integrate APL into a T-cell epitope prediction tool for HLA-derived peptides based on donor and recipient HLA genotypes. Finally, we will associate the risk of graft failure with counts of these peptides derived from APL-integrated prediction models using a historical kidney transplant cohort from 2000 to 2023. RESULTS/ANTICIPATED RESULTS: We expect that applying APL could reduce false-positive peptide binders influencing risk prediction scores. We anticipate improved peptide prediction accuracy compared to existing tools such as NetMHCIIPan, which assumes all possible peptides are equally likely to emerge from antigen processing. NetMHCIIPan is currently used by PIRCHE-II HLA mismatch risk algorithm. We expect that merging antigen processing (APL) and peptide-binding (NetMHCIIPan) models into a unified model would enhance risk stratification for graft failure. Current risk stratification still leads to poor outcomes post-transplant, especially for minority population groups. Our model can identify an alternative pool of well-matched donors and has the potential to improve equity for non-White minority candidates. DISCUSSION/SIGNIFICANCE OF IMPACT: Improving the understanding of how HLA matching contributes to kidney transplant outcomes can better stratify risks for kidney transplant recipients, enable personalized treatment, and ultimately improve outcomes for those undergoing kidney transplantation to treat renal diseases.

372

Defining and designing a remote monitoring tool for CAR T-cell therapy patients

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OBJECTIVES/GOALS: The research aims to prototype a mobile app for physicians to remotely monitor patients receiving CD19-directed CAR T-cell therapy post-discharge. This app will facilitate standardized data collection across carious CAR-T treatment centers and help harmonize follow-up protocols. METHODS/STUDY POPULATION: A literature review and semi-structured interviews with patients, clinical coordinators, and experts helped identify essential parameters for a mobile app prototype aimed at monitoring adverse effects such as cytokine release syndrome and neurotoxicity. The app was designed through process mapping to combine data from self-reports and wearable devices, such as the Garmin smartwatch. New screens were designed in Figma, drawing from an existing patient monitoring app for allogeneic stem cell transplant follow-up. Finally, a preliminary feasibility study will be conducted to gather feedback on the app prototype from CAR T-cell therapy patients, healthcare providers, and stakeholders, ensuring its effectiveness and usability. RESULTS/ANTICIPATED RESULTS: Semi-structured interviews with people with professional and lived experience with CAR T-cell therapy were conducted to determine what metrics might be monitored and how they could be measured remotely to effectively monitor for side effects. The mobile phone application was then prototyped using process mapping in Visio®, designed in Figma, and preliminary development was completed. The final prototype includes parameters that will be recorded or measured using a combination of self-reporting and devices to monitor body temperature, basic vitals, activity, sleep, and cognitive function, among others. The prototype of the remote monitoring app is the first step in implementing remote monitoring of CAR T patients, standardized data collection, and reduction in the overall cost of CAR T-cell therapy. DISCUSSION/SIGNIFICANCE OF IMPACT: This app will enable physicians to monitor patients for routine follow-ups and adverse effects, such as CRS and ICANS. Future research will validate the digitized ICANS assessment and used to establish best practices for standardizing CAR-T follow-up protocols across Canada.

373

Challenges in using real-world data to study opioid use disorder treatment in the hospital

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OBJECTIVES/GOALS: Our research group is focused on care of hospitalized persons with opioid use disorder (OUD) in the era of high-potency synthetic opioids (HPSO). In this work, we describe trends in patient-directed discharge (PDD) and inpatient treatment with medications for opioid use disorder (MOUD). We hypothesized that PDD is associated with MOUD dose and timing. METHODS/STUDY POPULATION: Patient data generated in the routine care of patients was automatically abstracted using a SQL query on Epic Clarity tables in the electronic health record (EHR). We included adult patients admitted to Johns Hopkins Hospital between July 1, 2019 and June 30, 2022, with an ICD-10-CM code for a list of opioid-related disorders (F11.X) consistent with OUD. Demographics, prior medication list, clinical care including hospital service, consultation services, COWS scores, length of time in emergency department, time of triage, time until receipt of methadone or buprenorphine, dosage and timing of MOUD, opioid medications other than methadone or buprenorphine, adjuvant medications; prior methadone or buprenorphine treatment and disposition. Query results were validated by manual abstraction of EHR. RESULTS/ANTICIPATED RESULTS: The SQL identification of the cohort of patients with OUD was found to be accurate. Time of triage, discrete orders completed during hospitalization were well represented in the query. The query was able to identify individual opioid medications but unable to summarize total dose in Morphine Milligram Equivalents. The query did not extract accurate information from patient-controlled analgesia pumps due to the continuous nature of the medication rather than discrete doses reflected in the medication administration record. Finally, the query characterized prior treatment with methadone or buprenorphine as a binary variable – dosage and timing of that prior treatment could not be accurately represented. Finally, stimulant use is not reliably collected in the EHR and was unavailable. DISCUSSION/SIGNIFICANCE OF IMPACT: Given the rise of HPSO, patients may not tolerate delay of MOUD. Improving the granularity of data collected will offer more insight into the inpatient treatment for OUD. Real-world data have promise but requires extensive technical expertise. Future work is needed to improve capture of derived variables such as total dosage of opioids in MME.

https://doi.org/10.1017/cts.2024.997 Published online by Cambridge University Press