CAR 2022
Putting the Patient at the Centre of Care
April 6-10, 2022 | VIRTUAL

CAR 2022 ASM Radiologist-in-Training Project – 1st Place Winner

Abstract # PROWMZZDMPF

Predicting Transplant Kidney Function Decline from Ultrasound Using an Interpretable Artificial Intelligence Model

Ricky Hu[1], Zoe Hu[1], Rohit Singla[2,3], Cailin Ringstrom[4], Grace Hu[2], Victoria Lessoway[4], Janice Reid[4], Robert N. Rohling[4], Christopher Nguan [5], Timothy Murray [6]
[1]School of Medicine, Queen's University, [2]School of Biomedical Engineering, [3]Faculty of Medicine, [4]Department of Electrical and Computer Engineering, [5]Department of Urological Sciences, [6]Department of Radiology, University of British Columbia

PRESENTER'S LEVEL OF TRAINING: Medical Student

OBJECTIVE: To develop and validate an interpretable artificial intelligence (AI) algorithm to predict 5-year 30% decline in estimated glomerular filtration rate (eGFR) for post-transplant patients using only ultrasound images.

METHODS: Post-transplant ultrasound scans and 5-year eGFR values from N=819 renal transplant patients were obtained from Vancouver General Hospital. A multi-stage AI algorithm was developed where a convolutional neural network first extracted kidney regions. Four ultrasound-based feature sets were then computed: morphology, intensity statistics, texture, and speckle parameters. Feature selection was performed by mutual information ranking and a random forest classifier used selected features to predict 5-year eGFR decline. Predictions were compared to actual outcomes with 5-fold cross-validation (80/20 train/test). For comparison, separate predictions were computed with non-imaging clinical variables, with removing feature selection, and with a neural network. For interpretability, predictive features were identified by perturbation error rates.

RESULTS / DISCUSSION: A mean prediction accuracy of 0.85 ± 0.08 was achieved with our algorithm. Accuracy decreased with clinical variables (0.58 ± 0.07) and without feature selection (0.71 ± 0.16) but was similar with a neural network (0.84 ± 0.11). Most predictive features (highest perturbation error) were cortex elongation (0.43 ± 0.03), textural cluster-shade (0.22 ± 0.03), and speckle shape (0.03 ± 0.01).

CONCLUSION: An eGFR decline prediction algorithm was developed, the first using only ultrasound input and with interpretable AI architecture. The predictivity of imaging details provides support for enhancing the role of ultrasound in kidney function assessment.

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CAR 2022 ASM Radiologist-in-Training Research Project – 3rd Place Winner

Abstract # PROF48S4LP0

Does Perception of Discrimination and Bullying Vary According to Gender, Ethnicity and the Level of Training?

Kiana Lebel[1], Elizabeth Hillier[2], Carol Hodgson[2], Tracey Hillier[2], Lucy B. Spalluto[3], Wan Wan Yap[4], Isabelle Trop[1], Kathryn E. Darras[4], Charlotte J. Yong-Hing[4]
[1]Université de Montréal, [2]University of Alberta, [3]Vanderbilt University, [4]University of British Columbia

PRESENTER'S LEVEL OF TRAINING: Resident

OBJECTIVE: To assess perception of discrimination and bullying in Canadian radiology according to gender and ethnicity.

METHODS: Redcap surveys in French and English were approved by UBC Ethics. The target population was Canadian radiologists and trainees (fellows and radiology residents). The survey was open for 2 months and distributed via the CAR, academic directors, and program directors. Demographic data was gender (women, men, non-binary) and ethnicity (visible minority (VM) or not). We asked participants if they had experienced discrimination and/or bullying in the past 12 months at work. We analyzed data with frequencies and the chi-square test.

RESULTS / DISCUSSION: 601 participants completed the survey (77.5% radiologists, 16.1% residents, 5.3% fellows, and 1.1% abstained) from all provinces. Gender distribution was 50.3% women, 45.3% men, 4% abstained and 0.5% non-binary. 30.6% self-declared as VM. 16% (n=97) reported experiencing discrimination; 21% of women vs. 11% of men ($p < 0.001$) and 26% VM vs. 11% non-VM ($p < 0.001$). 19% (n=114) reported experiencing bullying; 25% of women vs. 14% of men ($p < 0.001$) and 23% of VM vs. 17% of non-VM ($p=0.07$).

CONCLUSION: Our pan-Canadian survey shows women are 1.9x and VM are 2.4x more likely to report discrimination and women are 1.8x more likely to report bullying. Hence, national initiatives such as the CAR's Equity, diversity and inclusion (EDI) working group and local workshops, presentations, and discussions on EDI issues such as training on unconscious bias are crucial.