

Dr. James Howard MA (Cantab) MB BChir PhD MRCP

james@jph.am james.howard1@imperial.ac.uk jamesphoward.com

Nationality: British; DOB: 24.03.86

GMC No. 7080262

About me

I am a British Heart Foundation Intermediate Fellow at Imperial College London and Honorary Consultant Cardiologist at Hammersmith Hospital.

My research focuses on using novel computational approaches to solve important problems in heart disease. I am a computer scientist, and I was awarded my PhD, “Deep Learning Using Convolutional Neural Networks in Clinical Cardiology” in 2020. My academic and clinical training was supported by a prestigious Wellcome Trust PhD Fellowship and NIHR Clinical Lectureship.

I have published extensively in cardiovascular medicine and artificial intelligence (*b*-index 30), across diverse fields including MRI, echocardiography, electrophysiology and coronary physiology. I was awarded a \$40,000 prize by Facebook, Microsoft and Amazon for my work in AI for Deepfake identification, beating over 2000 teams, including Facebook’s own engineering team. I have won several Kaggle gold medals for AI solutions.

I am an expert in the Python programming language and the PyTorch machine learning framework. I have an excellent understanding of statistics, meta-analysis and R programming. I have authored several pieces of data analysis software.

I also have a keen interest in clinical trials and was joint first author and presenter of the SAMSON trial, published in *The New England Journal of Medicine* and *The Journal of the American College of Cardiology*. I run the website cardiologytrials.org.

Training & Employment

2022 –	BHF Intermediate Fellow – Imperial College London Honorary Consultant Cardiologist – Imperial College Healthcare NHS Trust
2020 – 2022	NIHR Clinical Lectureship – Imperial College London Specialist Registrar in Advanced Cardiac Imaging– Imperial College Healthcare NHS Trust
2017 – 2020	Wellcome Trust PhD Training Fellowship – Imperial College London – awarded January 2021 “Deep Learning Using Convolutional Neural Networks in Clinical Cardiology”
2015 – 2019	PG Diploma – Clinical Trials – London School of Hygiene & Tropical Medicine
2014 – 2017	NIHR Academic Clinical Fellowship in Cardiology – Imperial College, London
2012 – 2013	PG Cert - Medical Education (Distance Learning) – Cardiff University <ul style="list-style-type: none">• Awarded merit
2012 – 2014	Core Medical Training – London Deanery, North West Thames
2010 – 2012	The Foundation Programme – North East Thames Foundation School
2004 – 2010	Trinity College, The University of Cambridge <ul style="list-style-type: none">• Bachelor of Medicine, Bachelor of Surgery - Clinical Medicine• Bachelor & Master of Arts - Physiology, Development and Neuroscience (Class 2<i>i</i>)• Champion prize

Selected Recent First & Senior Author Publications

- First Howard JP & Wood FA, Finegold J, Nowbar A, Thompson D, Arnold A, Rajkumar C, Connolly S, Cegla J, Stride C, Sever P, Norton C, Thom S, Shun-Shin M, Francis DP.
N-of-1 Trial of a Statin, Placebo, or No Treatment to Assess Side Effects.
The New England journal of medicine 2020;383(22):2182-4 (research letter)
- First Howard JP & Wood FA, Finegold J, Nowbar A, Thompson D, Arnold A, Rajkumar C, Connolly S, Cegla J, Stride C, Sever P, Norton C, Thom S, Shun-Shin M, Francis DP.
Side Effect Patterns in a Crossover Trial of Statin, Placebo, and No Treatment.
Journal of the American College of Cardiology 2021;78(12):1210-22.
- First Howard JP, Stowell CC, Cole GD, Ananthan K, Demetrescu CD, Pearce K, Rajani R, Sehmi J, Vimalasvaran K, Kanaganayagam GS, McPhail E, Ghosh AK, Chambers JB, Singh AP, Zolgharni M, Rana B, Francis DP, Shun-Shin MJ.
Automated Left Ventricular Dimension Assessment Using Artificial Intelligence Developed and Validated by a UK-Wide Collaborative.
Circulation. Cardiovascular imaging 2021;14(5):e011951.
- First Howard JP, Fisher L, Shun-Shin MJ, Keene D, Arnold AD, Ahmad Y, Cook CM, Moon JC, Manisty CH, Whinnett ZI, Cole GD, Rueckert D, Francis DP.
Cardiac Rhythm Device Identification Using Neural Networks.
JACC. Clinical electrophysiology 2019;5(5):576-86.
- First Howard JP, Cook CM, van de Hoef TP, Meuwissen M, de Waard GA, van Lavieren MA, Echavarría-Pinto M, Danad I, Piek JJ, Göteborg M, Al-Lamee RK, Sen S, Nijjer SS, Seligman H, van Royen N, Knaapen P, Escaned J, Francis DP, Petraco R, Davies JE.
Artificial Intelligence for Aortic Pressure Waveform Analysis During Coronary Angiography: Machine Learning for Patient Safety.
JACC. Cardiovascular interventions 2019;12(20):2093-101.
- First Howard JP, Zaman S, Ragavan A, Hall K, Leonard G, Sutanto S, Ramadoss V, Razvi Y, Linton NF, Bharath A, Shun-Shin M, Rueckert D, Francis D, Cole G.
Automated analysis and detection of abnormalities in transaxial anatomical cardiovascular magnetic resonance images: a proof-of-concept study with potential to optimize image acquisition.
The international journal of cardiovascular imaging 2021;37(3):1033-42.
- Senior Patel R, Thong EHE, Batta V, Bharath AA, Francis D, Howard JP.
Automated Identification of Orthopedic Implants on Radiographs Using Deep Learning.
Radiology. Artificial intelligence 2021;3(4):e200183.
- Senior Ahmad Y, Madhavan MV, Stone GW, Francis D, Makkar R, Bhatt DL, Howard JP.
Sodium-glucose cotransporter 2 inhibitors in patients with heart failure: a systematic review and meta-analysis of randomized trials.
European heart journal. Quality of care & clinical outcomes, 2021
- Senior Ahmad Y, Francis DP, Bhatt DL, Howard JP.
Renal Denervation for Hypertension: A Systematic Review and Meta-Analysis of Randomized, Blinded, Placebo-Controlled Trials.
JACC. Cardiovascular interventions <https://doi.org/10.1016/j.jcin.2021.09.020>

Grants

Lead applicant £894,223.59 2022	Individualised and efficient cardiac magnetic resonance scanning with artificial Intelligence. British Heart Intermediate Clinical Research Fellowship (FS/ICRF/22/26039)
Co-applicant £1,499,538.07 2022	UNITY: UK Collaborative for integrating AI into echocardiography British Heart Foundation Programme Grant (RG/F/22/110059)
Co-applicant £42,956 2022	Expanding clinical and research applicability of coronary flow measurements with novel signal processing tools and Artificial Intelligence NIHR Imperial Biomedical Research Centre (BRC): project award
Lead applicant £28,540 2021	Diastolic function assessment with cardiac magnetic resonance imaging and echocardiography: a scan-rescan study Academy of Medical Sciences Starter Grants for Clinical Lecturers (SGL025\1051)
Co-applicant £197,023 2020	Deep Learning to maximise the value of hand-held cardiac ultrasound in acutely unwell patients: leveraging Imperial's large-scale outcome-linked, echocardiography dataset. NIHR Imperial Biomedical Research Centre (BRC) - Institute for Translational Medicine and Therapeutics (ITMAT)
Lead applicant £200,000 2017	Wellcome Trust PhD Training Fellowship for Clinicians Wellcome Trust / Imperial 4i programme, "Deep Learning Using Convolutional Neural Networks in Clinical Cardiology"
Collaborator £289,669 2015	Statin side effect or not? A patient-empowering within-subject randomized controlled trial and development of a practical technology to support 21st century primary prevention decisions. British Heart Foundation PG/15/7/31235

Prizes & Awards

International	Kaggle SETI Breakthrough Listen Challenge – Gold Medal - 2021 I was awarded 6 th place in a large international competition of 768 teams running over 3 months, using AI to process radio wave spectrograms to identify anomalous signals.
International	Kaggle Deepfake Detection Challenge – \$40,000 prize - 2020 In this huge international AI competition, my solution to detect "deep faked" videos outperformed those of over 2200 other teams, including Facebook's own engineering team (the tournament organisers). I was invited to present my work at CVPR.
International	Society of Cardiovascular Magnetic Resonance Travel Scholarship - 2019 I was awarded this scholarship to travel to Florida, USA to present my work on the automated interpretation of transaxial MRI images using artificial intelligence.
Regional	Best presentation – Imperial College Clinical Academic Conference - 2019
Local	Best Project Supervisor, Computational Medicine BSc, Imperial College - 2018
Local	Local Teaching Hero – Nominated by final year medical students – 2017

National	UK research paper of the year – BMJ awards - 2015 Our team were awarded this prestigious award for our study in the <i>BMJ</i> on discrepancies in clinical trials.
National	British Hypertension Society Young Investigator Award Finalist - 2013
National	Top Abstract - British Cardiovascular Society Annual Conference - 2012
Local	University of Cambridge Medical School – Champion Prize – 2010
National	British Association of Dermatologists’ Undergraduate Essay Prize - 2010

All MEDLINE/Pubmed Peer Reviewed Publications & Book Chapters

Paper 2022	<u>Howard</u> , Rajasundaram “Role of Blinding in N-of-1 Trials” <i>Circ Cardiovasc Qual Outcomes</i>. 2022 Jun;15(6):e008914.
Paper 2022	Tayal, Verdonshot, Hazebroek, <u>Howard</u> , Gregson, ... Prasad “Precision Phenotyping of Dilated Cardiomyopathy Using Multidimensional Data” <i>J Am Coll Cardiol</i>. 2022 Jun. 79 (22) 2219–2232
Paper 2022	Nowbar, <u>Howard</u> , Shun-Shin, Rajkumar, Foley, Basu, Goel, Patel, Adnan, ... Al-Lamee “Daily angina documentation versus subsequent recall: development of a symptom smartphone app” <i>European Heart Journal - Digital Health</i>, 3:2:276–283
Paper 2022	Ribeiro, Arnold, <u>Howard</u> , Shun-Shin, Zhang, Francis, Lim, Whinnett, Zolgharni “ECG-based real-time arrhythmia monitoring using quantized deep neural networks: A feasibility study” <i>Comput Biol Med</i>. 2022 Jan 22;143:105249
Paper 2022	Ahmad, <u>Howard</u> , ... Leon “Early Surgery for Patients With Asymptomatic Severe Aortic Stenosis: A Meta-Analysis of Randomized Controlled Trials” <i>Journal of the Society for Cardiovascular Angiography & Interventions</i>; 1:4 100383
Paper 2022	M Foley, Hall, <u>Howard</u> , Ahmad ... Sen “Aortic Valve Calcium Score Is Associated With Acute Stroke in Transcatheter Aortic Valve Replacement Patients” <i>Journal of Society of Cardiovascular Angiography and Interventions</i> 2022; 1:4:100349
Paper 2021	Kellman, Xue, Chow, <u>Howard</u> , Chacko, Cole, Fontana. “Bright-blood and dark-blood phase sensitive inversion recovery late gadolinium enhancement and T1 and T2 maps in a single free-breathing scan: an all-in-one approach.” <i>Journal of cardiovascular magnetic resonance</i> 2021;23(1):126.

- Paper 2021 Kelshiker, Seligman, Howard, Rahman, Foley ... Ahmad, Sen, Al-Lamee, Petraco
“Coronary flow reserve and cardiovascular outcomes: a systematic review and meta-analysis”
[European Heart Journal, 2021; ehab775, https://doi.org/10.1093/eurheartj/ehab775](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Zaman, Petri, Vimalasvaran, Howard, Bharath, Francis, Peters, Cole, Linton
“Automatic Diagnosis Labeling of Cardiovascular MRI Using Semisupervised Natural Language Processing of Text Reports”
[Radiology Artificial Intelligence 2021; https://doi.org/10.1148/ryai.210085](https://doi.org/10.1148/ryai.210085)
- Paper 2021 Ahmad, Francis, Bhatt , Howard
“Renal denervation for the treatment of hypertension: a systematic review and meta-analysis of randomized, blinded, placebo-controlled trials”
[JACC: Cardiovascular Interventions. 2021 \(in press\)](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Ahmad Y, Madhavan, ... Howard
“Sodium-glucose cotransporter 2 inhibitors in patients with heart failure: a systematic review and meta-analysis of randomized trials.”
[Eur Hear J - Qual Care Clin Outcomes 2021](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Howard, Francis
“Machine learning with convolutional neural networks for clinical cardiologists”
[Heart. 2021 Jul 23;heartjnl-2020-318686.](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Seligman, Nijjer, ... Howard, ... Petraco
“Phasic Flow Patterns of Right versus Left Coronary Arteries in Patients Undergoing Clinical Physiological Assessment”
[EuroIntervention. 2021 Aug 3;EIJ-D-21-00189.](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Cook, Howard, Ahmad, ... Davies
“Comparing invasive hemodynamic responses in adenosine hyperemia versus physical exercise stress in chronic coronary syndromes”
[Int J Cardiol. 2021 Aug 4;S0167-5273\(21\)01209-2.](https://doi.org/10.1093/eurheartj/ehab775)
- Paper 2021 Arnold, Shun-Shin, Ali, Keene, Howard, ... Whinnett
“Left ventricular activation time and pattern are preserved with both selective and nonselective His bundle pacing”
[Heart Rhythm O2, Aug 11, doi.org/10.1016/j.broo.2021.08.001](https://doi.org/10.1016/j.broo.2021.08.001)
- Paper 2021 Lane, Azarmehr, Jevsikov, Howard, Shun-Shin, Cole, Francis, Zolgharni
“Multibeat echocardiographic phase detection using deep neural networks”
[Comput Biol Med. 2021 Jun;133:104373. doi: 10.1016/j.compbio.2021.104373.](https://doi.org/10.1016/j.compbio.2021.104373)
- Paper 2021 Madhavan, Howard, Naqvi, ... Bangalore, Stone, Ahmad
“Long-term follow-up after ultrathin vs. conventional 2nd-generation drug-eluting stents: a systematic review and meta-analysis of randomized controlled trials”
[Eur Heart J. 2021 May 18;ehab280. doi: 10.1093/eurheartj/ehab280.](https://doi.org/10.1093/eurheartj/ehab280)
- Paper 2021 Mann, Linton, Coyle, Howard, ... Kanagaratnam
“RETRO-MAPPING: A New Approach to Activation Mapping in Persistent

Atrial Fibrillation Reveals Evidence of Spatiotemporal Stability.”

[Circ Arrhythm Electrophysiol. 2021 May 17. doi: 10.1161/CIRCEP.121.009602.](#)

- Paper
2021 Rajkumar, Shun-Shin, ... [Howard](#), ... Al-Lamee
“Placebo-Controlled Efficacy of Percutaneous Coronary Intervention for Focal and Diffuse Patterns of Stable Coronary Artery Disease”
[Circ Cardiovasc Interv. 2021 Aug;14\(8\):e009891.](#)
- Paper
2021 Thompson, Al-Lamee, Foley, ... [Howard](#), ... Wensel
“Achieving optimal adherence to medical therapy by telehealth: Findings from the ORBITA medication adherence sub-study”
[Pharmacol Res Perspect. 2021 Feb;9\(1\):e00710. doi: 10.1002/prp2.710.](#)
- Paper
2021 [Howard](#), Stowell, Cole, ... Francis, Shun-Shin
Automated Left Ventricular Dimension Assessment Using Artificial Intelligence Developed and Validated by a UK-Wide Collaborative
[Circ Cardiovasc Imaging. 2021 May;14\(5\). doi: 10.1161/circimaging.120.011951.](#)
- Paper
2021 Patel, Thong, Batta, Bharath, Francis, [Howard](#)
“Automated Identification of Orthopedic Implants in Radiographs Using Deep Learning”
[Radiol Art Int. 2021 Mar 2021 doi: 10.1148/ryai.2021200183](#)
- Paper
2021 Foley, Rajkumar, Shun-Shun, ... [Howard](#) ... Al-Lamee
“Achieving Optimal Medical Therapy: Insights From the ORBITA Trial”
[J Am Heart Assoc. 2021 Feb 2;10\(3\):e017381. doi: 10.1161/JAHA.120.017381.](#)
- Paper
2021 Ahmad, [Howard](#)
“Meta-Analysis of Usefulness of Cerebral Embolic Protection During Transcatheter Aortic Valve Implantation”
[Am J Cardiol. 2021 Feb 5:S0002-9149\(21\)00094-1.](#)
- Paper
2021 Ahmad, Kane, Arnold, Cook, Keene, Shun-Shin, ... [Howard](#)
“Randomized blinded placebo-controlled trials of renal sympathetic denervation for hypertension: a meta-analysis”
[Cardiovasc Revasc Med. 2021 Jan 30;S1553-8389\(21\)00082-8.](#)
- Paper
2020 Arnold, Shun-Shin, Keene, [Howard](#), ... Whinnett
“Electrocardiographic predictors of successful resynchronization of left bundle branch block by His bundle pacing”
[J Cardiovasc Electrophysiol. 2020 Dec 20.](#)
- Paper
2020 Ahmad, [Howard](#), Madhavan, Leon, Makkar
“Single versus dual antiplatelet therapy after transcatheter aortic valve replacement: a meta-analysis of randomized clinical trials”
[Cardiovasc Revasc Med. 2021 Jan 22;S1553-8389\(21\)00045-2.](#)
- Research letter
2020 [Wood & Howard](#), Finegold, ... Francis
“N-of-1 Trial of a Statin, Placebo, or No Treatment to Assess Side Effects”
[N. Engl J. Med 2020; DOI: 10.1056/NEJMc2031173](#)

- Paper
2020 Howard, Zaman, Ragavan ... Cole
“Automated analysis and detection of abnormalities in transaxial anatomical cardiovascular magnetic resonance images: a proof of concept study with potential to optimize image acquisition”
[Int J Cardiovasc Imaging. 2020 Oct 29. doi: 10.1007/s10554-020-02050-w.](#)
- Paper
2020 Howard, Tan, Shun-Shin... Francis
“Improving ultrasound video classification: an evaluation of novel deep learning methods in echocardiography”
[J Med Artif Intell. 2020;3:4](#)
- Paper
2020 Howard & Arnold, Gopi, Cheng...Whinnet
“Discriminating electrocardiographic responses to His-bundle pacing using machine learning”
[Cardiovasc. Dig. Health J. 2020;1:1:11-12](#)
- Paper
2020 Ahmad, Howard, ... Karpaliotis
“Mortality after drug-eluting stents vs. coronary artery bypass grafting for left main coronary artery disease: a meta-analysis of randomized controlled trials”
[Eur Heart J. 2020 Mar 2. pii: ehaa135.](#)
- Paper
2020 Ziff, Samra, Howard, ... Kotecha
“Beta-blocker Efficacy Across Different Cardiovascular Indications: An Umbrella Review and Meta-Analytic Assessment”
[BMC Med. 2020 May 5;18\(1\):103.](#)
- Paper
2020 Ahmad, Howard, ... Karpaliotis
“Complete Revascularization by Percutaneous Coronary Intervention for Patients With ST-Segment-Elevation Myocardial Infarction and Multivessel Coronary Artery Disease: An Updated Meta-Analysis of Randomized Trials”
[J Am Heart Assoc. 2020 Jun 1:e015263.](#)
- Paper
2020 Cook, Howard, ... Davies
“How Do Fractional Flow Reserve, Whole-Cycle PdPa, and Instantaneous Wave-Free Ratio Correlate With Exercise Coronary Flow Velocity During Exercise-Induced Angina?”
[Circ Cardiovasc Interv. 2020 Apr;13\(4\):e008460](#)
- Paper
2020 Chacko, Howard, ... Ahmad
“Effects of Percutaneous Coronary Intervention on Death and Myocardial Infarction Stratified by Stable and Unstable Coronary Artery Disease: A Meta-Analysis of Randomized Controlled Trials”
[Circ Cardiovasc Qual Outcomes. 2020 Feb;13\(2\):e006363.](#)
- Paper
2020 De Marvao, Dawes, Howard, O’Regan
“Artificial intelligence and the cardiologist: what you need to know for 2020”
[Heart. 2020 Mar;106\(5\):399-400.](#)
- Paper
2020 Warisawa, Cook, Rajkumar, Howard, ... Davies
“Safety of Revascularization Deferral of Left Main Stenosis Based on Instantaneous Wave-Free Ratio Evaluation”

[JACC Cardiovasc Interv. 2020 May 8;S1936-8798\(20\)30647-6.](#)

- Paper
2020 Vendrik, Ahmad, Eftekhari, [Howard](#), ... Baan
“Long-Term Effects of Transcatheter Aortic Valve Implantation on Coronary Hemodynamics in Patients With Concomitant Coronary Artery Disease and Severe Aortic Stenosis”
[J Am Heart Assoc. 2020 Mar 3;9\(5\):e015133.](#)
- Paper
2020 Cook, Ahmad, [Howard](#), ... Davies
“Association Between Physiological Stenosis Severity and Angina-Limited Exercise Time in Patients With Stable Coronary Artery Disease”
[JAMA Cardiol. 2019 Jun 1;4\(6\):569-574.](#)
- Paper
2020 Azarmehr, Ye, ... Howard, Francis, Zolgharni
“An optimisation-based iterative approach for speckle tracking echocardiography”
[Med Biol Eng Comput. 2020 Jun;58\(6\):1309-1323.](#)
- Paper
2019 [Howard](#), Cook, ... Davies
“Artificial Intelligence for Aortic Pressure Waveform Analysis During Coronary Angiography: Machine Learning for Patient Safety”
[JACC Cardiovasc Interv. 2019 Sep 20. pii: S1936-8798\(19\)31421-9](#)
- Paper
2019 [Howard](#), Fisher, ... Francis
“Cardiac Rhythm Device Identification Using Neural Networks”
[JACC Clin Electrophysiol. 2019 May;5\(5\):576-586.](#)
- Paper
2019 Al-Lamee, Shun-Shin, [Howard](#), ... Francis
“Dobutamine Stress Echocardiography Ischemia as a Predictor of the Placebo-Controlled Efficacy of Percutaneous Coronary Intervention in Stable Coronary Artery Disease: The Stress Echocardiography-Stratified Analysis of ORBITA”
[Circulation. 2019 Nov 11](#)
- Paper
2019 Ahmad, Vendrik, Eftekhari, [Howard](#), ... Sen
“Determining the Predominant Lesion in Patients With Severe Aortic Stenosis and Coronary Stenoses: A Multicenter Study Using Intracoronary Pressure and Flow”
[Circ Cardiovasc Interv. 2019 Dec;12\(12\):e008263.](#)
- Paper
2019 [Howard](#)
“Renal denervation: the three stages of academic grief”
[Trends Cardiovasc Med. 2019 Oct 22. pii: S1050-1738\(19\)30141-0.](#)
- Paper
2019 Cook, Warisawa, [Howard](#), ... Davies
“Algorithmic versus expert human interpretation of instantaneous wave-free ratio coronary pressure-wire pull back data”
[JACC Cardiovasc Interv. 2019 Jul 22;12\(14\):1315-1324.](#)
- Paper
2019 Warisawa, Cook, [Howard](#), ... Davies
“Physiological Pattern of Disease Assessed by Pressure-Wire Pullback Has an Influence on Fractional Flow Reserve/Instantaneous Wave-Free Ratio

Discordance”

[*Circ Cardiovasc Interv.* 2019 May;12\(5\):e007494.](#)

- Paper
2019 Sau, [Howard](#), ... Francis
“Meta-Analysis of Randomized Controlled Trials of Atrial Fibrillation Ablation With Pulmonary Vein Isolation Versus Without”
[*JACC Clin Electrophysiol.* 2019 Aug;5\(8\):968-976](#)
- Paper
2019 Nowbar, Gitto, [Howard](#), Francis, Al-Lamee
“Mortality From Ischemic Heart Disease”
[*Circ Cardiovasc Qual Outcomes.* 2019 Jun;12\(6\)](#)
- Paper
2019 Cook, Ahmad, [Howard](#), ... Davies
“Association Between Physiological Stenosis Severity and Angina-Limited Exercise Time in Patients with Stable Coronary Artery Disease”
[*JAMA Cardiol.* 2019 May 1.](#)
- Paper
2019 Keene, Shun-Shin, ... [Howard](#), ... Whinnett
“Quantification of Electromechanical Coupling to Prevent Inappropriate Implantable Cardioverter-Defibrillator Shocks”
[*JACC Clin Electrophysiol.* 2019 Jun;5\(6\):705-715.](#)
- Paper
2019 Arnold, [Howard](#), ... Whinnett
“Right Ventricular Pacing for Hypertrophic Obstructive Cardiomyopathy: Meta-Analysis and Meta-Regression of Clinical Trials.”
[*Eur Heart J Qual Care Clin Outcomes.* 2019 Jan 31.](#)
- Paper
2019 Sau, Al-Aidarous, [Howard](#), ... Sikkell
“Optimum lesion set and predictors of outcome in persistent atrial fibrillation ablation: a meta-regression analysis”
[*Europace.* 2019 May 9. pii: eu3108.](#)
- Paper
2019 Seligman, Shun-Shin, ... [Howard](#), ... Petraco
“Fractional flow reserve derived from microcatheters versus standard pressure wires: a stenosis-level meta-analysis”
[*Open Heart.* 2019 Mar 25;6\(1\):e000971.](#)
- Paper
2019 Sen, Ahmad, Dehbi, [Howard](#), ... Davies
“Clinical Events After Deferral of LAD Revascularization Following Physiological Coronary Assessment”
[*J Am Coll Cardiol.* 2019 Feb 5;73\(4\):444-453.](#)
- Paper
2018 Hartley, ... [Howard](#), Francis
“Key opinion leaders’ guide to spinning a disappointing clinical trial result”
[*BMJ* 2018; 363](#)
- Paper
2018 Al-Lamee, [Howard](#), ... Francis
“Fractional Flow Reserve and Instantaneous Wave-Free Ratio as Predictors of the Placebo-Controlled Response to Percutaneous Coronary Intervention in Stable Single-Vessel Coronary Artery Disease.”
[*Circulation.* 2018 Oct 23;138\(17\):1780-1792.](#)

- Paper
2018 Arnold, Shun-Shin, ... Howard ..., Whinnett
“His resynchronization versus biventricular pacing in patients with heart failure and left bundle branch block”
[J Am Coll Cardiol. 2018 Dec 18;72\(24\):3112-3122.](#)
- Paper
2018 Warisawa, Cook, Howard, ... Davies
“Physiological Pattern of Disease Assessed by Pressure-Wire Pullback Has an Influence on Fractional Flow Reserve/Instantaneous Wave-Free Ratio Discordance.”
[Circ Cardiovasc Interv. 2019 May;12\(5\):e007494.](#)
- Paper
2018 Ferreira-Martins, Howard, Al-Khayatt, ... Sikkell
“Outcomes of Paroxysmal AF ablation Studies are Affected more by Study Design and Patient Mix than Ablation Technique.”
[J Cardiovasc Electrophysiol. 2018 Sep 19. doi: 10.1111/jce.13745.](#)
- Paper
2018 Ahmad, Gotberg, Cook, Howard, ... Sen
“Coronary Hemodynamics in Patients With Severe Aortic Stenosis and Coronary Artery Disease Undergoing Transcatheter Aortic Valve Replacement”
[JACC Cardiovasc Interv. 2018 Aug 20. pii: S1936-8798\(18\)31521-8](#)
- Paper
2018 Cook, Ahmad, Howard, ... Davies
“Impact of Percutaneous Revascularization on Exercise Hemodynamics in Patients With Stable Coronary Disease”
[J Am Coll Cardiol. 2018 Aug 28;72\(9\):970-983. doi: 10.1016/j.jacc.2018.06.033.](#)
- Paper
2018 Keene, ... Howard, ... Francis
“Rationale and design of the randomized multicentre His Optimized Pacing Evaluated for Heart Failure (HOPE - HF) trial”
[ESC Heart Fail. 2018 Jul 9. doi: 10.1002/ehf2.12315](#)
- Paper
2018 Howard, Murthy
“A Song of Pressure and Flow, or There and Back Again”
[JACC Cardiovasc Interv. 2018 Apr 23;11\(8\):754-756.](#)
- Paper
2018 Whinnett, Sohaib, ... Howard, ... Francis
“Multicenter Randomized Controlled Crossover Trial Comparing Hemodynamic Optimization Against Echocardiographic Optimization of AV and VV Delay of Cardiac Resynchronization Therapy: The BRAVO Trial”
[JACC Cardiovasc Imaging. 2018 May 11.](#)
- Paper
2018 Ahmad, Howard, ... Sen
“Patent foramen ovale closure vs. medical therapy for cryptogenic stroke: a meta-analysis of randomized controlled trials”
[Eur Heart J. 2018 Mar 24.](#)
- Paper
2018 Ahmad, Demir, Rajkumar, Howard, ... Sen
“Optimal antiplatelet strategy after transcatheter aortic valve implantation: a meta-analysis”

[Open Heart. 2018 Jan 26;5](#)

- Paper
2018 Petraco, Dehbi, Howard ... Francis
“Effects of disease severity distribution on the performance of quantitative diagnostic methods and proposal of a novel ‘V-plot’ methodology to display accuracy values”
[Open Heart. 2018 Jan 20;5\(1\)](#)
- Paper
2018 Al-Lamee, Thompson, Dehbi, Sen ... Howard ... Francis
“Percutaneous coronary intervention in stable angina (ORBITA): a double-blind, randomised controlled trial”
[Lancet. 2018 Jan 6;391\(10115\):31-40](#)
- Paper
2017 Sikkil, Francis, Howard, Gordon, Rowlands, Peters, Lyon, Harding, MacLeod
“Hierarchical statistical techniques are necessary to draw reliable conclusions from analysis of isolated cardiomyocyte studies”
[Cardiovascular Research, cvx151, https://doi.org/10.1093/cvr/cvx151](#)
- Paper
2017 Shun-Shin, Zheng, Cole, Howard, Whinnett, Francis
“Implantable cardioverter defibrillators for primary prevention of death in left ventricular dysfunction with and without ischaemic heart disease: a meta-analysis of 8567 patients in the 11 trials”
[Eur Heart J. 2017 Jun 7;38\(22\):1738-1746.](#)
- Paper
2016 Howard, Shun-Shin, Hartley, Bhatt, Krum, Francis
“Quantifying the three biases that lead to unintentional overestimation of the blood-pressure lowering effect of renal denervation: meta-analysis of 148 trials of 6114 patients and implications for design of future trials”
[Circ Cardiovasc Qual Outcomes. 2016 Jan;9\(1\):14-22](#)
- Paper
2016 Maznyczka, Howard, Banning, Gershlick
“A Propensity Matched Comparison of Return to Work and Quality of Life after Stenting or Coronary Artery Bypass Surgery”
[Open Heart. 2016 Jan 13;3\(1\):e000322.](#)
- Paper
2015 Patel, Hayward, Vassiliou, Patel, Howard, Di Mario
“Renal denervation for the management of resistant hypertension”
[Integr Blood Press Control. 2015; 8: 57–69.](#)
- Paper
2015 Howard, Patel, Shun-Shin, Mourad, Blacher, Mahfoud, Zeller, Weber, Francis
“Impact of number of prescribed medications on visit-to-visit variability of blood pressure: implications for design of future trials of renal denervation”
[J Hypertens. 2015 Nov;33\(11\):2359-67](#)
- Paper
2015 Jones, Howard, Rathod, Gallagher, Knight, Jain, Mathur, Mohiddin, Timmis, Mills, Archbold, Wragg
“The impact of socioeconomic status on all-cause mortality after percutaneous coronary intervention: an observational cohort study of 13,770 patients”
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- Book chapter Howard, Shun-Shin, Francis
“Great Myths of Blood Pressure Effect Size in Renal Denervation”
[Renal Denervation, 2015, 175-180](#)
- Paper
2014 Howard, Francis
“Overcoming the 3 biases obscuring the science of renal denervation in humans: big day bias, check-once-more bias and I'll-take-it-now bias.”
[Trends CV Med. 2014. doi:10.1016/j.tcm.2014.10.011](#)
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“Recent advances in antithrombotic treatment for acute coronary syndromes.”
[Expert Rev Clin Pharmacol. 2014 May 31:1-15.](#)
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“Glycoprotein IIb/IIIa inhibitors use and outcome after Percutaneous Coronary Intervention for Non-ST-elevation myocardial infarction”
[BioMed Research International 2014. doi: 10.1155/2014/643981](#)
- Paper
2014 Nowbar, Mielewczik, Karavassilis, Dehbi, Shun-Shin, Jones, Howard, Cole, Francis
“Discrepancies in autologous bone marrow stem cell trials and enhancement of ejection fraction (DAMASCENE): weighted regression and meta-analysis”
[BMJ. 2014 Apr 28;348:g2688. doi: 10.1136/bmj.g2688.](#)
- Paper
2014 Nowbar, Howard, Finegold, Asaria, Francis
“2014 Global geographic analysis of mortality from ischaemic heart disease by country, age and income: Statistics from World Health Organisation and United Nations”
[Int J Cardio 2014; doi: 10.1016/j.ijcard.2014.04.096](#)
- Paper
2014 Shun-shin, Howard, Francis
“Removing the hype from hypertension”
[BMJ. 2014 Mar 6;348:g1937. doi: 10.1136/bmj.g1937.](#)
- Paper
2014 Howard, Cole, Sievert, Bhatt, Papademetriou, Kandzari, Davies, Francis
“Unintentional overestimation of an expected antihypertensive effect in drug and device trials: Mechanisms and solutions”
[Int J Cardiol 2014; doi: 10.1016/j.ijcard.2013.12.183](#)
- Paper
2013 Howard, Nowbar, Francis
“Size of blood pressure reduction from renal denervation: insights from meta-analysis of antihypertensive drug trials of 4,121 patients with focus on trial design - the CONVERGE report”
[Heart. 2013 Nov;99\(21\):1579-87. doi: 10.1136/heartjnl-2013-304238](#)
- Paper
2012 Jones, Rathod, Howard, ... Wragg
“Safety and Feasibility of Hospital Discharge 2 days following Primary Percutaneous Intervention for ST Segment Elevation Myocardial Infarction”
[Heart 2012;98:1722-1727 doi:10.1136/heartjnl-2012-302414](#)

Professional memberships and qualifications

General Medical Council – Certificate of Completion of Training in Cardiology

European Association of Cardiovascular Imaging – Cardiovascular Magnetic Resonance – Level 3

Society of Cardiovascular Computed Tomography – Level 2

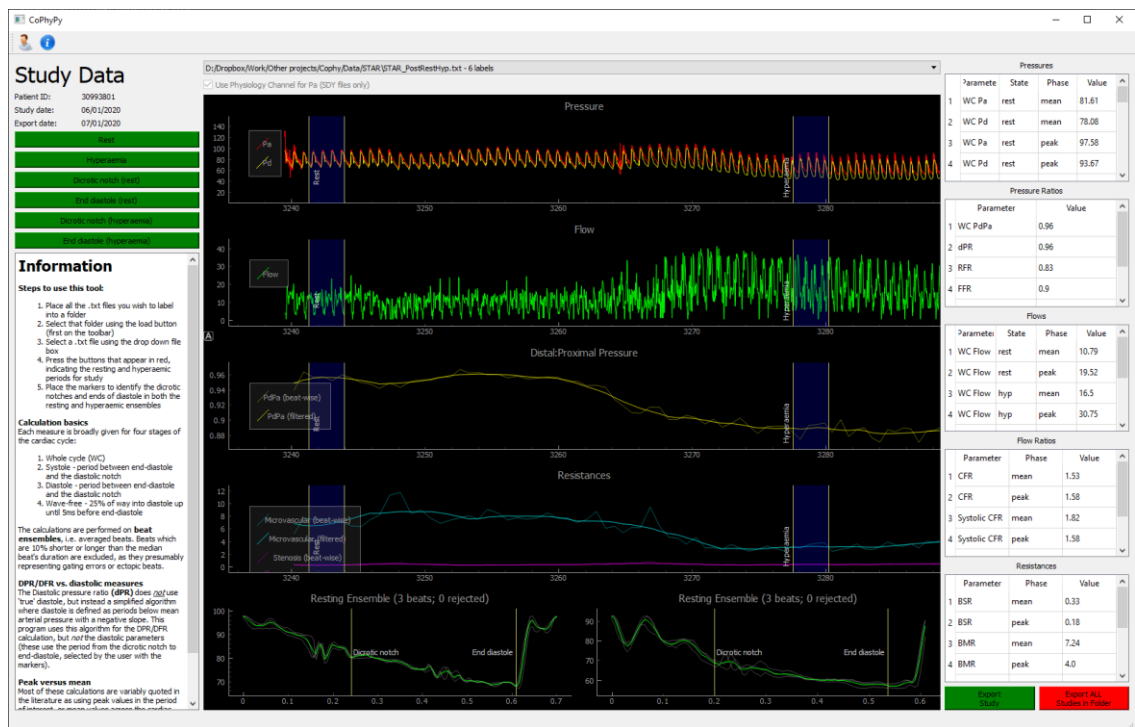
British Society of Echocardiography – Adult transthoracic echocardiography

Membership of the Royal College of Physicians of London

Other key projects

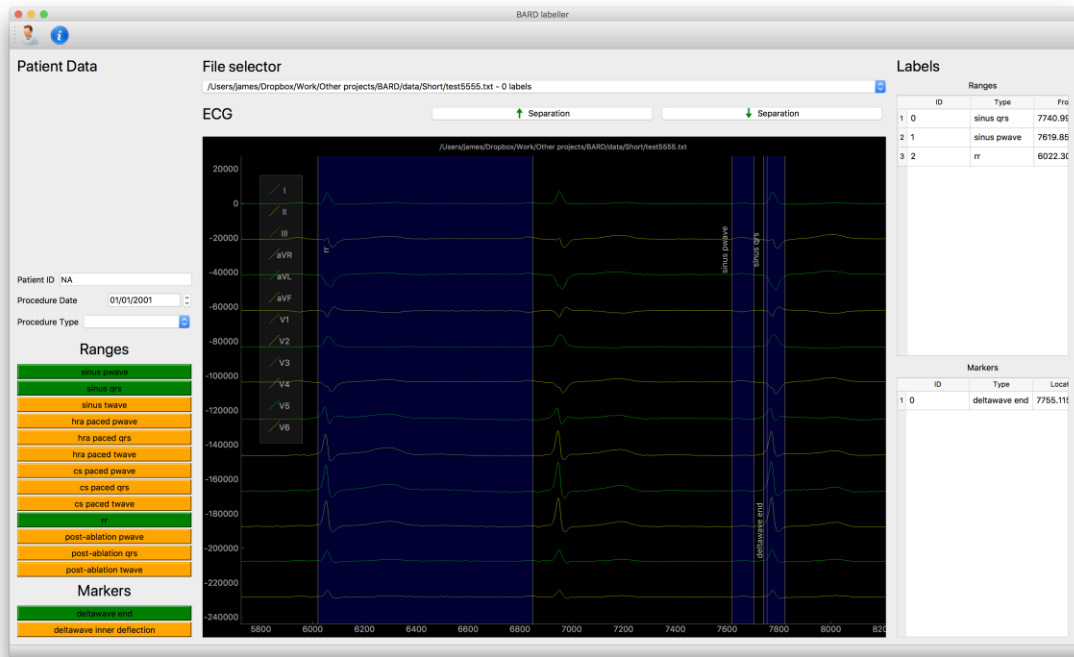
Desktop app **CophyPy – Coronary physiology in Python**

Current coronary physiology analysis packages typically require many steps, such as segmenting out SDY files and exporting them as TXT files before analysis can even begin. I developed a free to use coronary physiology package that can calculate the common coronary physiology parameters including FFR, iFR, DFR, RFR, CFR, BSR, BMR and HMR. Parameters are given for full cycle, diastole, systole and the wave-free period. The software can read directly from SDY files, without requiring pre-processing.



Desktop app **ECG waveform processing application to allow machine learning of signals**

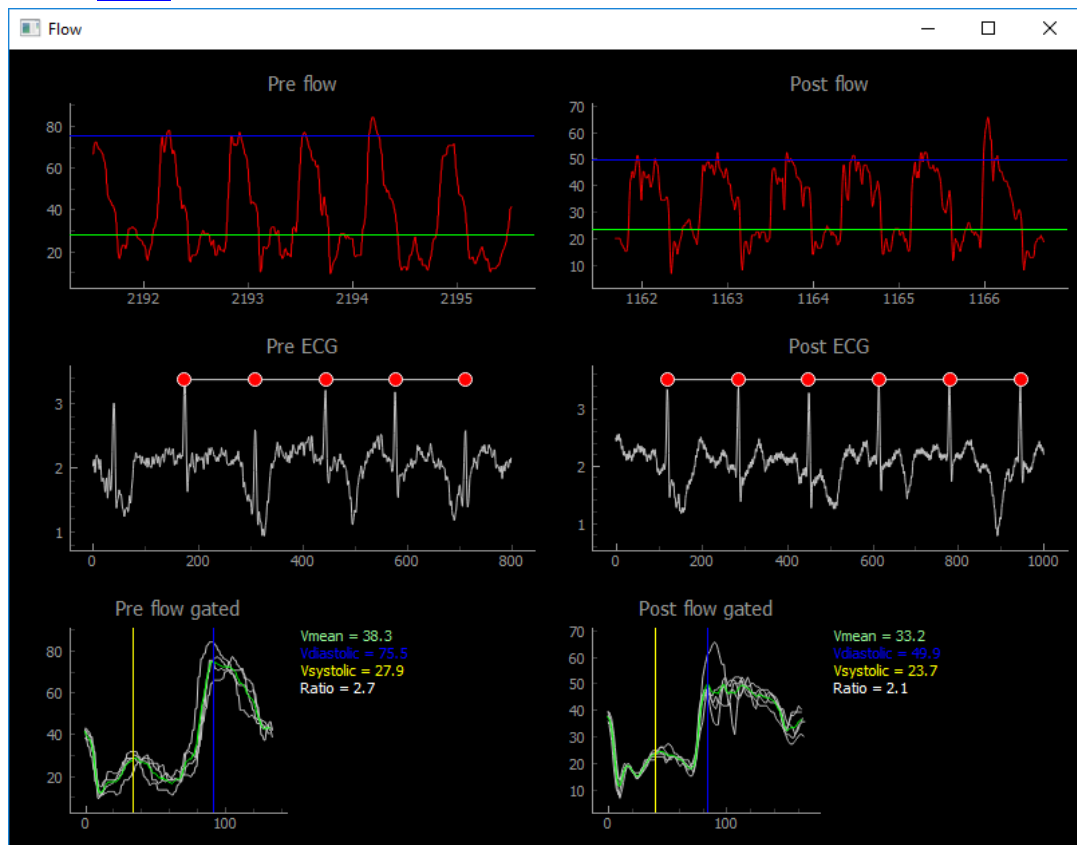
I created an open-source program to allow exporting of ECGs from the proprietary 'BARD' electrophysiology application. The program allows labelling of ECG waveforms and batch exporting, and is fully configurable via config files. This system has been used by multiple research groups within the University for machine learning projects, and is cited in several publications.



Desktop app

Coronary physiology analysis package

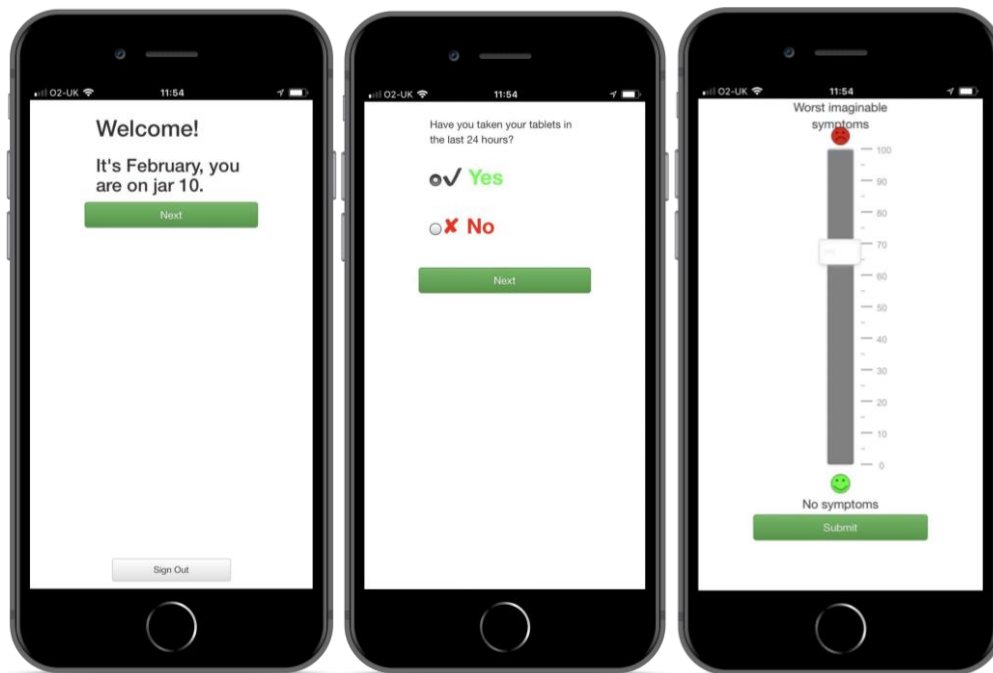
A recent publication by our group required complex coronary waveform analysis. I created an open source python program for this. The work has been published in [The Journal of the American College of Cardiology](#) and the code is available on [GitHub](#).



Mobile app

SAMSON Trial Quality of life

At Imperial College London we are running a one-year trial which allows people to determine what proportion of their symptoms are truly statin related. For this I have developed an HTML5/JavaScript application which allows trial participants to upload daily Quality of Life scores which can be reviewed in real-time by the study team. This ensures all recorded data are timely, cannot be retrospectively amended, and allows flairs of side effects to be picked up earlier. The app is also able to cache data when an internet connection is not available, to ensure data are not lost when participants are overseas without roaming, for example.



Online database

The Cardiology Trials Database – cardiologytrials.org

During my FY1 rotation in cardiology I became aware of the importance of a good understanding of the evidence base. For example, I learned how the treatment of heart failure had been revolutionised by showing prognostic benefits from drugs acting via the renin-angiotensin-aldosterone system and beta-blockers, whilst digoxin had shown symptomatic yet no prognostic benefits. I tried to further my understanding online, yet found no easily accessible source of consolidated information. Some covered only sub-specialties, others compiled data into PowerPoint files that were impractical to quickly reference and often required registration.

I set out to construct a free database with the key trials trainees needed to be aware of and formatted in a fashion where it can be easily viewed 'on the run', e.g. on a smartphone.

See cardiologytrials.org. The site currently receives over 6000 visits per month and has received a third of a million page views since its inception.



Chrome Extension

Imperial eJournals for Chrome

This small Chrome Extension allows easy access, via Imperial College Library, to journal articles, which would otherwise be behind a premium pay-wall. This small button to the right of the address bar will try to use the Imperial proxy to allow members of Imperial College to access premium content such as journals. It does this by simply altering the page URL. No user data is stored.

<https://chrome.google.com/webstore/detail/imperial-ejournals-for-ch/infolkakifickpdmjgcmhklgkbbpid>

Mobile app

FMCalc – The Free Medical Calculator

On acquiring a Windows Phone 7-based smartphone, I noticed there were no free medical calculators for the operating system, with only two highly priced options. I therefore worked to create a free alternative, FMCalc. The application is now on the official Windows Phone 7 marketplace and has been downloaded by over four thousand unique users in fifteen different countries. It includes over 40 medical criteria and calculators, including anion gap, CHADS2 score, Child-Pugh score, Duke criteria, Rockall score and more. Feedback has been very positive, and I've continued adding scores such as the CHIP prediction rule following requests from users.

Teaching & Supervision experience

I have regularly supervised students from Imperial College BSc programs, with an emphasis on machine learning and neural networks.

- 2021 – 2024 **PhD Co-supervisor (35% credit) – National Heart and Lung Institute student**
- 2021 – 2024 **PhD Assistant Supervisor –Department of bioengineering student**
- 2021 – 2022 **BSc Student Supervisor – Within-patient echo- and CMR-derived LV strain**
- 2020 – 2021 **BSc Student Supervisor – MRI view recognition with neural networks**
- 2019 – 2020 **BSc Student Supervisor – ECG classification with neural networks**
- 2018 – 2019 **BSc Student Supervisor – ECG classification with neural networks**
- 2017 – 2018 **BSc Student Supervisor – Pacemakers in neural networks**
- 2017 – 2021 **Lecturer in “Machine Learning for Image Analysis”**
I deliver an annual lecture on machine learning to the Cardiovascular BSc students with an emphasis on medical image analysis.
- 2016 - 2017 **Imperial College Teaching Hero**
For my “organisation and delivery of undergraduate teaching to Year 6 Cardiology students” I was designated a Teaching Hero by Imperial College London.
- 2011 - 2012 **Junior Clinical Teaching Fellow – Colchester Hospital University NHS Foundation Trust**
- 2011 **“Cardiology for Finals” – Barts and the London School of Medicine**
- 2010 - 2011 **PBL Facilitator - Barts and The London School of Medicine**
- 2010 **Practice OSCE examiner – The Royal London Hospital**
- 2009 **Associate clinical supervisor – Cambridge University Medical School**