Derivation and Internal Validation of a Disease-specific Cardiovascular Risk Prediction Model for Patients with Psoriasis and Psoriatic Arthritis

Keith Colaço, Ker-Ai Lee, Vinod Chandran, Paula Harvey, Richard J. Cook, Dafna D. Gladman, Vincent Piguet, Lii Eder

Background
- Cardiovascular disease (CVD) risk in patients with psoriatic disease (PsD) may be underestimated by conventional scoring systems.

Objective
- To develop and internally validate a 5-year disease-specific cardiovascular risk prediction model for patients with psoriatic disease.

Methods (1)
- Design: Longitudinal, prospective cohort study.
- Population: Patients with psoriatic disease in Ontario, Canada, enrolled in IPART.
- Exclusions: Patients with a history of a CVD event prior to clinic entry.
- Outcome: Incident fatal and non-fatal CVD events.
- Analysis: Using time-varying covariates, we fit models to predict CVD events within a 5-year period.
- Model evaluation:
  - A base prediction model included traditional CVD risk factors.
  - An expanded model, controlled for the specific class of medication used, included the base model and PsD-related factors.

Methods (2)
- The following traditional CVD risk factors and psoriatic disease-related variables were assessed at each study visit:
  - Demographic & Ps-related Risk Factors:
    1. Age
    2. Sex
    3. Smoking status
    4. Diabetes
    5. Systolic blood pressure
    6. Body Mass Index
    7. Total cholesterol
    8. Triglycerides
    9. Use of anti-hypertensive medications
    10. Use of lipid-lowering medications
  - Traditional CVD Risk Factors:
    1. Race
    2. Number of clinically damaged joints
    3. Number of dactylitic digits
    4. Number of tender enthesal sites
    5. Number of tender swollen joints
    6. Psoriasis severity, by Psoriasis Area and Severity Index (PASI)
    7. Physical function, by HAQ (Health Assessment Questionnaire)
    8. ESR (Erythrocyte Sedimentation Rate)

Results
- 1,336 patients: 92% with PsA, 47% female, Mean follow-up: 6.8 years
- 85 incident CVD events

Model Discrimination:
- Discriminative ability of the base model (with traditional CVD risk factors alone) was excellent, with an area under the curve (AUC) of 85.5.
- The expanded model, controlled for the strongest medication (use of daily NSAIDs, csDMARDs or biologics) used at each visit, did not select any of the disease-related risk factors and did not improve risk discrimination compared to the base model.

Figure 1. Area under the receiver operating characteristic curve (AUC) for the different 5-year risk prediction models.

Figure 2A. Base model (traditional CVD risk factors)
Figure 2B. Expanded model

Sensitivity and specificity of the cut-off values (5% and 10%) for CVD risk across both models were similar. When considering the total number of events:
- (1) Up to 53% of events occurred in patients classified as low to intermediate risk (<10%). (2) Up to 25% of events occurred in patients classified as low risk (<5%).

Conclusion
- A 5-year prediction model that includes traditional cardiovascular risk factors alone is accurate in predicting cardiovascular risk in patients with psoriatic disease, showing excellent discrimination and calibration.

Acknowledgements
- This study was supported by Canadian Institutes of Health Research, Women's College Hospital, National Psoriasis Foundation, Arthritis Society, and the Krembil Foundation.