#AHA22

# "TEMPUS Geisinger **Deep Learning Prediction of New-Onset Atrial Fibrillation Using Echocardiography** Videos

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#### **Disclosure Page**

Geisinger receives funding from Tempus for ongoing development of predictive modeling technology and commercialization.

None of the Geisinger authors have ownership interest in any of the intellectual property resulting from the partnership.

John Pfeifer, Brandon Fornwalt and Sushravya Raghunath are Tempus employees.





## Introduction

- •Patients at high risk of undiagnosed Atrial Fibrillation (AF) can be identified by ECG for increased monitoring.
- •Early identification of AF may lead to better clinical outcomes including stroke risk reduction
- •A similar task may be feasible with Echocardiography.





### **Hypothesis**

By leveraging a large echocardiography database, a model can be trained to accurately predict future AF in patients undergoing routine echocardiography.







#### Dataset Geisinger

- 769,854 Echo studies (6 views) from 337,388 patients
- 80% Train & 20% Test split by patient
- Testing on at risk population:
  1 random Echo per patient
  - Positive: No prior AF and AF positive >7 days after echo (prevalence 5%)
  - Negative: No prior AF and at least 1-year AF free





#### **Multiview Deep Learning Model**

- View classification model labels apical 2,4,5 chamber, parasternal long axis (PLA), parasternal short axis (PSA) views with high accuracy
- Trained one AF model per Echo view
- Concatenated the risk scores from each view to train an XGboost model with all views



#### Results

- Apical Four Chamber is most predictive of Future AF - AUROC 75%
- Combining all views gives minor improvement - AUROC 78%





#### Conclusions

- 1. Deep learning models trained on echocardiography videos can predict new-onset AF with moderate performance
- 2. Echocardiography views that captured the left atrium had better performance compared to those that did not

## **Limitations and Next Steps**

- 1. Retrospective data, single institution
- 2. Prospective validation
- 3. Add additional echo data including doppler views

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