BJS_11440

Evaluation of appendicitis risk prediction models: systematic review and prospective, multicentre cohort study of adults with suspected appendicitis in the United Kingdom†

*RIFT Study Group on behalf of the West Midlands Research Collaborative**

*Collaborators are listed in Appendix S2

Table S1: Clinical components of validated risk prediction models

	Patient		Clinical symptoms							Examination findings				Biochemical/ haematological tests*			
Model	**Age**	**Sex**	**Symptom duration**	**Recurrent pain**	**Anorexia**	**Nausea/ vomiting**	**Migration of pain**	**RIF pain**	**Fever**	**RIF tenderness**	**RIF guarding**	**Rebound tenderness**	**Rovsing sign**	**WCC**	**neut**	**CRP**	**UA**
AAS[1]	x		x				x	x		x	x			x	x	x	
AIRS[2]						x		x	x		x	x		x	x	x	
Alvarado[3]					x	x	x		x	x		x		x	x		
Birkhahn[4]										x	x	x		x	x		
Christian[5]						x		x	x	x				x	x		
Eskelinen, 1992[6]			x					x		x	x	x		x			
Eskelinen, 1994[7]		x						x	x	x	x	x					
Goh[8]							x		x	x		x		x			
Izbicki[9]		x		x			x				x	x		x			
Mikaere[10]		x			x		x				x				x	x	
Modified Alvarado[11]					x	x	x		x	x		x		x			
RIPASA[12]	x	x	x		x	x	x	x	x	x	x	x	x	x			x
Ting[13]					x	x	x		x	x				x	x		
van der Broek[14]		x	x						x			x		x			
Van Way[15]	x	x	x		x	x											

AAS: Adult Appendicitis Score, AIRS: Appendicitis Inflammatory Response Score, CRP: C reactive protein, Neut: neutrophils, RIF: right iliac fossa, RIPASA: Raja Isteri Pengiran Anak Saleha Appendicitis, UA: urinalysis, WCC: white cell count.

*WCC was measured by the clinical team for 99.0% (51/5345) patients; CRP was measured by the clinical team for 96.7% (177/5345) patients; urinalysis was performed by the clinical team for 83.9% (4485/5345) of patients.

Table S2: Appendicitis risk prediction models that could not be validated, with tabulation of specific missing data points that would have been required to complete validation

Model	Total variables included	Diarrhoea	Abdominal mass	GU	Location of initial pain	Pain duration <12hr	Pain outside RIF	Pain onset: sudden or gradual	Pain intensity: increasing or decreasing	Exacerbation of pain on movement	Exacerbation of pain on coughing	Tender outside RIF	Rigors	Heel drop test	Rectal tenderness	Rectal mass
Ahn[16]	4													x		
Arnbjornsson[17]	15	x	x	x	x							x			x	x
Bengezi[18]	10										x				x	
Fenyo[19]	19	x				x		x	x	x	x	x	x		x	
Jahn[20]	11					x		x	x	x	x					
Jawaid[21]	10				x											
Lindberg[22]	10					x	x		x		x					
Ohmann[23]	8			x					x							
Ramirez[24]	7	x			x											
Teicher[25]	7			x												x
Wilasrusmee[26]	7								x	x	x					

GU: genitourinary symptoms; RIF: right iliac fossa

Tables S1 an S2 References

1. Sammalkorpi HE, Mentula P, Leppaniemi A. A new adult appendicitis score improves diagnostic accuracy of acute appendicitis--a prospective study. *BMC Gastroenterol* 2014;**14**: 114.

2. Andersson M, Andersson RE. The appendicitis inflammatory response score: a tool for the diagnosis of acute appendicitis that outperforms the Alvarado score. *World J Surg* 2008;**32**(8): 1843-1849.

3. Alvarado A. A practical score for the early diagnosis of acute appendicitis. *Ann Emerg Med* 1986;**15**(5): 557-564.

4. Birkhahn RH, Briggs M, Datillo PA, Van Deusen SK, Gaeta TJ. Classifying patients suspected of appendicitis with regard to likelihood. *Am J Surg* 2006;**191**(4): 497-502.

5. Christian F, Christian GP. A simple scoring system to reduce the negative appendicectomy rate. *Ann R Coll Surg Engl* 1992;**74**(4): 281-285.

6. Eskelinen M, Ikonen J, Lipponen P. A computer-based diagnostic score to aid in diagnosis of acute appendicitis. A prospective study of 1333 patients with acute abdominal pain. *Theoretical Surgery* 1992;**7**(2): 86-90.

7. Eskelinen M, Ikonen J, Lipponen P. Sex-specific diagnostic scores for acute appendicitis. *Scand J Gastroenterol* 1994;**29**(1): 59-66.

8. Goh PL. A Simplified Appendicitis Score in the Diagnosis of Acute Appendicitis. *Hong Kong J Emerg Med* 2017;**17**: 230–235.

9. Izbicki JR, Knoefel WT, Wilker DK, Mandelkow HK, Muller K, Siebeck M*, et al.* Accurate diagnosis of acute appendicitis: a retrospective and prospective analysis of 686 patients. *Eur J Surg* 1992;**158**(4): 227-231.

10. Mikaere H, Zeng I, Lauti M, Kularatna M, MacCormick AD. Derivation and validation of the APPEND score: an acute appendicitis clinical prediction rule. *ANZ J Surg* 2018;**88**(4): E303-E307.

11. Kalan M, Talbot D, Cunliffe WJ, Rich AJ. Evaluation of the modified Alvarado score in the diagnosis of acute appendicitis: a prospective study. *Ann R Coll Surg Engl* 1994;**76**(6): 418-419.

12. Chong CF, Adi MI, Thien A, Suyoi A, Mackie AJ, Tin AS*, et al.* Development of the RIPASA score: a new appendicitis scoring system for the diagnosis of acute appendicitis. *Singapore Med J* 2010;**51**(3): 220-225.

13. Ting HW, Wu JT, Chan CL, Lin SL, Chen MH. Decision model for acute appendicitis treatment with decision tree technology--a modification of the Alvarado scoring system. *J Chin Med Assoc* 2010;**73**(8): 401-406.

14. van den Broek WT, Bijnen BB, Rijbroek B, Gouma DJ. Scoring and diagnostic laparoscopy for suspected appendicitis. *Eur J Surg* 2002;**168**(6): 349-354.

15. Van Way CW, 3rd, Murphy JR, Dunn EL, Elerding SC. A feasibility study of computer aided diagnosis in appendicitis. *Surg Gynecol Obstet* 1982;**155**(5): 685-688.

16. Ahn S, Lee H, Choi W, Ahn R, Hong JS, Sohn CH*, et al.* Clinical Importance of the Heel Drop Test and a New Clinical Score for Adult Appendicitis. *PLoS One* 2016;**11**(10): e0164574.

17. Arnbjornsson E. Scoring system for computer-aided diagnosis of acute appendicitis. The value of prospective versus retrospective studies. *Ann Chir Gynaecol* 1985;**74**(4): 159-166.

18. Fente BG, Echem RC. Prospective evaluation of the Bengezi and Al-Fallouji modified Alvarado score for presumptive accurate diagnosis of acute appendicitis in University of Port Harcourt Teaching Hospital, Port Harcourt. *Niger J Med* 2009;**18**(4): 398-401.

19. Fenyo G. Routine use of a scoring system for decision-making in suspected acute appendicitis in adults. *Acta Chir Scand* 1987;**153**(9): 545-551.

20. Jahn H, Mathiesen FK, Neckelmann K, Hovendal CP, Bellstrom T, Gottrup F. Comparison of clinical judgment and diagnostic ultrasonography in the diagnosis of acute appendicitis: experience with a score-aided diagnosis. *Eur J Surg* 1997;**163**(6): 433-443.

21. Jawaid A, Asad A, Motiei A, Munir A, Bhutto E, Choudry H*, et al.* Clinical scoring system: a valuable tool for decision making in cases of acute appendicitis. *J Pak Med Assoc* 1999;**49**(10): 254-259.

22. Lindberg G, Fenyo G. Algorithmic diagnosis of appendicitis using Bayes' theorem and logistic regression. *Bayesian statistics* 1988;**3**: 665–668.

23. Ohmann C, Franke C, Yang Q. Clinical benefit of a diagnostic score for appendicitis: results of a prospective interventional study. German Study Group of Acute Abdominal Pain. *Arch Surg* 1999;**134**(9): 993-996.

24. Ramirez JM, Deus J. Practical score to aid decision making in doubtful cases of appendicitis. *Br J Surg* 1994;**81**(5): 680-683.

25. Teicher I, Landa B, Cohen M, Kabnick LS, Wise L. Scoring system to aid in diagnoses of appendicitis. *Ann Surg* 1983;**198**(6): 753-759.

26. Wilasrusmee C, Siribumrungwong B, Phuwapraisirisan S, Poprom N, Woratanarat P, Lertsithichai P*, et al.* Developing and validating of Ramathibodi Appendicitis Score (RAMA-AS) for diagnosis of appendicitis in suspected appendicitis patients. *World J Emerg Surg* 2017;**12**: 49.

Table S3: Final diagnoses in low-risk women who did not undergo appendicectomy (n=1627)

Gastrointestinal	**130**
Gastritis/ gastroenteritis	36
Duodenal ulcer disease	1
Mesenteric adenitis	13
Colitis	18
Diverticulitis	6
Inflammatory bowel syndrome (IBS)	7
Constipation	37
Adhesional symptoms	3
Other gastrointestinal pathology	9
Hepatobiliary	**23**
Biliary colic	14
Cholecystitis	4
Pancreatitis	1
Other hepatobiliary pathology	4
Gynaecological	**433**
Benign ovarian cyst	257
Polycystic ovarian syndrome (PCOS)	9
Confirmed/ suspected ovarian cancer	3
Other ovarian pathology	7
Endometriosis	23
Fibroids	18
Menstrual pain	43
Pelvic inflammatory disease (PID)	43
Other gynaecological pathology	30
Urological	**126**
Urinary tract infection (UTI)	99
Renal stone	21
Other urological pathology	6
Other	**915**
Non-specific abdominal pain	851
Musculoskeletal pain	9
Hernia	7
Lower respiratory tract infection	2
Confirmed/suspected non-ovarian cancer	3
Other miscellaneous pathology	16
No diagnosis made/ outpatient investigations pending	9
Data missing	18

Table S4: Final diagnoses in low-risk men who did not undergo appendicectomy (n=175)

Gastrointestinal	**27**
Gastritis/ gastroenteritis	12
Mesenteric adenitis	4
Colitis	4
IBS	1
Constipation	6
Hepatobiliary	**3**
Biliary colic	2
Pancreatitis	1
Urological	**18**
Urinary tract infection (UTI)	4
Testicular/ epididymal pathology	1
Renal stone	12
Other urological pathology	1
Other	**127**
Non-specific abdominal pain	110
Musculoskeletal pain	8
Hernia	1
Missing data	8

Appendix S1: Statistical analysis plan

Data was collected in accordance with a published, peer-reviewed protocol*.

In the published study protocol* this study's aim was to validate appendicitis risk prediction models in a multicentre cohort. Prior to the commencement of data analysis, study collaborators met at the National Research Collaborative Meeting in Birmingham on 30 November 2017 to finalise the statistical analysis plan. Firstly, it was agreed that prior to data analysis, rather than restricting the study to the risk prediction models that the team were aware of, a formal systematic review should be conducted to identify all existing risk prediction models that might be eligible for evaluation in the study. Secondly, a consensus was established that the clinical priority for appendicitis risk models should be to identify patients who are at low-risk of appendicitis. Based on this consideration it was agreed that the main outcome measure for this study should be the best achievable specificity whilst maintaining an acceptable failure rate. Definitions of failure rate and specificity were:

- Failure rate. The negative predictive value (NPV) is the proportion of patients stratified to the low-risk group who do not have the disease. To make it easier for surgeons to interpret our findings, we have used the reciprocal of NPV, the failure rate. In our study, failure rate is the proportion of patients stratified to the low-risk group who do have appendicitis.
- Specificity. This is the proportion of all patients who do not have disease, who are stratified to the low-risk group.

Generally, for any particular risk prediction model, the lower the cut-off used for the low-risk group, the lower the failure rate is likely to be. However, this comes at the cost of a lower specificity. A high failure rate would risk many diagnoses of appendicitis being delayed or even missed. A very low failure rate, whilst safe, but would be associated with a specificity so low as to make risk scoring meaningless.

Delphi methodology and results

In order to ensure that our findings are relevant to practicing surgeons, prior to commencing data analysis, we conducted a modified Delphi process to identify an expert consensus for the maximum acceptable failure rate for an appendicitis risk scoring. General surgeons who regularly manage patients with acute right iliac fossa pain, and who have at least ten years of surgical experience were invited to participate. The Delphi was conducted in two rounds by email. In the first round participants were asked to identify their view of the maximum acceptable failure rate. Following collation of the results, both the overall median rate and the distribution of proposed rates was fed back to participants, along with a summary of discussion points for consideration. Participants were then invited to modify their original rate.

Of the 24 surgeons invited to participate in the consensus process, 15 took part in both rounds and 7 took part in one round each (overall response rate: 77%). The median maximum acceptable rate reported in round 1 was 5.0% (interquartile range 3.1-7.5%). Following feedback, the median rate in round 2 was 5.0% (interquartile range 3.3-5.0%). Therefore, we identified a-priori 5% as the maximum acceptable failure rate.

Deviation from published protocol

The published protocol* briefly outlined that the sensitivity, specificity, positive predictive value, negative predictive value, and area under the curve (c-statistic) would be calculated for each clinical risk score. In the final statistical analysis plan, the main outcome was based on both specificity and the negative predictive value (the reciprocal of the failure rate). In addition, the area under the curve was calculated for each risk prediction model was also calculated and presented. Sensitivity and positive predictive values were not presented as they would not directly address in the principal clinical need to evaluate the ability of risk scores to identify low-risk patients.

*RIFT Study Group On behalf of the West Midlands Research Collaborative. Right Iliac Fossa Pain Treatment (RIFT) Study: protocol for an international, multicentre, prospective observational study. Send to BMJ Open. 2018 Jan 13;8(1):e017574.

Appendix S2: Authorship (all co-authors PubMed citable)

Writing group (investigation; writing – original draft preparation; writing – review & editing): D Nepogodiev, JH Matthews, GL Morley, DN Naumann, A Ball, P Chauhan, S Bhanderi, I Mohamed, JC Glasbey, RJW Wilkin, TM Drake, J Clements, NS Blencowe, PJJ Herrod, F Pata, M Frasson, R Blanco-Colino, AS Soares, A Bhangu (overall guarantor)

Statistical analysis (data curation; formal analysis): D Nepogodiev, A Bhangu

Steering group (conceptualization; methodology; investigation; project administration; writing – review & editing): JH Matthews, GL Morley, S Bhanderi, A Ball, P Chauhan, S Jain, I Mohamed, T Amuthalingam, R Tyler, JC Glasbey, RJW Wilkin, F Pata, M Frasson, R Blanco-Colino, AS Soares, A Bhangu, D Nepogodiev (chair)

Advisory group (conceptualization; methodology; writing – review & editing): EA Griffiths, TD Pinkney, O Gee, DG Morton

Modified Delphi experts (methodology; writing – review & editing): A Beggs, D Beral, A Bhangu, NS Blencowe, D Bowley, N Cruickshank, I Daniels, E Griffiths, ST Hornby, JN Lund, P Marriott, TD Pinkney, P Singh, NJ Smart, D Speake, C Thompson, J Torkington, A Torrance, R Vohra, O Warren, RJW Wilkin, DC Winter

Italy national committee (investigation; project administration; writing – review & editing): F Pata, G Pellino, A Sgrò, A Simioni, V Farina, M Podda, S Di Saverio, A Birindelli, S Pasquali, ITSurg

Portugal national committee (investigation; project administration; writing – review & editing): AS Soares, PTSurg

Spanish national committee (investigation; project administration; writing – review & editing): R Blanco-Colino, M Frasson

Regional leads (investigation; project administration; writing – review & editing): NS Blencowe, W Bolton, CJ Bradshaw, CS Chean, G Harris, JB Haddow, NB Jamieson, S McCain, J Mason, D Milgrom, GR Nana, MS Noor Mohamed, J O'Brien, JCH Pearce, M Rabie, K Sahnan, P Sarmah, C Skerritt, East Midlands Surgical Academic Network, London Surgical Research Group, Paediatric Surgical Trainee Research Network, West Midlands Research Collaborative

Local leads (investigation; project administration; writing – review & editing): MA Ghazanfar (Aberdeen Royal Infirmary); L Sreedharan (Addenbrooke's Hospital); S Kabwama (Airedale General Hospital, Keighley); RT Gray (Altnagelvin Area Hospital); IW Kamande (Antrim Area Hospital); S Nazarian (Barnet Hospital); FA Dar (Barnsley District General Hospital); AT Misky (Basildon University Hospital); S Arunachalam (Basingstoke And North Hampshire Hospital); CS Twum-Barima (Bedford Hospital); IM Mohamed (Birmingham Heartlands Hospital); KL Connor (Borders General Hospital, Melrose); PO Coe (Bradford Royal Infirmary); A Kosti (Bristol Royal Infirmary); M Elshaer (Broomfield Hospital); DA Colvin (Causeway Hospital, Coleraine); MP Charalambous (Charing Cross Hospital); KTD Yeung (Chelsea And Westminster Hospital); LAG Merker (Cheltenham General Hospital); TEM Morrison (Colchester General Hospital); AJ Thaventhiran (Conquest Hospital, St Leonards On Sea); TM Gilbert (Countess Of Chester Hospital); JM Clements (Craigavon Area Hospital); G Hicks (Croydon University Hospital); S Afshar (Cumberland Infirmary, Carlisle); NC Mckinley (Daisy Hill Hospital, Newry); N Assaf (Darent Valley Hospital, Dartford); T Hanna (Derriford Hospital); EGE Macinnes (Doncaster Royal Infirmary); N Thavanesan (Dorset County Hospital, Dorchester); AS Dubois (Dr Gray's Hospital, Elgin);

LK Palani-Velu (Forth Valley Royal Hospital, Larbert); S Tezas (Furness General Hospital, Barrow-In-Furness); LPS Yow (Glan Clwyd Hospital, Rhyl); RW Radwan (Glangwili General Hospital, Carmarthen); NB Jamieson (Glasgow Royal Infirmary); M Abdelrahman (Gloucestershire Royal Hospital); KA Lee (Good Hope District General Hospital); Z A Zarka (Great Western Hospital, Swindon); NA Mcdowall (Hairmyres Hospital); CY Tan (Hinchingbrooke Hospital, Huntingdon); ML Venn (Homerton University Hospital); DL Ashmore (Huddersfield Royal Infirmary); SE Whitehorn (Hull Royal Infirmary); AM Golder (Inverclyde Royal Hospital, Greenock); A Reddy (James Cook University Hospital, Middlesbrough); C Delimpalta (James Paget Hospital, Great Yarmouth); OH Kay (John Radcliffe Hospital); P Sarmah (Kettering General Hospital); SM Shah (King George Hospital, Ilford); I Eiben (King's College Hospital); C Doyle (King's Mill Hospital, Sutton In Ashfield); V Tudyka (Kingston Hospital); E Issa (Leicester General Hospital); H West (Leicester Royal Infirmary); HK Brewer (Lincoln County Hospital); EZ Farrow (Lister Hospital, Stevenage); NS Taylor (Luton & Dunstable Hospital); CJ Smart (Macclesfield District General Hospital); NP Griffiths (Manchester Royal Infirmary); C Halkias (Medway Maritime Hospital, Gillingham); P Vitish-Sharma (Milton Keynes University Hospital); SR Knight (Monklands Hospital, Airdrie); NG Mowbray (Morriston Hospital, Swansea); JB Olivier (Musgrove Park Hospital, Taunton); KJ Lee (New Cross Hospital, Wolverhampton); KD Clement (Ninewells Hospital, Dundee); DRR Chrastek (Norfolk And Norwich University Hospital); N Panda (North Manchester General Hospital); MJ Connor (North Middlesex University Hospital); SE Fahmy (Northampton General Hospital, Northampton); ES Bryan (Northern General Hospital, Sheffield); WS Ngu (Northumbria Specialist Emergency Care Hospital); SO Adegbola (Northwick Park Hospital, Harrow); EM Vaughan (Perth Royal Infirmary); W Stupalkowska (Peterborough City Hospital); LFC Simmonds (Pilgrim Hospital, Boston); A Malik (Pinderfields Hospital); A Hussein (Princess Alexandra Hospital, Harlow); MJ Karim (Princess Of Wales Hospital, Grimsby); T Singhal (Princess Royal University Hospital, Orpington); R Ormiston (Queen Alexandra Hospital, Portsmouth); D Nepogodiev (Queen Elizabeth Hospital Birmingham); VWS Kung (Queen Elizabeth Hospital, Woolwich); MA Rabie (Queen Elizabeth The Queen Mother Hospital); JH Park (Queen Elizabeth University Hospital, Glasgow); N Lal (Queen's Hospital); D Worku (Queen's Hospital, Romford); M D'Auria (Queen's Medical Centre, Nottingham); A Ang (Rotherham District General Hospital); M Orizu (Royal Alexandra Hospital, Paisley); E Gammeri (Royal Berkshire Hospital, Reading); ECS Clough (Royal Bolton Hospital); CH Choy (Royal Cornwall Hospital, Truro); PJJ Herrod (Royal Derby Hospital); S Lawday (Royal Devon & Exeter Hospital); AJ Hann (Royal Free Hospital); D Robinson (Royal Glamorgan Hospital, Ynysmaerdy); BG Wardle (Royal Gwent Hospital, Newport); D Mcdonnell (Royal Hampshire County Hospital, Winchester); DG Rutherford (Royal Infirmary Of Edinburgh); LM Hickey (Royal Lancaster Infirmary); AG Garg (Royal London Hospital); S Rezvani (Royal Oldham Hospital); CR Bell (Royal Preston Hospital); F Mahmood (Royal Stoke University Hospital); S Rehman (Royal Sussex County Hospital, Brighton); G Donaldson (Royal Victoria Hospital); A Peleki (Russells Hall Hospital); L Pearce (Salford Royal); OL Sharp (Salisbury District Hospital); S Jain (Sandwell General Hospital, West Bromwich); S Singh (Scarborough General Hospital); DB Thompson (Scunthorpe General Hospital); O El-Tayar (South West Acute, Enniskillen); M Hollyman (Southmead Hospital, Bristol); SN Rupasinghe (Southport And Formby District General Hospital); DB Toomey (St George's Hospital, London); MP Murray (St Helier Hospital, Carshalton); N Amtul (St James' University Hospital); RJ Mersh (St Mary's Hospital, London); RC Newton (St Peter's Hospital, Chertsey); W Al-Khyatt (St Richard'S Hospital, Chichester); GF Stephens (St Thomas' Hospital); SH Abbas (Stoke Mandeville Hospital, Aylesbury); MR Iqbal (Tunbridge Wells Hospital, Pembury); CE Brown (Ulster Hospital, Dundonald); S Renshaw (University College Hospital); KA Hureibi (University Hospital Coventry and Warwickshire); UP Pullabatla-Venkata (University Hospital Crosshouse, Kilmarnock); N O Donohoe (University Hospital Lewisham); A Myatt (University Hospital Of North Tees); RJ Egan (University Hospital Of Wales, Cardiff); K Rangarajan (University Hospital Southampton); M Trail (Victoria Hospital, Kirkcaldy); SC Mckay (Walsall Manor Hospital); NFT Engall (Warrington Hospital); E Jerome (Warwick Hospital); DC

Townsend (Watford General Hospital); BY Patel (West Middlesex University Hospital); S Pronin (Western General Hospital, Edinburgh); N Chandratreya (Weston General Hospital, Weston-Super-Mare); JH Choong (Whipps Cross University Hospital); TM Mohamed (Whittington Hospital); NJ Hudson-Peacock (William Harvey Hospital); R Manson (Wishaw General Hospital); S Bhanderi (Worcestershire Royal Hospital); KRM Hebbar (Worthing Hospital); BS Mothe (Wythenshawe Hospital, Manchester); CR Weegenaar (Yeovil District Hospital); M Saad (York Hospital); CR Bowman (Ysbyty Wrexham Maelor Hospital); **Italy:** F Serventi (Alghero Ospedale Civile); F Fleres (AOU G. Martino Policlinico di Messina / Università degli Studi di Messina); C Foppa (Aou-Careggi - Florence); G Pata (Asst Spedali Civili di Brescia); G Baronio (Asst Valle Camonica-Esine); D Pertile (Ausl Piacenza); A Lucchi (Ausl Romagna - Ceccarini Hospital - Riccione); A Sagnotta (Azienda Ospedaliera Santa Maria Terni); I Maretto (Azienda Ospedaliera Universitaria Di Padova); T Campagnaro (Azienda Ospedaliera Universitaria Integrata Verona); M Gatti (Borgomanero Hospital); EGJ Gjoni (Busto Arsizio Hospital); F Roscio (Galmarini Hospital, Tradate); M Inama (Hospital Pederzoli); F Coccolini (Hpg XXIII Bergamo); A Sgrò (Irccs Policlinico San Matteo - Pavia); F Colombo (L.Sacco University Hospital); A Avanzolini (Morgagni-Pierantoni Hospital, Forlì); S Aresu (Nostra Signora Della Mercedes Hospital); A De-Manzoni-Garberini (Ospedale Civile Spirito Santo di Pescara); DA Merlini (Ospedale Di Rho (Milano); - Asst Rhodense); A Chessa (Ospedale S.Giovanni di Dio-Orbetello); N Tamini (Ospedale San Gerardo); S Mulas (Ospedale Santissima Annunziata Aou Sassari Uoc Chirurgia Generale E D'Urgenza); N Cillara (Po Santissima Trinità - Assl Cagliari); D Coletta (Policlinico Umberto I Università 'La Sapienza'); J Atzeni (Policlinico Universitario Di Monserrato); E Erdas (Policlinico Universitario 'Duilio Casula'); G Gallo (Pugliese-Ciaccio' Hospital, Catanzaro / University "Magna Graecia" of Catanzaro); E Francone (S. Andrea Hospital Poll-Asl5); P Di Gioia (S. Maria Delle Croci Ravenna); A Birindelli (S.Orsola-Malpighi); CL Bianchi (San Bartolomeo Hospital Sarzana); F Ferrara (San Carlo Borromeo Hospital, Milan); A Biancafarina (San Donato Hospital, Arezzo); M Podda (San Francesco Hospital, Nuoro); S Scabini (San Martino Genova); L Marano (San Matteo degli Infermi Hospital - Ausl Umbria 2 - Spoleto); A Miegge (San Raffaele Hospital); D Sasia (Santa Croce And Carle Hospital, Cuneo); G Savino (Santa Maria Regina degli Angeli Aulss 5 Polesana- Adria Hospital); F Pata (Sant'Antonio Abate Hospital, Gallarate); M Scatizzi (Santo Stefano Hospital); FE D'Amico (Treviso Hospital - Ca Foncello); GA Arcuri (U.S.L. Umbria 1 - Città Di Castello); L Gavagna (University of Ferrara); G Salamone (University of Palermo); F Tatulli (V. Emanuele II, Bisceglie); E Goldin (Vicenza Hospital); **Portugal:** ML Matos (Centro Hospitalar de Entre o Douro e Vouga E.P.E.); AB Caldeira (Centro Hospitalar De São João); J Romano (Centro Hospitalar Lisboa Ocidental); J Pereira (Centro Hospitalar Tondela-Viseu); JGM Azevedo (Centro Hospitalar Vila Nova De Gaia); JM Azevedo (Hospital Da Horta); JFF Simoes (Hospital Garcia De Orta); ACQ Silva (Hospital Pedro Hispano - Uls Matosinhos); AS Soares (Hospital Prof. Dr. Fernando Fonseca); **Republic of Ireland:** DP O'Leary (Beaumont Hospital); ND Kennedy (Blackrock Clinic); EM Quinn (Connolly Hospital, Blanchardstown); AY Zhang (Letterkenny University Hospital); PM Neary (Mater Misericordiae University Hospital); JA De-Marchi (Our Lady Of Lourdes Hospital); BR O'Connor (Our Lady's Children's Hospital, Dublin); K Wijesundera (Portiuncula Hospital); NM Foley (Sligo University Hospital); J Wong (St James' Hospital, Dublin, Ireland); ND Kennedy (St Vincent's University Hospital); LA Tiedt (Tallaght Hospital); JC Bolger (University Hospital Limerick); TM Connelly (University Hospital Waterford); OS Ahmed (Wexford General Hospital); **Spain:** V Vigorita (Alvaro Cunqueiro Hospital); V García (Complejo Asistencial De Segovia); J Arredondo (Complejo Asistencial Universitario De León); E Redondo (Complejo Asistencial Universitario De Palencia); B Sainz (Complejo Hospitalario De Navarra); I Aldrey (Complexo Hospitalario Universitario De Ourense); A Landaluce-Olavarria (Galdacano); A De Andrés Gómez (General University Hospital Of Valencia); E Cordoba (H Clinico Universitario Zaragoza); MN Sánchez-Fuentes (H.U. Miguel Servet. Zaragoza); C Cerdán-Santacruz (Hospital Arnau De Vilanova De Lleida); J Beltran-De-Heredia (Hospital Clinico De Valladolid); MTGM García (Hospital Comarcal De Valdeorras); T Veres (Hospital De Cerdanya); A García-Novoa (Hospital Do Salnés); A Melero Abellán (Hospital General de

Villarrobledo); L García-Catalá (Hospital General Universitario De Elche); M Ruiz-Marín (Hospital General Universitario Reina Sofía); P Menendez (Hospital Gutierrez Ortega); S Roldán-Ortiz (Hospital Puerta Del Mar); JA Navas-Cuéllar (Hospital Punta De Europa); D Sabia (Hospital Sant Joan Despi, Moises Broggi); JC Gomez-Rosado (Hospital Univ. Virgen Macarena); M Serrano Navidad (Hospital Universitari de Bellvitge); C Caula (Hospital Universitari De Girona Doctor Josep Trueta); ER Sanchez (Hospital Universitari Germans Trias I Pujol); E Espin-Basany (Hospital Universitari Vall D'Hebron); D Fernández-Martínez (Hospital Universitario Central De Asturias, Oviedo); AF Bravo-Gutiérrez (Hospital Universitario de Canarias); C Payá-Llorente (Hospital Universitario Doctor Peset, Valencia); P Dujovne (Hospital Universitario Fundación Alcorcon, Madrid); F Lima (Hospital Universitario Infanta Sofia); V Soria-Aledo (Hospital Universitario J.M. Morales Meseguer, Murcia); CJ Gomez (Hospital Universitario Joan XXIII, Tarragona); I Pascual-Miguelañez (Hospital universitario La Paz); M Muinelo (Hospital Universitario Lucus Augusti); C Magadan Alvarez (Hospital Universitario Marques De Valdecilla); HJ Vargas-Pierola (Hospital Universitario Mutua Terrassa); M Vallve-Bernal (Hospital Universitario Nuestra Señora De Candelaria); JM Hidalgo-Rosas (Hospital Universitario Parc Tauli); JJ Arenal-Vera (Hospital Universitario Rio Hortega); F Sena-Ruiz (Hospital Universitario Son Espases); L Sanchez-Guillen (Hospital Universitario Y Politécnico La Fe); P Villarejo-Campos (Hospital Universitarios Ciudad Real); L Tallon-Aguilar (Hospital Virgen Del Rocío, Sevilla); A Garcea (Torrevieja Hospital).

Supervising consultants (investigation; supervision; writing – review & editing):
United Kingdom: E Aly (Aberdeen Royal Infirmary); JM Bennett (Addenbrooke's Hospital); L Whittaker (Airedale General Hospital, Keighley); AL Gidwani (Altnagelvin Area Hospital); CK Byrnes (Antrim Area Hospital); SMF Saunders (Barnet Hospital); MH Shiwani (Barnsley District General Hospital); N Ashraf (Basildon University Hospital); AK Venkatasubramaniam (Basingstoke And North Hampshire Hospital); KE Bevan (Bedford Hospital); D Mcarthur (Birmingham Heartlands Hospital); AK Mustafa (Borders General Hospital, Melrose); JP Griffith (Bradford Royal Infirmary); JM Blazeby (Bristol Royal Infirmary); A Charalabopoulos (Broomfield Hospital); W Campbell (Causeway Hospital, Coleraine); G Reese (Charing Cross Hospital); OJ Warren (Chelsea And Westminster Hospital); M Peacock (Cheltenham General Hospital); D Menzies (Colchester General Hospital); D Jenner (Conquest Hospital, St Leonards On Sea); NJ Eardley (Countess Of Chester Hospital); S Yoong (Craigavon Area Hospital); M Abulafi (Croydon University Hospital); H Avalapati (Cumberland Infirmary, Carlisle); R Thompson (Daisy Hill Hospital, Newry); P Nastro (Darent Valley Hospital, Dartford); R Kochupapy (Derriford Hospital); D Beral (Doncaster Royal Infirmary); BM Stubbs (Dorset County Hospital, Dorchester); R McIntyre (Dr Gray's Hospital, Elgin); J Crozier (Forth Valley Royal Hospital, Larbert); PK Patel (Furness General Hospital, Barrow-In-Furness); V Pento (Glan Clwyd Hospital, Rhyl); WD Beasley (Glangwili General Hospital, Carmarthen); CSD Roxburgh (Glasgow Royal Infirmary); ST Hornby (Gloucestershire Royal Hospital); H Youssef (Good Hope District General Hospital); R Alexander (Great Western Hospital, Swindon); S Denley (Hairmyres Hospital); F Di Franco (Hinchingbrooke Hospital, Huntingdon); A Quddus (Homerton University Hospital); A Saha (Huddersfield Royal Infirmary); I Hunter (Hull Royal Infirmary); JAF Hannay (Inverclyde Royal Hospital, Greenock); A Reddy (James Cook University Hospital, Middlesbrough); VR Velchuru (James Paget Hospital, Great Yarmouth); GEL Bond-Smith (John Radcliffe Hospital); Y Salama (Kettering General Hospital); A Bhargava (King George Hospital, Ilford); SP Panagiotopoulos (King's College Hospital); N Watson (King's Mill Hospital, Sutton In Ashfield); V Tudyka (Kingston Hospital); G Garcea (Leicester General Hospital); AP Boddy (Leicester Royal Infirmary); PG Dunning (Lincoln County Hospital); Geraint Lloyd (Lister Hospital, Stevenage); SV Gurjar (Luton & Dunstable Hospital); CJ Smart (Macclesfield District General Hospital); J Hill (Manchester Royal Infirmary); B Andrews (Medway Maritime Hospital, Gillingham); A Singh (Milton Keynes University Hospital); F Ruzvidzo (Monklands Hospital, Airdrie); G Shingler (Morriston Hospital, Swansea); D Mahon (Musgrove Park Hospital, Taunton); S Elgaddal (New Cross Hospital, Wolverhampton); CJ Payne (Ninewells

Hospital, Dundee); IA Shaikh (Norfolk And Norwich University Hospital); S Dalmia (North Manchester General Hospital); MS Nair (North Middlesex University Hospital); JG Finch (Northampton General Hospital, Northampton); KS Chapple (Northern General Hospital, Sheffield); S Bawa (Northumbria Specialist Emergency Care Hospital); J Watfah (Northwick Park Hospital, Harrow); CA Carden (Perth Royal Infirmary); R Makhija (Peterborough City Hospital); M Rao (Pilgrim Hospital, Boston); J Sarveswaran (Pinderfields Hospital); V Vijay (Princess Alexandra Hospital, Harlow); S Rekhraj (Princess Of Wales Hospital, Grimsby); T Singhal (Princess Royal University Hospital, Orpington); B Knight (Queen Alexandra Hospital, Portsmouth); TD Pinkney (Queen Elizabeth Hospital Birmingham); MN Siddiqui (Queen Elizabeth Hospital, Woolwich); JF Sebastian (Queen Elizabeth The Queen Mother Hospital); P Glen (Queen Elizabeth University Hospital, Glasgow); S Vakis (Queen's Hospital); H Ebied (Queen's Hospital, Romford); R Vohra (Queen's Medical Centre, Nottingham); R Rajaram (Rotherham District General Hospital); J Gray (Royal Alexandra Hospital, Paisley); D Mcgrath (Royal Berkshire Hospital, Reading); G Faulkner (Royal Bolton Hospital); S Gopalswamy (Royal Cornwall Hospital, Truro); JN Lund (Royal Derby Hospital); NJ Smart (Royal Devon & Exeter Hospital); M Varcada (Royal Free Hospital); A Woodward (Royal Glamorgan Hospital, Ynysmaerdy); GL Williams (Royal Gwent Hospital, Newport); K Szentpali (Royal Hampshire County Hospital, Winchester); R Ravindran (Royal Infirmary Of Edinburgh); C Bronder (Royal Lancaster Infirmary); MA Thaha (Royal London Hospital); A Rate (Royal Oldham Hospital); V Daya Shetty (Royal Preston Hospital); VSR Rao (Royal Stoke University Hospital); MS Sajid (Royal Sussex County Hospital, Brighton); B Clements (Royal Victoria Hospital); RT Patel (Russells Hall Hospital); C Mason (Salford Royal); G Branagan (Salisbury District Hospital); A Torrance (Sandwell General Hospital, West Bromwich); K Maude (Scarborough General Hospital); G Kaur (Scunthorpe General Hospital); A Lyons (Southmead Hospital, Bristol); P Ainsworth (Southport And Formby District General Hospital); R Hagger (St George's Hospital, London); AZ Zadi (St Helier Hospital, Carshalton); SU Maslekar (St James' University Hospital); J Kinross (St Mary's Hospital, London); S Irukulla (St Peter's Hospital, Chertsey); W Hawkins (St Richard'S Hospital, Chichester); S Wheatstone (St Thomas' Hospital); T Magro (Stoke Mandeville Hospital, Aylesbury); STR Bailey (Tunbridge Wells Hospital, Pembury); G Marshall (Ulster Hospital, Dundonald); J Mccullough (University College Hospital); G Marangoni (University Hospital Coventry and Warwickshire); EL Leung (University Hospital Crosshouse, Kilmarnock); CM Borg (University Hospital Lewisham); S Gopinath (University Hospital Of North Tees); J Torkington (University Hospital Of Wales, Cardiff); J Kirkby-Bott (University Hospital Southampton); S Yalamarthi (Victoria Hospital, Kirkcaldy); S Mirza (Walsall Manor Hospital); M Brett (Warrington Hospital); S Ramcharan (Warwick Hospital); V Pandey (Watford General Hospital); B Thava (West Middlesex University Hospital); D Speake (Western General Hospital, Edinburgh); N Chandratreya (Weston General Hospital, Weston-Super-Mare); SM Andreani (Whipps Cross University Hospital); SJ Sahay (Whittington Hospital); B Aravind (William Harvey Hospital); M Downey (Wishaw General Hospital); D Nicol (Worcestershire Royal Hospital); P Whitehouse (Worthing Hospital); A Sharma (Wythenshawe Hospital, Manchester); N Francis (Yeovil District Hospital); P Chitsabesan (York Hospital); DJ Stewart (Ysbyty Wrexham Maelor Hospital); **Italy:** GG Norcia (Alghero Ospedale Civile); E Cucinotta (AOU G. Martino Policlinico di Messina / Università degli Studi di Messina); F Cianchi (Aou-Careggi - Florence); U Fumagalli Romario (Asst Spedali Civili di Brescia); L Taglietti (Asst Valle Camonica-Esine); P Capelli (Ausl Piacenza); G Garulli (Ausl Romagna - Ceccarini Hospital - Riccione); A Parisi (Azienda Ospedaliera Santa Maria Terni); D Nitti (Azienda Ospedaliera Universitaria Di Padova); A Guglielmi (Azienda Ospedaliera Universitaria Integrata Verona); A Alonzo (Borgomanero Hospital); IS Scandroglio (Busto Arsizio Hospital); F Roscio (Galmarini Hospital, Tradate); G Moretto (Hospital Pederzoli); L Ansaloni (Hpg XXIII Bergamo); A Pietrabissa (Irccs Policlinico San Matteo - Pavia); D Foschi (L.Sacco University Hospital); N Vettoretto (Montichiari Hospital); G Ercolani (Morgagni-Pierantoni Hospital, Forlì); M Coppola (Nostra Signora Della Mercedes Hospital); E Colangelo (Ospedale Civile Spirito Santo di Pescara); E Morandi (Ospedale Di Rho (Milano Asst Rhodense); A Chessa (Ospedale S.Giovanni di Dio-Orbetello); N Tamini

(Ospedale San Gerardo); P Niolu (Ospedale Santissima Annunziata Aou Sassari Uoc Chirurgia Generale E D'Urgenza); M Pala (Po Santissima Trinità - Assl Cagliari); M Coletti (Policlinico Umberto I Università 'La Sapienza'); A Pisanu (Policlinico Universitario Di Monserrato); A Nicolosi (Policlinico Universitario 'Duilio Casula'); G Sammarco (Pugliese-Ciaccio' Hospital, Catanzaro / University "Magna Graecia" of Catanzaro); S Berti (S. Andrea Hospital Poll-Asl5); P Soliani (S. Maria Delle Croci Ravenna); V Tonini (S.Orsola-Malpighi); CL Bianchi (San Bartolomeo Hospital Sarzana); M Stella (San Carlo Borromeo Hospital, Milan); G Ceccarelli (San Donato Hospital, Arezzo); C De Nisco (San Francesco Hospital, Nuoro); S Scabini (San Martino Genova); G Castagnoli (San Matteo degli Infermi Hospital - Ausl Umbria 2 - Spoleto); P De Nardi (San Raffaele Hospital); F Borghi (Santa Croce And Carle Hospital, Cuneo); F Agresta (Santa Maria Regina degli Angeli Aulss 5 Polesana- Adria Hospital); A Benevento (Sant'Antonio Abate Hospital, Gallarate); S Cantafio (Santo Stefano Hospital); FE D'Amico (Treviso Hospital - Ca Foncello); MC Cesari (U.S.L. Umbria 1 - Città Di Castello); M Rubbini (University of Ferrara); G Salamone (University of Palermo); G Chetta (V. Emanuele II, Bisceglie); F De Marchi (Vicenza Hospital); **Portugal:** MF Nora (Centro Hospitalar de Entre o Douro e Vouga E.P.E.); HS Sousa (Centro Hospitalar De São João); CA Nascimento (Centro Hospitalar Lisboa Ocidental); CAO Casimiro (Centro Hospitalar Tondela-Viseu); SD Costa (Centro Hospitalar Vila Nova De Gaia); MJ Rosa (Hospital Da Horta); NMD Carvalho (Hospital Garcia De Orta); JCF Correia (Hospital Pedro Hispano - Uls Matosinhos); AP Gomes (Hospital Prof. Dr. Fernando Fonseca); **Republic of Ireland:** AD Hill (Beaumont Hospital); TN Walsh (Connolly Hospital, Blanchardstown); MA Aremu (Letterkenny University Hospital); J Mulsow (Mater Misericordiae University Hospital); S El-Masry (Our Lady Of Lourdes Hospital); J Gillick (Our Lady's Children's Hospital, Dublin); J Garvin (Portiuncula Hospital); M Caldwell (Sligo University Hospital); B Mehigan (St James' Hospital, Dublin); DC Winter (St Vincent's University Hospital); CB Peirce (University Hospital Limerick); F Cooke (University Hospital Waterford); K Mealy (Wexford General Hospital); **Spain:** A Ruano (Alvaro Cunqueiro Hospital); G Ais (Complejo Asistencial De Segovia); J Fueyo (Complejo Asistencial Universitario De León); E Redondo (Complejo Asistencial Universitario De Palencia); B Sainz (Complejo Hospitalario De Navarra); AE Parajó (Complexo Hospitalario Universitario De Ourense); A Landaluce-Olavarria (Galdacano); JC Bernal-Sprekelsen (General University Hospital Of Valencia); E Cordoba (H Clinico Universitario Zaragoza); JA Monzón-Abad (H.U. Miguel Servet. Zaragoza); C Cerdán-Santacruz (Hospital Arnau De Vilanova De Lleida); F Blanco (Hospital Clinico De Valladolid); T Veres (Hospital De Cerdanya); A Melero Abellán (Hospital General de Villarrobledo); A Arroyo (Hospital General Universitario De Elche); M Ruiz-Marín (Hospital General Universitario Reina Sofía); P Menendez (Hospital Gutierrez Ortega); MC Bazán-Hinojo (Hospital Puerta Del Mar); JA Navas-Cuéllar (Hospital Punta De Europa); MI Ramos-Bernado (Hospital Sant Joan Despi, Moises Broggi); JA Lopez-Ruiz (Hospital Univ. Virgen Macarena); T Golda (Hospital Universitari de Bellvitge); D Julià (Hospital Universitari De Girona Doctor Josep Trueta); MM Cuadrado (Hospital Universitari Germans Trias I Pujol); E Espin-Basany (Hospital Universitari Vall D'Hebron); D Fernández-Martínez (Hospital Universitario Central De Asturias, Oviedo); AF Bravo-Gutiérrez (Hospital Universitario de Canarias); SA Gómez-Abril (Hospital Universitario Doctor Peset, Valencia); P Dujovne (Hospital Universitario Fundación Alcorcon, Madrid); J Martinez (Hospital Universitario Infanta Sofia); JL Aguayo (Hospital Universitario J.M. Morales Meseguer, Murcia); M Millan (Hospital Universitario Joan XXIII, Tarragona); M Alvarez-Gallego (Hospital universitario La Paz); M Muinelo-Lorenzo (Hospital Universitario Lucus Augusti); JI Martin Parra (Hospital Universitario Marques De Valdecilla); E Muñoz-Muñoz (Hospital Universitario Mutua Terrassa); PE González De Chaves-Rodríguez (Hospital Universitario Nuestra Señora De Candelaria); G Cánovas-Moreno (Hospital Universitario Parc Tauli); M Rodriguez-Lopez (Hospital Universitario Rio Hortega); JJ Segura-Sampedro (Hospital Universitario Son Espases); A García-Granero (Hospital Universitario Y Politécnico La Fe); FJ Redondo-Calvo (Hospital Universitarios Ciudad Real); L Tallon-Aguilar (Hospital Virgen Del Rocío, Sevilla); A Garcea (Torrevieja Hospital).

Collaborators (investigation; writing – review & editing): V Quan, G Ramsay, P Mekhail, C Richards, M Ghazanfar, JM Wohlgemut (Aberdeen Royal Infirmary); S Dyson, D Thakur, L Sreedharan, C Swords, O Siaw, M Zelazek, R Woo, A Badran (Addenbrooke's Hospital); N Aruparayil, P Christopoulos, B Chambers (Airedale General Hospital, Keighley); N O'Neill, RH Long, RT Gray, P Mccaughey, MJ Lynch Wong, RS Mccain, HC Lennox-Warburton, C Moore, KM Manektella (Altnagelvin Area Hospital); IW Kamande, S Mcilwaine, S Rupani, DJ Simpson, J Wauchope, M Ng, L Christian, A Crone (Antrim Area Hospital); JB Haddow, R Sacks, S Nazarian, NRA Symons, A Lazzaro (Barnet Hospital); SD Patil, FA Dar, S Roomi (Barnsley District General Hospital); I Silva, JM Hodgson, C Ly, AT Misky, H Froud, H Patel (Basildon University Hospital); S Arunachalam, P Cay, RS Karwal, S Arunachalam, D Danquah-Boateng (Basingstoke And North Hampshire Hospital); BJM Berry, HD Esmail, CS Twum-Barima, H Maripi, D Bilku, MA McKelvie, K Miller, A Maina (Bedford Hospital); R Velho, R Hasan, R Clingan, SMH Jah, K Waite, A Jones (Birmingham Heartlands Hospital); S Buckley-Jones, L Lecky-Thompson, KL Connor (Borders General Hospital, Melrose); N Saghir, S Mansoor, D Mistry, R Brown, A Wong, S Gurung (Bradford Royal Infirmary); F Wensley, TA Fleming, RKL Griggs, A Kosti, S Haines, S Bedoya, A Beverstock, J Johnson (Bristol Royal Infirmary); M Elshaer, G Govind, O Niaz (Broomfield Hospital); DA Colvin, ARS Dyal (Causeway Hospital, Coleraine); E Tokidis, S Punj, A Leusink (Charing Cross Hospital); KTD Yeung, I Rudland, M Kelly, R Morgan, S Al-Musawi, C Lek (Chelsea And Westminster Hospital); A Gilbert, A Gosal, R Mahoney, I Parwaiz (Cheltenham General Hospital); TEM Morrison, MJ Mitchard, B Ribeiro, H Merai, EA Dean, S Khan (Colchester General Hospital); A Baginski, C Mann, W Foers, L Jones, B Woodward (Conquest Hospital, St Leonards On Sea); DM Mcwhirter, AT Thomas, TG Gilbert, LW Weatherburn, JP Pilkington, FC Cameron, TM Gilbert, CS Chean (Countess Of Chester Hospital); JM Clements, JD Clements, C Mccann, S Davidson, L Hackney, JS Clements (Craigavon Area Hospital); A Martin, G Hicks, DT Du (Croydon University Hospital); Z Shakoor, SK Yen, M Adnan, S Ranathunga, S Sana, YH Tay, MY Chin, M Gillespie (Cumberland Infirmary, Carlisle); AG Brown, U Campbell (Daisy Hill Hospital, Newry); N Assaf, M Chatzikonstantinou (Darent Valley Hospital, Dartford); B Mahendran, T Flack (Derriford Hospital); M Chowdhary, JM Lim, EGE Macinnes, E Whiteman, JA Shepherd, A Pedder (Doncaster Royal Infirmary); N Thavanesan, KL Siggens, CW Lai, V Morrison-Jones, Z Hayat (Dorset County Hospital, Dorchester); AS Dubois, I Nehikhare, C Macleod, HC Quinn (Dr Gray's Hospital, Elgin); A Brown, G Neagle, LK Palani-Velu (Forth Valley Royal Hospital, Larbert); SM Chok, FM Carrano, OA Abbassi, GA Divekar, S Halmer (Furness General Hospital, Barrow-In-Furness); LPS Yow, V Pento, RE Adams, PL Davies, SY Wong, R Amarasinghe, LE Tague, E Jones (Glan Clwyd Hospital, Rhyl); RW Radwan, A Martin, E Jones (Glangwili General Hospital, Carmarthen); NB Jamieson, J Singh, K Boza, SD Kelly, F Morrison, W Hei Chan (Glasgow Royal Infirmary); NS Blencowe, M Abdelrahman, EJ Wilson, OO Awokoya, SN Griffiths, EN Kirkham, AE Cotton, A Adimonye, PA Leighton (Gloucestershire Royal Hospital); KA Lee, A Abdelrahman, H Cartwright, Z Gates, M Miguras (Good Hope District General Hospital); ZA Zarka, K Khan, C Louw, T Grove, T Badenoch, J Mckeon (Great Western Hospital, Swindon); NA Mcdowall, CS Wood, RP Leitch (Hairmyres Hospital); P Sgardelis, MI Perera, D Nagarajan, Y Malam (Hinchingbrooke Hospital, Huntingdon); K Theodoropoulou, ML Venn, S Rajagopal, S Kaptanis, D Popova, O Olagbaiye, S Tayeh, S Rigby (Homerton University Hospital); DL Ashmore, MP Harris (Huddersfield Royal Infirmary); SE Whitehorn, KZ Ren, G Liaw, S Zhou, F White (Hull Royal Infirmary); AM Golder, CM Marshall, JH Mitchell, DJ Anderson (Inverclyde Royal Hospital, Greenock); V Kanakala, A Hollingsworth, KR Paramasevon, J Milward, S Ahmed (James Cook University Hospital, Middlesbrough); C Delimpalta, BF Fanibi, N Ferguson (James Paget Hospital, Great Yarmouth); EA Dickson, AV Shaw, OH Kay, F Dixon, S Morrish, R Dandy, P Fooks (John Radcliffe Hospital); P Sharma, N Islam, V Tabain, R Keegan, P Sarmah, J Ahel, T Alhammali (Kettering General Hospital); J Graveston, EJ Balai, J Graveston, SM Shah, K Rothnie (King George Hospital, Ilford); GP Pankin, IE Eiben, NJ Jackson, M Dhar, D Nash (King's College Hospital); C Doyle, S Dharamavaram, M Seth, F Chowdhury (King's Mill Hospital, Sutton In Ashfield); M Rezacova, N Seneviratne, EJ Turner

(Kingston Hospital); C Currow, E Issa, JD Isherwood (Leicester General Hospital); BM Hobson, H West, DH Lui (Leicester Royal Infirmary); GR Nana, V Rodger, N Ting, HK Brewer, D Photiou (Lincoln County Hospital); EZ Farrow, D Taze, S Lodhia, L Earnshaw, K Kumar, A Neale, J Bastianpillai, M Cipparrone, A Barrie (Lister Hospital, Stevenage); NS Taylor, Z Nash, L Anandan, K Tailor, Z Vinnicombe, S Krivan, R Kuo, A Giorga, H Habib (Luton & Dunstable Hospital); K Malik, M Bogdan (Macclesfield District General Hospital); FP Mahon-Daly, MJ Athersmith, JA Strange, NP Griffiths, C Wheeler, L Summerfield, RA Khaw (Manchester Royal Infirmary); O Ashour, E Iosif, M Fadel, K Gopalakrishnan, N Orme, S Williams, M Rashid (Medway Maritime Hospital, Gillingham); A Sultana, N Patel (Milton Keynes University Hospital); SR Knight, R Pearson (Monklands Hospital, Airdrie); T Yasin, V Bevan, NG Mowbray, B Al-Sarireh (Morriston Hospital, Swansea); JB Olivier, M Brown, N Mohd, EE Howie, M Poudevigne, C Paget (Musgrove Park Hospital, Taunton); H Rallage, K Chui, F Fawzi, S Layman, E Okorocha, GM Jama (New Cross Hospital, Wolverhampton); P Orawiec, O Kouli, A Hassane, KD Clement, J Kilkenny, AA Devine (Ninewells Hospital, Dundee); M Laurenson, I Slezak, T Barker, EYL Lau, M Limbada, J O'Brien, J Weaver, T Barker (Norfolk And Norwich University Hospital); N Panda, S Hajibandeh, J Shah, MM Mansour, SN Malik, S Davis, F Trew, SK Bandyopadhyay, K Dart (North Manchester General Hospital); MJ Connor, S Guru-Naidu, R Callan, MK Nair (North Middlesex University Hospital); M Alani, E Sezen, S Salim, SE Fahmy (Northampton General Hospital, Northampton); J Shurlock, K Siddique, A Forouzanfar, R Brews (Northern General Hospital, Sheffield); WS Ngu (Northumbria Specialist Emergency Care Hospital); A Acharya, A Jain, SO Adegbola, K Sahnan, PJ Tozer, J Warusavitarne (Northwick Park Hospital, Harrow); KM Emslie, O Collier-Wakefield, P Sivaloganathan, C Dobson, M Elseedawy, EM Vaughan (Perth Royal Infirmary); W Stupalkowska, L McNally, M Williams, FH Motiwala, S Choi, A Ahmad Asmadi, D Burnside, A Everden, S Suriyakumar,L Sandu (Peterborough City Hospital); DA Kent, J Bowen, LFC Simmonds, P Long, A Khair (Pilgrim Hospital, Boston); A Malik, K Shah, L Phelan (Pinderfields Hospital); R Pierre, AA Dhari, A Hussein, M Hoff (Princess Alexandra Hospital, Harlow); MJ Karim, S Nickson, T Setshwaelo, A Chalk, MJ Parkola, A Harlinska (Princess Of Wales Hospital, Grimsby); TCW Chan, JG Dudek, R Rolph (Princess Royal University Hospital, Orpington); M Allen, H Pollard, R Ormiston, R Gormely, H Finlayson, G Ljungqvist (Queen Alexandra Hospital, Portsmouth); C Peponis, JC Glasbey, R Tyler, MMA Rahman, S Dhesi, MS Noor Mohamed, F Arshad, RJW Wilkin, AR Faris,T Sooriyamoorthy (Queen Elizabeth Hospital Birmingham); VWS Kung, EL Springate, W Barnieh, AS Patel, ZA Siddiqui, IA Chishti, J Ayube-Brown (Queen Elizabeth Hospital, Woolwich); MR Rabie, L Blake, E Yardimci, S Nagendram (Queen Elizabeth The Queen Mother Hospital); JH Park, GI Neophytou, L Henderson, MMH Farhan-Alanie, CY Kong, R Ghazala (Queen Elizabeth University Hospital, Glasgow); N Lal, J Evans, N Hussain (Queen's Hospital); M Kabir, D Worku (Queen's Hospital, Romford); I Hraishawi, M D'Auria, M Cox, JA Bailey, N Muhibullah, F Yanni (Queen's Medical Centre, Nottingham); A Ang (Rotherham District General Hospital); M Orizu, R Stevenson, A Nair, C Murphy, O Mcgucken (Royal Alexandra Hospital, Paisley); E Gammeri, R Pandya, H Bowerman, G Lafaurie, GI Van Boxel, K Shanmugarajah, D Maragouthakis, Z Hanif (Royal Berkshire Hospital, Reading); JD Evans, S Yoganathan, TD Richardson (Royal Bolton Hospital); CH Choy, V Cook, GL Clark, B Rigney, E O'Neill, J Guliani (Royal Cornwall Hospital, Truro); PJJ Herrod, D Chan, F Harper, T Sian, C Boereboom, JEM Blackwell, E Hardy, H Boyd-Carson, DG Couch,CA Barter,SN Thoukididou,JR Hatt(Royal Derby Hospital); CS Jones, S Dean, N Rajaretnam, S Lawday, M Masood, N Thakral, D Griffith, C Doherty, A Longshaw (Royal Devon & Exeter Hospital); D Peprah, G Mathew, AJ Hann (Royal Free Hospital); A Hook, D Robinson, J Vance-Daniel (Royal Glamorgan Hospital, Ynysmaerdy); YMS Ibrahim, BG Wardle, KJ Walters, HE Whewell, MA Sherif, M Mckenna, JCH Pearce (Royal Gwent Hospital, Newport); D O'Sullivan, C Woodrow (Royal Hampshire County Hospital, Winchester); S Gill, A Johnstone, R Gentry, R Irwin, A Forgie, S Welsh (Royal Infirmary Of Edinburgh); LM Hickey, P Ivey, JK Bullivant (Royal Lancaster Infirmary); WJ English, A Osterberg, A Morowala, Z Al-Faham, S Islam, E Tan, AG Garg, S Sadek (Royal London Hospital); N Sihra, D Shrestha (Royal Oldham Hospital); B Chong, A Nadeem, JA Fasuyi,

MM Patel (Royal Preston Hospital); R Daureeawoo, B Okekunle, M Cheruvu, E Mazumdar, F Mahmood, A Hussain, C Patel, M Mcquaid, A Banks,A Robinson (Royal Stoke University Hospital); MS Khan, W Riaz, M Verroiotou, JA Cohen, E Kouroumpas, S Rehman (Royal Sussex County Hospital, Brighton); G Donaldson, I Ghaffari, J Moradzadeh (Royal Victoria Hospital); A Peleki, M Kamal, M Gulamhussein (Russells Hall Hospital); L Pearce, E Gaines, S Ghatorae, S Clark (Salford Royal); OL Sharp, A Savill, B Hutchinson, J Chapman, F Wu, W Creasy, M Raymond, S Grosvenor (Salisbury District Hospital); A Odeh, Y Malik, H Bansal (Sandwell General Hospital, West Bromwich); C Grant, A Raofi, B Ahmed, D Mai (Scarborough General Hospital); DB Thompson, JEH Souter, RN Hamelmann, S Ikram (Scunthorpe General Hospital); O El-Tayar, A De-Manzoni-Garberini (South West Acute, Enniskillen); M Hollyman, M Durbacz, N Gilliland (Southmead Hospital, Bristol); A Salem, D Chudek, SN Rupasinghe (Southport And Formby District General Hospital); N Ladwa, R Storey, C Fontaine, D Toomey, B Miller, A Robinson (St George's Hospital, London); M Oakey, H Smoker (St Helier Hospital, Carshalton); N Amtul, SJ Chapman, SC O'Hagan, W Tahir, GJA Wilcox, A Ahmad, F Akram, TS Baddams (St James' University Hospital); PR Boshier, M Fehervari, S Easdon, RJ Mersh, T Ilozue, ME Adam (St Mary's Hospital, London); RC Newton, S Jokhan, A Foster, K Nambiar, P Bohra, S Janardanan, V Shanmuganathan, F Maqboul (St Peter's Hospital, Chertsey); C Ettles, SD Wardle, E Martinou (St Richard'S Hospital, Chichester); GF Stephens, A Khasria, R Bagga, D Motter, N Mundkur, Y Pan (St Thomas' Hospital); SH Abbas, K Akbari, SM Farrell, A Rahim, A Gummaraju (Stoke Mandeville Hospital, Aylesbury); MR Iqbal, A Mahmoud, O Akinsola, N Smallcombe, M Tarazi, C Hanley (Tunbridge Wells Hospital, Pembury); CE Brown, UM Campbell, NC Mckinley (Ulster Hospital, Dundonald); S Renshaw, D Franklin, JR Davidson (University College Hospital); KA Hureibi, SS Raza, A Krishnamoorthy, Y Rajjoub, M Ali, TC Seddon, RE Payne, A Das (University Hospital Coventry and Warwickshire); LM Martin, KN Naismith, UP Pullabatla Venkata, VM Manda (University Hospital Crosshouse, Kilmarnock); N O Donohoe, KM Burns, J Huang (University Hospital Lewisham); M Samuel, JA Docherty (University Hospital Of North Tees); WL Cheah, R Ooi, M Nyeko-Lacek, L Marsh, A Prideaux, CH Li, A Poacher, M Lee, M Muzaffar,RJ Egan (University Hospital Of Wales, Cardiff); A Kara, E Walsh, A Kara (University Hospital Southampton); H Sunter, NPG Roth, C Roy, D Mcmorran, A Turnbull, M Trail (Victoria Hospital, Kirkcaldy); GR Layton, JE Archer, P Yang (Walsall Manor Hospital); NFT Engall (Warrington Hospital); L Henderson, E Douka, V Amin, K Borghol, P Marriott (Warwick Hospital); DC Townsend, OD Blackford, S Bond, B Baker, WO Mohamed (Watford General Hospital); R Williams, J Garnham, BY Patel, HD Robb, J Allington, L Cloney (West Middlesex University Hospital); A Tamborska, K Kalia, EJM Fung, Z Johnston, L Lynch, A Christides, HL Tan, G Cynthia, B Tsang,KK Ang (Western General Hospital, Edinburgh); C Rossi, M Kaubrys, N Al-Khafaji, M Jenkins (Weston General Hospital, Weston-Super-Mare); JH Choong, SM Chok (Whipps Cross University Hospital); GB Peiris, TM Mohamed, S Gunning, E Nimako, D Pandya (Whittington Hospital); P Hever, A Amayo, C Bull, NJ Hudson-Peacock, C Clements, M Al-Sheikh (William Harvey Hospital); F Savioli, M Long, E Horsfield, C Robertson, S Ogboru, AC Mcilwrath (Wishaw General Hospital); S Bhanderi, S Bailey, J Bell (Worcestershire Royal Hospital); KRM Hebbar, C Limb, N Obeid, JE Rich, A Balasubramaniam (Worthing Hospital); BS Mothe, R Mashar (Wythenshawe Hospital, Manchester); M Taylor, JR Schuster Bruce, CR Weegenaar, G Dennison, NJ Curtis (Yeovil District Hospital); M Saad, E Ezerska, B Ellis, M Brown, S Wiggill, A Tee (York Hospital); S Ng, CFW Carder, A Abdelwahed, CR Bowman, SB Chandler, BJ Tinsley (Ysbyty Wrexham Maelor Hospital); **Italy:** G Savino, E Finotti (Santa Maria Regina degli Angeli Aulss 5 Polesana- Adria Hospital); F Serventi, G Occhioni, F Cossu (Alghero Ospedale Civile); I Vulcano, F Viscosi (AOU G. Martino Policlinico di Messina / Università degli Studi di Messina); G Pata (Asst Spedali Civili di Brescia); G Baronio, M Michelini, B Compagnoni, C Sepe (Asst Valle Camonica-Esine); SM Isolani, G Regina, D Pertile (Ausl Piacenza); A Lucchi, V Alagna, G Martorelli, C Gabbianelli (Ausl Romagna - Ceccarini Hospital - Riccione); P Moroni, M Zuin (Azienda Ospedaliera Universitaria Di Padova); S Conci, T Campagnaro, G Lazzari (Azienda Ospedaliera Universitaria Integrata Verona); D Costamagna, JH Choong (Borgomanero Hospital); TZ

Zurleni, MA Altomare, EGJ Gjoni (Busto Arsizio Hospital); J Desiderio, A Sagnotta, A Di Cintio, A Gemini, S Trastulli (Azienda Ospedaliera Santa Maria Terni); FM Carrano, CE Brown (Galmarini Hospital, Tradate); E Viviani, M Inama (Hospital Pederzoli); F Coccolini, M Tomasoni, G Montori (Hpg XXIII Bergamo); A Sgrò, G Harder, F Argenti, S Malabarba (Irccs Policlinico San Matteo - Pavia); P Checcacci, P Montanelli, F Guerra, I Skalamera, F Staderini, S Grandi, T Nelli, F Coratti (Aou-Careggi - Florence); L Sorrentino, A Maffioli, F Colombo, D Cavallo, A Bondurri (L.Sacco University Hospital); G Groppo (Montichiari Hospital); R Curti, L Solaini (Morgagni-Pierantoni Hospital, Forlì); A Xidas, S Aresu, T Manias, D Delogu, A Vacca (Nostra Signora Della Mercedes Hospital); L Solinas (Ospedale S.Giovanni di Dio-Orbetello); A De-Manzoni-Garberini (Ospedale Civile Spirito Santo di Pescara); C Corbellini, L Fiore (Ospedale Di Rho (Milano); - Asst Rhodense); A Nigro, L Santurro, M Angrisani, N Tamini (Ospedale San Gerardo); S Mulas, C Sparta, A Lorettu, FA Mura, GV Ruggiu (Ospedale Santissima Annunziata Aou Sassari Uoc Chirurgia Generale E D'Urgenza); PF Pirari, R Pau, M Melis, F Piu, S Patti, A Deserra, N Cillara (Po Santissima Trinità - Assl Cagliari); D Coletta, D Angelieri, C Del Basso, D Rossi, I Iannone, C De Padua, C Giubilo, F Falaschi, B Cirillo (Policlinico Umberto I Università 'La Sapienza'); L Gordini, F Podda, S Sanna, E Erdas (Policlinico Universitario 'Duilio Casula'); A Saba, G Poillucci, E Pinna, A Messina (Policlinico Universitario Di Monserrato); G Sena, G Sammarco, R Cardona, G Gallo, E De Luca, R Sacco, G Vescio, M Ammendola, R Romano (Pugliese-Ciaccio' Hospital, Catanzaro / University "Magna Graecia" of Catanzaro); A Bianco, P Bonfante, L D'Ambra, C Feleppa, E Francone, A Gennai, V Lizzi, E Moggia, M Imperatore (S. Andrea Hospital Poll-Asl5); S Bolzon, N Assaf, M Chatzikonstantinou (S. Maria Delle Croci Ravenna); A Birindelli, A Belvedere, E Amaducci, MC Ripoli, E Segalini, M Cervellera, S Vaccari (S.Orsola-Malpighi); CO Eretta, R O'Neill, O Llewelyn, NFT Engall, N Jones (San Bartolomeo Hospital Sarzana); F Clerici, M Ballabio, F Ferrara (San Carlo Borromeo Hospital, Milan); E Andolfi, M Angelini, A Biancafarina, A Fontani, E Miranda, M Scricciolo, G Provenza, GA Pellicanò (San Donato Hospital, Arezzo); F Pulighe, M Podda, G Argenio, A Melis, F Balestra, M Anania, A Cruccu, C Massaiu, ML Murru (San Francesco Hospital, Nuoro); A Martino, AP Luzzi, G La Valle, S Scabini (San Martino Genova); CI Zapana Chillitupa, A Bartoli, D Conti, L Marano, A Spaziani, R Bellochi, C Listorti, G Castagnoli (San Matteo degli Infermi Hospital - Ausl Umbria 2 - Spoleto); MC Salandini, A Miegge, P De Nardi, M Carlucci (San Raffaele Hospital); F Pata, SM Tenconi, M Cannavò (Sant'Antonio Abate Hospital, Gallarate); D Sasia, A Marano, MC Giuffrida, G Cannata, L Pellegrino, G Giraudo (Santa Croce And Carle Hospital, Cuneo); M Baraghini, A Garzi, R Giudicissi, T Zalla, L Romoli, A Vannucchi, I Giani, F Feroci, M Calussi (Santo Stefano Hospital); M Ribaudo, A Fiorot, T Stecca, FE D'Amico, C Nistri, C Fornasier (Treviso Hospital - Ca Foncello); GA Arcuri, SV Valiani, DB Brunelli, LE Evoli, NG Giuliani, AC Contine, CR Renzi (U.S.L. Umbria 1 - Città Di Castello); CV Feo, G Anania, L Gavagna, P Carcoforo, F Aisoni (University of Ferrara); G Salamone, L Licari, R Tutino, G Cocorullo, V Silvestri, P De Marco, T Fontana, G Orlando, N Falco (University of Palermo); M Baseggio, S Napetti, A Mella, GM Rossi, A Chimetto, E Goldin, M Cosci, M Bonomo (Vicenza Hospital); G Scialandrone, N Chetta (V. Emanuele II, Bisceglie); **Portugal:** ML Matos, LC Carvalho, JS Magalhães, AM Pereira (Centro Hospitalar de Entre o Douro e Vouga E.P.E.); C Fernandes, A Fareleira, D Gonçalves, M Pais, A Pereira, FM Resende (Centro Hospitalar De São João); D Correia, D Cardoso (Centro Hospitalar Lisboa Ocidental); AFS Tojal, S Catarino Santos (Centro Hospitalar Tondela-Viseu); LCS Barbosa, HC Louro (Centro Hospitalar Vila Nova De Gaia); F Bairos, FM Martins, FM Messias (Hospital Da Horta); MS Ferreira, FC Borges, P Botelho (Hospital Garcia De Orta); MJRT Lima, PM Valente (Hospital Pedro Hispano - Uls Matosinhos); AA João, JM Guimarães, AS Soares, R Rocha, ST Nogueira (Hospital Prof. Dr. Fernando Fonseca); **Republic of Ireland:** U Kabir, CLL Wong, LS Rahmani, S Tan, S Chng, B Jasinski, SA Cheng, S Mardhiah, K McGlynn (Letterkenny University Hospital); E Hannan, J Burke (Beaumont Hospital); ND Kennedy, Z Haveliwala (Blackrock Clinic); M O'Neill, M Boland (Connolly Hospital, Blanchardstown); C Hayes, AMW Fox (Mater Misericordiae University Hospital); A Zaborowski, RM Mitru, JA De-Marchi, A Mc-Dermott (Our Lady Of Lourdes Hospital); D Coyle, I Stoica, SV McMahon, BR O'Connor, D Mc Laughlin, M

Kannegieser-Bailey, R Murphy, A Muntean (Our Lady's Children's Hospital, Dublin); S Shet, L Thomas, S De Freitas (Portiuncula Hospital); S Quill, A Aljorfi, NM Foley (Sligo University Hospital); BWT Soh, JJ Law, J Hartnett, T Jansen, JET Gilgan, J Jung, K Scanlon, A Szucs, J Wong (St James' Hospital, Dublin, Ireland); DP Ahern, AE Redmond (St Vincent's University Hospital); A Szucs, SE Edwards, LA Tiedt, P Manoharan, S Brennan (Tallaght Hospital); JC Bolger, AM Abdelgadir, KL Mckevitt, MA Zarog (University Hospital Limerick); G Ahmed, W Bukhari (University Hospital Waterford); A Ahad, OS Ahmed (Wexford General Hospital); **Spain:** M Paniagua, C Samartin, JC Primo, L Garrido, M Lopez, E Rufo, I Trostchansky, L Rodriguez, H Infante (Alvaro Cunqueiro Hospital); A Acosta, P Cremades, A Cidoncha (Complejo Asistencial De Segovia); V Olmos, I Oliva, C Santamaria, A Cavero, H Calvo (Complejo Asistencial Universitario De León); CA Suero, VM Maderuelo, P Galvez (Complejo Asistencial Universitario De Palencia); A Hernando, I Eguaras, AC Recreo (Complejo Hospitalario De Navarra); M García-Carrero, R Moreda, M García (Complexo Hospitalario Universitario De Ourense); U De Andres, E Del Pozo, M Calvo (Galdacano); C Navarro Moratalla, R Núñez Ronda, R Gómez Contreras, C Báez De Burgos, GF Valderas Cortés, C Cifre Martínez, A Rios Agudo, J Tárraga Soriano, XM Hernández Ramos (General University Hospital Of Valencia); E Echazarreta, M Elia, A Hernaez, L Sanchez (H Clinico Universitario Zaragoza); C Vallejo-Bernad, JR Oliver, M Sánchez-Rubio, HK Kälviäinen, S Genzor, T González-Nicolás, E Puerta, E Laviano, T Gimenez (H.U. Miguel Servet. Zaragoza); C Cerdán-Santacruz, A Fermiñán, P Muriel-Álvarez, JE Sierra-Grañón, J Escoll-Rufino, E Cuello-Guzmán, N Mestres-Petit, M Merichal-Resina, A Pinillos-Somalo (Hospital Arnau De Vilanova De Lleida); Z Gomez-Carmona, AP Vazquez-Fernandez, JJ Trujillo-Diaz (Hospital Clinico De Valladolid); JLRC Rodríguez Couso, MIDR Darriba Fernández (Hospital Comarcal De Valdeorras); E Riera, J Espinosa (Hospital De Cerdanya); A García-Novoa, M Carral-Freire, R Martínez-Almeida (Hospital Do Salnés); S Santarrufina-Martínez, JC Sebastián-Tomás, P Gonzálvez-Guardiola (Hospital Universitario Doctor Peset, Valencia); E Corral Fernández, A Sánchez Mozo, T Ivanov Stoyanov, P Casado Santamaría, E García Grimaldo (Hospital General de Villarrobledo); L García-Catalá, A Fernández-Candela, C Curtis-Martínez (Hospital General Universitario De Elche); SR Del-Valle-Ruiz, A Sánchez-Cifuentes, M Ramírez-Faraco, AJ Fernández López (Hospital General Universitario Reina Sofía); C Leon, S Kumar (Hospital Gutierrez Ortega); M Fornell-Ariza, S Ayllón-Gámez, C Peña-Barturen (Hospital Puerta Del Mar); L Ojea-Ruiz-Yherla, M Saavedra-Chacón, JA Navas-Cuéllar (Hospital Punta De Europa); J Perez-Calvo, H Gomez-Facundo, L Riba-Combatti, O Crusellas Manas (Hospital Sant Joan Despi, Moises Broggi); B De-Soto-Cardenal, P De-La-Herranz-Guerrero, C Dominguez-Sanchez, JC Gamero-Huaman, A Suarez-Cabrera, AA Ramirez-Redondo, Y Lara-Fernandez, B Bascuas-Rodrigo, BL Lopez-Duran (Hospital Univ. Virgen Macarena); C Caula, A Pigem, J Gil, H Salvador, P Planellas, R Farrés (Hospital Universitari De Girona Doctor Josep Trueta); ER Sanchez, A Caballero, M Arnau (Hospital Universitari Germans Trias I Pujol); R Blanco-Colino, I Tapiolas, N Ridaura (Hospital Universitari Vall D'Hebron); L Sobrino Roncero, F Collado-Roura, L Martinez Fijo, M Serrano Navidad, O Barrios Cormenzana, N Lluís Viñas, M Sorribas Grifell, M Alberich Prats, A Alvarez Torrado (Hospital Universitari de Bellvitge); S Sanz-Navarro, E Contreras-Saiz, L Solar-García, M Moreno-Gijón, A Suárez-Sánchez, T Díaz-Vico, D Fernández-Martínez, JL Rodicio-Miravalles, C García-Gutierrez (Hospital Universitario Central De Asturias, Oviedo); U Pila, S Melone, L Martin-Prieto (Hospital Universitario Fundación Alcorcon, Madrid); JA Rojo, M Gonzalez, L Zorrilla (Hospital Universitario Infanta Sofia); V Soria-Aledo, JA Garcia-Marin, M Baeza-Murcia, E Pellicer-Franco, MA Jimenez-Ballester (Hospital Universitario J.M. Morales Meseguer, Murcia); L Asensio-Gomez, S Gortazar-De-Las-Casas, J Guevara-Martinez (Hospital universitario La Paz); M Lopez, L Ramirez, S Verea, F Anguita, G Navarro (Hospital Universitario Lucus Augusti); A Del Castillo Criado, M Cañon Lara, E Toledo Martinez (Hospital Universitario Marques De Valdecilla); A Sanchez-Martinez, L Hernandez-Gimenez, M Galofre-Recasens (Hospital Universitario Mutua Terrassa); I Ferrer-Vilela, LE Pérez-Sanchez, M Burneo Esteves, A Menéndez-Moreno, C Baz-Figueroa, A Rosat, M Savoie Hontoria, N Alonso García (Hospital Universitario Nuestra Señora De Candelaria); R Gracia-Roman, M Pascua-Sole, O Pino-

Perez (Hospital Universitario Parc Tauli); JM García-Pérez, C Pineño-Flores, D Ambrona-Zafra (Hospital Universitario Son Espases); L Sanchez-Guillen, J Sancho-Muriel, E Alvarez, A García-Granero, R Jiménez-Rosellón, O Daga (Hospital Universitario Y Politécnico La Fe); A Alberca-Paramo, S Sanchez-Garcia, E García-Santos (Hospital Universitarios Ciudad Real); F Pareja-Ciuró, C Olivares-Oliver, L Navarro-Morales, MJ Tamayo-López, J Tinoco-González, CO García-Rivera, I Alarcón-Del Agua, F Moreno-Suero, E Pereira-Mosquera (Hospital Virgen Del Rocío, Sevilla); C Zerpa, E Llacer, A Diaz, A Caro, F Feliu, M Franco, J Escuder, M Abellan, E Padilla (Hospital Universitario Joan XXIII, Tarragona); M Rodriguez-Lopez, S Mambrilla-Herrero, KT Plua-Muniz, M Bailon-Cuadrado, FJ Tejero-Pintor, E Choolani-Bhojwani (Hospital Universitario Rio Hortega); C Vila-Zarate, LJ Delgado-Plasencia (Hospital Universitario de Canarias); L Ponchietti, G Pata (Torrevieja Hospital).

Data validators (validation; writing – review & editing): N Varma (Addenbrooke's Hospital); L Cousins (Altnagelvin Area Hospital); A Busuttil (Basildon University Hospital); C Baird (Birmingham Heartlands Hospital); N Drye (Bradford Royal Infirmary); OD Brown (Bristol Royal Infirmary); S Mansour (Broomfield Hospital); O Anderson (Colchester General Hospital); B Woodward (Conquest Hospital, St Leonards On Sea); R Mahapatra (Countess Of Chester Hospital); JA Clements (Craigavon Area Hospital); N D'Souza (Croydon University Hospital); R Thompson (Daisy Hill Hospital, Newry); DJ Littlehales (Furness General Hospital, Barrow-In-Furness); AM Tang (Glangwili General Hospital, Carmarthen); BE Byrne (Gloucestershire Royal Hospital); CY Tan (Hinchingbrooke Hospital, Huntingdon); P Cunha (Homerton University Hospital); C Ogbuokiri (Huddersfield Royal Infirmary); T Alhammali (Kettering General Hospital); P Eiben (King's College Hospital); F Chowdhury (King's Mill Hospital, Sutton In Ashfield); G Gravante (Leicester Royal Infirmary); H Kho (Lincoln County Hospital); S Lodhia (Lister Hospital, Stevenage); S Dobbs (Manchester Royal Infirmary); T Doulias (Medway Maritime Hospital, Gillingham); JCK Ng (Monklands Hospital, Airdrie); MSJ Wilson (Ninewells Hospital, Dundee); R Venugopal (Norfolk And Norwich University Hospital); N Panda (North Manchester General Hospital); J Wolff (Northampton General Hospital, Northampton); K Akhtar, HD Walji (Peterborough City Hospital); JM Tognarelli (Queen Elizabeth Hospital, Woolwich); KA Knight (Queen Elizabeth University Hospital, Glasgow); A Ansari (Queen's Medical Centre, Nottingham); SA Hussaini (Rotherham District General Hospital); E Wright (Royal Alexandra Hospital, Paisley); E Gammeri (Royal Berkshire Hospital, Reading); H Brewer (Royal Derby Hospital); S Rinkoff (Royal Free Hospital); RL Harries (Royal Gwent Hospital, Newport); CJ Fairfield (Royal Infirmary Of Edinburgh); LM Hickey (Royal Lancaster Infirmary); TEF Abbott (Royal London Hospital); A Jackson (Scunthorpe General Hospital); HL Wright (St Thomas' Hospital); U Walters (University College Hospital); K Carney (University Hospital Of North Tees); PC Logan (Walsall Manor Hospital); Z Mughal (University Hospital Coventry and Warwickshire); E Strachan (West Middlesex University Hospital); M Boland (Western General Hospital, Edinburgh); SM Andreani (Whipps Cross University Hospital); B Chasty (Whittington Hospital); A Sharma (Wythenshawe Hospital, Manchester); JKY Ma (Ysbyty Wrexham Maelor Hospital); **Italy:** C Mazzeo (AOU G. Martino Policlinico di Messina / Università degli Studi di Messina); B Badii (Aou-Careggi - Florence); A Armellini (Asst Spedali Civili di Brescia); M Grassia (Ausl Romagna - Ceccarini Hospital - Riccione); A Perin (Azienda Ospedaliera Universitaria Di Padova); A Ruzzenente (Azienda Ospedaliera Universitaria Integrata Verona); F Roscio (Galmarini Hospital, Tradate); M Magnoli (Irccs Policlinico San Matteo - Pavia); A Avanzolini (Morgagni-Pierantoni Hospital, Forlì); S Mulas (Ospedale Santissima Annunziata Aou Sassari Uoc Chirurgia Generale E D'Urgenza); N Cillara (Po Santissima Trinità - Assl Cagliari); N Depalma (Policlinico Umberto I Università 'La Sapienza'); A Longheu (Policlinico Universitario 'Duilio Casula'); M Papandrea (Pugliese-Ciaccio' Hospital, Catanzaro / University "Magna Graecia" of Catanzaro); L Dova (S. Andrea Hospital Poll-Asl5); M De Prizio (San Donato Hospital, Arezzo); GP Gusai (San Francesco Hospital, Nuoro); L Di Zitti (San Matteo degli Infermi Hospital - Ausl Umbria 2 - Spoleto); P Geretto (Santa Croce And Carle Hospital, Cuneo); A Azabdaftari (Santa Maria Regina degli Angeli Aulss 5 Polesana- Adria Hospital); G Chianese (Sant'Antonio Abate Hospital,

Gallarate); C Elbetti (Santo Stefano Hospital); C Ruffolo (Treviso Hospital - Ca Foncello); S Giaccari (University of Ferrara); G Salamone (University of Palermo); **Portugal:** V Devezas (Centro Hospitalar De São João); JS Ferreira (Centro Hospitalar Vila Nova De Gaia); RSA Peixoto (Hospital Pedro Hispano - Uls Matosinhos); **Republic of Ireland:** AD Hill (Beaumont Hospital); A Alshafei (Our Lady's Children's Hospital, Dublin); **Spain:** G Ais (Complejo Asistencial De Segovia); V Simo (Complejo Asistencial Universitario De León); H San José (Complejo Asistencial Universitario De Palencia); B Ugarte-Sierra (Galdacano); A De Andrés Gómez (General University Hospital Of Valencia); C Cerdán-Santacruz (Hospital Arnau De Vilanova De Lleida); J Beltran-De-Heredia (Hospital Clinico De Valladolid); MC Bazán-Hinojo (Hospital Puerta Del Mar); JA Navas-Cuéllar (Hospital Punta De Europa); JC Gomez-Rosado (Hospital Univ. Virgen Macarena); A Bravo Salva (Hospital Universitari de Bellvitge); N Gómez (Hospital Universitari De Girona Doctor Josep Trueta); F Marinello (Hospital Universitari Vall D'Hebron); V Medina-Arana (Hospital Universitario de Canarias); C Payá-Llorente (Hospital Universitario Doctor Peset, Valencia); L Vega (Hospital Universitario Fundación Alcorcon, Madrid); M Mengual Ballester (Hospital Universitario J.M. Morales Meseguer, Murcia); B Espina (Hospital Universitario Joan XXIII, Tarragona); MI Prieto-Nieto (Hospital universitario La Paz); M Lopez (Hospital Universitario Lucus Augusti); E Caballero Rodríguez (Hospital Universitario Nuestra Señora De Candelaria); M Rodriguez-Lopez (Hospital Universitario Rio Hortega); M Frasson (Hospital Universitario Y Politécnico La Fe); D Padilla-Valverde (Hospital Universitarios Ciudad Real); VM Duran-Muñoz-Cruzado (Hospital Virgen Del Rocío, Sevilla).

Acknowledgements: We are grateful to the Birmingham Surgical Trials Consortium at the University of Birmingham for the use of their servers for secure online data collection.