
The phase 3 “LOCK-IT-100” (Study Assessing Safety & Effectiveness of a Catheter Lock Solution in Dialysis Patients to Prevent Bloodstream Infection) trial included 795 adults receiving maintenance hemodialysis with a permanent CVC enrolled at 70 US centers. Patients were randomly assigned to receive a taurolidine (13.5 mg/mL) and heparin (1000 U/mL) solution or heparin only. Study solutions were instilled at the end of each hemodialysis session. Baseline characteristics were similar between groups. The primary outcome was the occurrence of CRBSI, assessed by blinded clinical adjudication. Catheter removal and loss of patency were evaluated as secondary outcomes.

Of 41 CRBSI events, 32 occurred in the heparin-only group: 2% of patients assigned to taurolidine and heparin versus 8% with heparin only. Event rates were 0.3 for heparin only versus 0.46 for taurolidine and heparin per 1000 catheter days. The hazard ratio for CRBSI was 0.28 in the taurolidine and heparin group. Based on this “highly statistically significant” result and the absence of safety issues, the study was terminated after a planned interim analysis.

Secondary outcomes were similar between groups. Most patients in both groups experienced treatment-emergent adverse events, mainly mild to moderate. In both groups, 5% of patients died, most commonly due to cardiac causes.

The LOCK-IT-100 results led to US Food and Drug Administration (FDA) approval of the proprietary taurolidine and heparin catheter lock solution, marketed as DefenCath. It is the third drug to be approved under the Limited Population Pathway for Antibacterial and Antifungal Drugs and received both a fast-track and Qualified Infectious Disease Product designation, according to an FDA announcement.

By lowering the risk of CRBSIs, the new product is likely to reduce morbidity and mortality in the vulnerable group of in patients undergoing hemodialysis with CVCs. The investigators conclude: “Reducing CRBSIs in hemodialysis patients will likely increase the efficiency of care and reduce the number and duration of hospitalizations and overall costs” [Agarwal AK, et al. Taurolidine/heparin lock solution and catheter-related bloodstream infection in hemodialysis: A randomized, double-blind, active-control, phase 3 study. *Clin J Am Soc Nephrol* 2023; 18:1446–1455. doi: 10.2215/CJN.000000000000278]. ■



Can AI Predict Which Donor Kidneys Will Be Transplanted?

Machine-learning approaches show promise for use in identifying potential donor kidneys at high risk of organ nonuse or nonrecovery, according to a study in *JAMA Surgery*.

Using information from the United Network for Organ Sharing (UNOS), the researchers evaluated the use of artificial intelligence (AI) approaches to make predictions about the use versus nonuse of potential donor kidneys. The study evaluated machine learning (ML) models using structured data on donor characteristics, as well as natural language processing (NLP) models using unstructured, free-text donor narratives. The free-text data included comments from the UNOS admission course, medical and social history, as well as donor highlights.

The AI approaches were evaluated for their ability to classify donors regardless of recovery status versus those who had at least one kidney recovered for transplant. Performance was compared with that of a model using the Kidney Donor Profile Index (KDPI). A training and validation cohort consisted of 9555 donors offered to the study center between 2015 and 2020; a test cohort comprised 2481 donors from 2021.

Just 20% to 30% of potential donors had at least one kidney transplanted. The model using the KDPI had an area under the receiver operating characteristic curve of 0.69, with accuracy of 0.64. Performance was almost identical for two multivariable ML models based on structured donor data (logistic regression and random forest classifier models).

A classic “bag of words” NLP model showed the best performance with the random forest classifier: area under the curve, 0.70 and accuracy, 0.59. An advanced Bidirectional Encoder Representations from Transformers model met this level of performance only after the addition of basic donor information.

Models using free text were “slightly inferior” to models using structured data. Analysis of feature importance and Shapley additive explanation summaries provided information on conditions potentially affecting donor selection: Terms implying chronic disease tended to have negative effects, whereas terms implying trauma appeared positive.

The findings suggest that ML models can potentially predict donors with high-risk kidneys that are ultimately not used for kidney transplant. The researchers conclude: “The use of structured data is likely to expand the possibilities, but further exploration of new approaches...will be necessary to develop explainable models with high predictive metrics” [Sageshima J, et al. Prediction of high-risk donors for kidney discard and nonrecovery using structured donor characteristics and unstructured donor narratives. *JAMA Surg*, published online November 1, 2023. doi: 10.1001/jamasurg.2023.4679]. ■

Remote Monitoring Improves Hypertension Outcomes



Remote patient monitoring (RPM) can improve the outcomes of anti-hypertensive therapy in older adults, with some accompanying increases in costs, reports a study in *Annals of Internal Medicine*.

The researchers identified matched groups of traditional Medicare beneficiaries receiving treatment for hypertension at practices with high use of RPM (≥25% of patients) or low RPM use (<2.5% of patients). The analysis included 19,978 patients at 192 high-use RPM practices and 95,029 patients at 942 low-use RPM practices. Measures of anti-hypertensive medication use were compared, along with outpatient visits, use of tests and imaging, and hypertension-related spending.

Several measures of anti-hypertensive medication use were significantly improved in the high-use RPM group. Findings included relative increases of 3.3% in medication fills, 1.6% in days with medication supply, and 1.3% in unique medications prescribed. Hypertension-related acute care encounters decreased by 9.3% with high RPM

use, whereas testing and imaging use decreased by 5.9%. Most of the reduction in testing was related to clinical chemistry tests. Patients treated at high-use RPM practices had a relative 7.2% increase in primary care office visits, with a \$45 increase in spending, largely driven by increased use of telemedicine. The total increase in spending in the high-use RPM group was \$274 per patient, for a relative increase of 7.4%.

In subgroup analyses, patients with low initial medication adherence had greater improvements in hypertension-related acute care visits and hospitalizations. These effects included not only emergency department visits but also hospitalizations for stroke and cardiovascular disease.

The authors define RPM as “remote transmission of physiologic measurements from patients to clinicians.” Although the use of RPM for chronic disease management is growing rapidly, there are concerns that it may lead to increased spending without meaningful improvements in care.

The new study, designed to emulate a longitudinal cluster randomized trial, shows increased anti-hypertensive medication use for Medicare patients at high-use RPM practices. This and other improvements suggest “a more aggressive approach to hypertension control” at practices that use RPM. The findings also show “overall increased spending from direct RPM reimbursement and incremental PCP [primary care physician] visits,” the researchers write. They discuss possible approaches to increase the value of RPM for patients with hypertension [Tang M, et al. Effects of remote patient monitoring use on care outcomes among Medicare patients with hypertension: An observational study. *Ann Intern Med* 2023; 176:1465–1475. doi: 10.7326/M23-1182]. ■

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