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## Table S2: CoCE criteria description, processes outlined and monitoring protocols described in the initiatives.

1 <sup>st</sup> Author	Country / Region	PROCESSES DESCRIBED		
		Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
Bitzer et al <sup>1</sup>	Europe	<ul> <li>Staffing and infrastructure recommendations</li> <li>Training and professional development opportunities</li> <li>Formal links with academic institution</li> </ul>	Not reported	In order to audit outcomes, the number of patients, gender, diagnoses, and interventions would be tracked, as well as patient follow-up and satisfaction. Lastly, a cost analysis is necessary.
Burkett et al <sup>2</sup>	Not reported	<ul> <li>High patient satisfaction</li> <li>Lower utilization of medical services and medications</li> <li>Low overall cost of care</li> <li>Provide a quicker return to work or regular activity for patients.</li> <li>Superior medical care with seamless coordination between disciplines</li> <li>High volume of patients treated.</li> </ul>	Not reported	Report that centers of excellence are held to specific quality metrics to maintain "center of excellence" designation, specific quality metrics not reported.
Campbell et al <sup>3</sup>	India	<ul> <li>High level of patient need</li> <li>Good working relationship between organisations</li> <li>Receptiveness and capacity of local government, hospitals, and medical societies</li> <li>Political and economic environment consistent with the ability to provide care</li> </ul>	Local government approached Operation Smile for assistance with treating its cleft backlog. Site visit to determine site suitability.	Not reported
Carvalho and Jill <sup>4</sup>	USA	<ul> <li>Must demonstrate adherence to all criteria below (each clearly described in source documents):</li> <li>Personnel and staffing Equipment, protocols, and policies</li> <li>Simulation and team training</li> <li>Obstetric emergency management</li> <li>Caesarean delivery and labour analgesia care</li> <li>Recommendations and guidelines for implementation</li> <li>Quality assurance and patient follow-up systems</li> </ul>	Apply to the Society of Obstetric Anaesthesia and Perinatology applications reviewed and graded by the COE Subcommittee. If successful, granted CoE Designation	Recertify every 4 years using the same process
Casanueva et al <sup>5</sup> & Tritos <sup>6</sup>	International	<ul> <li>Provide the best standard of care to patients with pituitary tumors and disorders</li> <li>Organise multi-D clinical management</li> <li>Liaison between experienced neurosurgeons and expert neuroendocrinology</li> <li>Specialised staff training</li> <li>Provision of educational courses</li> <li>Comprehensive patient information and data management</li> <li>Sharing information with scientific bodies and administrators</li> <li>Support endocrine units outside PTCOE</li> <li>Advise health administrators and authorities on specific problems</li> <li>Advance the science and scholarship of pituitary tumours</li> </ul>	Not reported	Currently, no formal accreditation for PTCOE exists. The external body may or may not perform the final step of validation of the centre

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		Include tumour data on national registries		
Chang et al <sup>7</sup> & Lymphatic Education & Research Network <sup>8</sup>	USA	<ul> <li>Minimum criteria for comprehensive centers of excellence:</li> <li>Mandatory list of staffing including surgeons and therapist</li> <li>Demonstrated proficiency in diagnosis, imaging, conservative management, assessment tools, interventional therapies, surgery</li> </ul>	<ul> <li>Applications will be reviewed by the LE&amp;RN Global Oversight Committee (GOC). All applications will be scored, using the following three individual criteria: <ul> <li>a. The quality of the overall application/services.</li> <li>b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic.</li> </ul> </li> <li>C. Miscellaneous (e.g., lymphatic disease community citizenship, research).</li> </ul>	Designation is valid for 3 years
Choque- Velasquez et al <sup>9</sup>	Peru	Not reported	Not reported	Evaluated using volume of neurosurgery
Coon et al <sup>10</sup>	USA	Comprised of: • Core clinical team • Additional subspeciality care • Longitudinal data collection • Support group involvement • Research opportunities • Additional support	Not reported	Not reported
Creehan et $al^{11}$	USA	<ul> <li>Domains of ANCC model for the Magnet Recognition Program         <ul> <li>transformational leadership</li> <li>structural empowerment</li> <li>exemplary professional practice</li> <li>new knowledge, innovation and improvement</li> </ul> </li> </ul>	Not reported	Not reported
Daming et al <sup>12</sup>	USA	<ul> <li>Established in tertiary care hospital.</li> <li>Created inpatient and outpatient protocol.</li> <li>Has a set of criteria specific to maternal cardiac CoE and cardiac CoE and cardiovascular intensive care unit</li> </ul>	Self-nominated as Centre of Excellence	<ul> <li>Monitoring productivity and streamlining communication between hospital</li> <li>Management and stakeholders are the role of a program director.</li> </ul>
Deshmukh et al <sup>13</sup>	India	<ul> <li>CoE is an organisational environment that strives for and succeeds in developing high standards of conduct in a field of research, innovation and learning.</li> <li>Capacity building for staff</li> <li>Patient awareness</li> <li>Increase in number of patients visiting the units and opting for treatment.</li> <li>Research initiatives</li> <li>Collaborations and networking</li> </ul>	Not reported	Evaluation based on public health program evaluation criteria - assessing and documenting program implementation, outcomes, efficiency and cost-effectiveness of activities.
		Criteria for pillars of excellence (Academics, Research, Clinical, Faculty		

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		development, Technology, Social) – what consisted of the criteria was not described, however the outcome was outlined in the study)		
Dietz et al <sup>14</sup>	USA	<ul> <li>Suggestion of CoE criteria but did not expand</li> <li>Multi-disciplinary care pathways and teams and evaluation of surgeon's credentials,</li> <li>Electronic medical records</li> <li>Patient data management and or tracking</li> <li>Process metric</li> </ul>	Not reported	Not reported
Distiller and Brown <sup>15</sup>	South Africa	<ul> <li>Integrated information technology systems</li> <li>Aligned finances and responsibility</li> <li>Care planning</li> <li>Clinical engagement and leadership</li> <li>Robust clinical governance</li> <li>Multi-disciplinary team</li> </ul>	Not reported	Outcome-based monitoring protocol • Glycaemic control • Hospital admission • Microvascular disease outcomes
Draznin et al <sup>16</sup>	USA	<ul> <li>Focus on high-risk individuals and an open-door policy</li> <li>Clear communication to guide care</li> <li>Provision of comprehensive care</li> <li>Ongoing focus on quality improvement</li> <li>Ongoing monitoring of patient outcomes</li> <li>Education and dissemination</li> </ul>	Not reported	Not reported
El-Eshmawi et al <sup>17</sup>	USA	<ul> <li>Centers with surgeons that can achieve a very high likelihood of a durable valve repair</li> <li>Dedicated multidisciplinary team (see staffing resources)</li> <li>Transparent data management and quality assessment</li> </ul>	Self-nominated -The center was formed and then discussed the criteria used in this study.	Monitoring of proportion of patients with successful valve repair; durability of valve repair
Elrod and Fortenberry <sup>18</sup>	USA	<ul> <li>Supplies an exceptionally high concentration of expertise and related resources centered on a particular area of medicine</li> <li>Delivers care in a comprehensive, interdisciplinary fashion</li> <li>Leads to best possible patient outcomes.</li> </ul>	Overseen by organisation – an interdisciplinary committee vets the proposed Centre of excellence (assesses financial resources, culture and leadership support)	Not reported
Ferguson and Froehlich <sup>19</sup>	USA	Not reported.	Self-nominated	<ul> <li>Length of stay</li> <li>Increased Patient volume</li> <li>Monthly snapshot of - financial (includes caseload, cost and labour/case) <ul> <li>operational (includes length of stay, discharge to rehabilitation)</li> <li>patient experience</li> <li>quality (includes process measures, infections, falls, readmissions)</li> </ul> </li> </ul>
Frara et al <sup>20</sup>	Authorship	• "Explicit and practical definitions for a degree of excellence have not yet	Most are self-appointed without any formal	Discuss measuring effect via patient outcomes, cost of treatment,

	team from Spain	been defined" • Require an integrated multidisciplinary group in a single location	acknowledgement	research outputs, and contribution to scientific efforts (e.g. scientific meetings, health registries)
Geetha et al <sup>21</sup>	USA	<ul> <li>Achieving a level of mastery related to</li> <li>Patient care</li> <li>Explicitly modelling this mastery to medical trainees</li> <li>Collaborating with investigators to advance science and discovery</li> </ul>	Not reported	Not reported
Haider et al <sup>22</sup>	LMIC	<ul> <li>Patient care: must provide safe, effective and accessible care to the highest possible standards depending on geography, resources, infrastructure, patient population and local culture with site-specific management guidelines</li> <li>Training: provides leadership in best practices, research, support and training for focus area</li> <li>Dissemination of knowledge is essential function of the centre</li> </ul>	Not reported	Recommend data collection to quantify impact and identify areas for change
King, Jamieson and Berg <sup>23</sup>	USA	<ul> <li>Reviewed criteria of designated Centres of Excellence within Solid organ Transplant Networks- common features include</li> <li>Number of patients treated</li> <li>Good patient and graft outcomes compared to national average on Scientific Registry of Transplant Recipients</li> <li>Centres of Medicare and Medicaid Services certified</li> <li>+/- cost-effective care</li> </ul>	Formally designated by insurers and employers	Need to monitor quality of care: Patient factors Facility and program structure Transplant centre processes Waiting list management Post transplant care Clinical and patient centred outcomes Cost effectiveness Team experience Organ donation environment
Kullar et al <sup>24</sup>	USA	<ul> <li>Sustained institutional leadership commitment and accountability (e.g. mission statement, letter of attestation from management, documentation of physician leadership) Drug expertise (evidence of infectious disease and pharmacy expertise)</li> <li>Action (e.g. action plan, disease specific protocol)</li> <li>Tracking (e.g. monitoring antibiotic use, demonstration of use of electronic health record as part of antimicrobial stewardship program)</li> <li>Reporting (e.g. demonstrated participation in national reporting program)</li> <li>Education (documented professional development program)</li> </ul>	Infectious Diseases Society of America (IDSA) solicited applications. Centres required to submit documentation of core criteria. A committee of 6 ID pharmacists and physicians with extensive AMS experience reviewed applications.	The CoE designation is valid for 2 years, after which the institution must re-apply
Lancellotti, Dulgheru and Sakalihasan <sup>25</sup> & Chambers et	Multiple European countries	<ul> <li>Specialist valve clinic acts as a hub between community, other hospitals and extracardiac departments, and between non-invasive cardiologists and surgeons and interventional cardiologists</li> <li>Nominated cardiac experts with speciality skills</li> <li>Regular case discussions</li> </ul>	Not reported	Have a high-volume operation rate on valvular heart disease, which is believed to be associated with better repair results and potentially improved outcome. This partly explains why there is no obligation to refer patients eligible for surgical repair in centres of excellence

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al <sup>26</sup>		<ul> <li>Systematic approach to reducing medical and surgical risks</li> <li>Data review: Robust internal audit processes including repair rates, rates of residual regurgitation, complications, durability of repair and reoperation rate</li> <li>Results available for review internally and externally</li> <li>Involvement in national databases</li> </ul>		
Li et al <sup>27</sup>	USA	<ul> <li>Variable - can be selected and overseen by insurance companies, medical professional societies, government organisations, employer professional associations, individual employers or hospitals themselves</li> <li>Insurers (different criteria used between different companies) tend to use data and identify centres that perform well on structural outcomes such as use of protocols and outcome measures such as hospital readmissions, complication rates, and volume. Cost sometimes considered</li> </ul>	Some insurers use of a panel of experts from national organizations who understand the insurer's objectives and help select hospitals to be part of the CoE network.	Not reported
Marinoff and Heiberger <sup>28</sup>	China	Not reported	Self-nominated following partnership between State University of New York College of Optometry and Wenzhou Medical University	Not reported
Martin et al <sup>29</sup>	various	<ul> <li>Standardization of protocols for the workup of suspected spinal cord compression across the regional hospital system to improve time to diagnosis, transport, and intervention.</li> <li>Unified and standardized vendors and equipment across surgeons and the two departments to improve cost savings and resource utilization.</li> </ul>	Not reported	Not reported
McLaughlin et al <sup>30</sup>	USA	<ul> <li>Propose that centres fulfil the following</li> <li>Provide multidisciplinary optimal clinical care to patients with pituitary tumours and related disorders</li> <li>Provide residency, fellowship training and/or continuing medical education and patient support</li> <li>Contribute to research in the field of pituitary disorders.</li> </ul>	Not reported	Need to develop - suggested recognition or verification process be an ongoing process that is updated biannually
Nakov <sup>31</sup>	Bulgaria	<ul> <li>Elements that should be considered:</li> <li>Establish a dedicated team of multidisciplinary experts</li> <li>Engage with patient advocacy group</li> <li>Initiate a specific training regime to continue education for new and existing members of the team</li> <li>Source appropriate funding to ensure sustainability</li> <li>Schedule regular team meetings to ensure an individual plan for patient diagnosis, treatment and follow up</li> </ul>	Not reported	Not reported
Piccini et al <sup>32</sup>	Not specifically	<ul> <li>Identification and referral of patients</li> <li>Appropriate staffing and dedicated clinics that focus on AF patients</li> </ul>	Not reported	Not reported

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	identified	<ul> <li>Developing a comprehensive care team</li> <li>Specific treatment goals</li> <li>Evaluating and improving symptoms</li> <li>Rate and rhythm control</li> <li>Stroke prevention</li> <li>Treatment of risk factors</li> <li>Development of team based care pathways</li> <li>Quality improvement</li> </ul>		
Pronovost et al <sup>33</sup>	USA	<ul> <li>Provide frictionless access</li> <li>Ensure coordinated compassionate navigation</li> <li>Epply rigorous appropriateness criteria for all the expensive diagnostic studies and procedures</li> <li>Engage the entire team around the purpose of providing high-value care</li> <li>Ensure the site of service and surgeon optimal</li> <li>Reduce variation and complications by using evidence-based protocols</li> <li>Provide personalized care</li> <li>Continually monitor, transparent report and improve performance</li> </ul>	Not reported	Outcome-based evaluation process
Safer Care Victoria <sup>34</sup>	Australia	<ul> <li>Centres based on population health (e.g., acute, chronic and prevention, older people, women and children and funded program.</li> <li>Have 3 core functions: advocate and inform, guidance and advice and improvement.</li> <li>Has a list of key groups that the centres partner with to plan and deliver work</li> </ul>	Not reported	Not reported
Sandhu et al <sup>35</sup>	USA	Focus area • Access to care • Stroke prevention • Education • AF quality improvement • AF barrier	Not reported	Not reported
Santos- Moreno et al <sup>36-38</sup>	South America	<ul> <li>3 types of CoEs were defined based on structure, process and outcomes indicators         <ul> <li>structure indicators - Evaluate the institutional capacity to deliver the expected results, adequate infrastructure, suitable personnel including rheumatologists and other professionals to ensure comprehensive attention, and the existence of complementary resources</li> <li>process indicators (Adherence to management recommendations based on treatment strategy by objectives</li> <li>outcome indicators (The achievement of the objectives proposed along the care or comprehensive patient must be evaluated. The progression of</li> </ul> </li> </ul>	Steps to implement CoE for RA Step 1: implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of center of excellence Step 2: filling the self-assessment form of each type of center of excellence and implementing improvement actions Step 3: requesting and preparing for a verification visit Step 4: receiving a verification visit	<ul> <li>The follow-up should take place according to the following 6 characteristics:</li> <li>1. Clinimetrics</li> <li>2. Decision-making factors based on the results of the clinimetrics</li> <li>3. Opportunities to access treatment or follow-up</li> <li>4. Patient education</li> <li>5. Clinical care guidelines</li> <li>6. Evaluation system</li> </ul>

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		<ul> <li>the disease, functional disability, and the achievement of remission goals must be quantified using clinimetric scales.</li> <li>Different quality standards requirements for each CoE model and centres need to apply to get CoE.</li> <li>3 types of centre (must meet accreditation and meet minimum criteria for each type)</li> <li>Standard</li> <li>Optimum</li> <li>Model</li> </ul>	Step 5: official notice of the results of the assistance and verification visit	<ul> <li>Must be assessed and accredited cyclically based on standards, evaluators and evaluation and qualification process.</li> </ul>
Sheha and lyer <sup>39</sup>	USA	<ul> <li>Suggested to use Joint Commission certification that requires healthcare facility to comply with national starts, use of evidence based practice and collect performance measures. Also to partner with American Academy of Orthopaedic Surgeons to provide certifications to standardised CoE.</li> <li>Key tenets for CoE</li> <li>Creating value - highest quality care at lowest cost is the overarching goal of CoE in ambulatory spinal care (is the confluence of safety, institutional processes, patient satisfaction and outcome measures, overall cost to patient, payer and society)</li> <li>Centralization of organization - "one-stop shop" (integration of a variety of specialists under the umbrella of one hospital system gives CoE the ability to treat conditions that may complicate or arise from patient's episode of care)</li> <li>Multidisciplinary team building and protocol creation (utilization of multidisciplinary meetings geared at creating value and improving outcomes by carefully scrutinizing patient treatment plans)</li> </ul>	Not reported	Accreditation Association for Ambulatory Health Care have provided a set of criteria for certification as an ambulatory orthopaedic surgery CoE
Shikora, Delegge and Van Way III <sup>40</sup>	USA	<ul> <li>Criteria that was described were used for BSCoE and to be adapted by NSCoE</li> <li>Surgeon Specific Criteria to ensure surgeons have obtained the experience and training necessary to perform the appropriate surgical procedure</li> <li>Institute Specific Criteria to ensure that the facility is committed to the program</li> </ul>	<ul> <li>Based on BSCoE</li> <li>Online application completed by surgeon or facility</li> <li>Successful application results in provisional status</li> <li>Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome</li> <li>Mandatory submission of all patient data to a database</li> </ul>	Recertification is required every 3 years and includes an online application followed by a site visit.
Shommu et al <sup>41</sup>	Canada	Essential criteria of CoE that were divided into short (1-3 years) and long terms (>5 years) goals/ activities specific to IBD • Excellence in Clinical Care • Novel Discovery and Research • Knowledge translatio	Not reported	Not reported
Silver et al <sup>42</sup>	USA	Suggested Criteria	Not reported	Not reported

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		<ul> <li>Multidisciplinary team</li> <li>Intensive care unit and facilities</li> <li>Blood services – blood bank with 24/7 service</li> </ul>		
Steiner et al <sup>43</sup>	USA	<ul> <li>Suggested standards</li> <li>Competence of staff - staffed by headache specialists</li> <li>Provision of care – management of headache</li> <li>Quality and evolution and assurance - monitors quality of care</li> <li>Networks and collaborations - maintains quality of endeavour through networking, collaboration and the sharing of experience with other international and/or national centres.</li> <li>Teaching - principal resource for national postgraduate training</li> <li>Research - useful research output in the field of headache</li> <li>Empirical support of existence</li> </ul>	Agencies with appropriate competence and authority might use these standards as a basis for centre accreditation.	Not reported
Tapela et al <sup>44</sup>	Rwanda	<ul> <li>Key attributes that made it possible</li> <li>Meaning full partnership emphasising health systems strengthening</li> <li>Innovative task and infrastructure shifting</li> <li>Strong RMOH leadership coordinating efforts to embed services with the public sector</li> <li>An equity-driven agenda to serve those most in need</li> </ul>	Not reported	Not reported
Thomas et al <sup>45</sup>	USA	Not reported	Appears self-nominated	Outcome-based – site-specific patient outcomes (not benchmarked to other services)
Vivian et al <sup>46</sup>	USA	<ul> <li>Objectives</li> <li>Provide the highest standard of care, services and support to each patient</li> <li>Communicate process improvements and data to key stakeholders in the pancreas domain</li> <li>Analyse barriers and data to create better clinical pathways and care maps</li> <li>Identify best practice guidelines and use them in our pancreas population</li> <li>Identify quality and utilisation metrics used to analyse physician practices</li> </ul>	<ul> <li>Process outlined.</li> <li>Establishing the foundation (leadership structure and purpose)</li> <li>Formalising the program (clinical education training, MDT involvement)</li> <li>Solidifying the CoE status (certification/accreditation by external institute)</li> </ul>	Not reported
Williams <sup>47</sup>	USA	<ul><li>Key components of an HCM centre include.</li><li>HCM multi-disciplinary team and an administrative HCM coordinator.</li><li>Administrative support for marketing and programmatic development.</li></ul>	A centre must meet various criteria set forth by the NCI both in terms of clinical expertise and research capabilities	Not reported
Wirth et al <sup>48</sup>	Europe (Barcelona)	Criteria with specific requirements are outlined in the study • Core team • Associated services • Multi-disciplinary team • Diagnostic pathway • Therapeutic pathway	When an institution successfully achieves all the steps, it will be certified as an EPCCE.	The certification will be reviewed every 3 years, The accreditation team will be prespecified, and it will be composed of seven members of the EPCCCM.

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Wu et al <sup>49</sup>	USA	The BDC+ program encompasses quality criteria on structure, process, and outcomes and cost criteria A cost threshold was set at 1.05 times the national average cost of surgery. Facilities that met predetermined clinical requirements and had spine surgery costs below the threshold received the value designated BDC+ designation.	Not reported	Facilities receiving a value designation were associated with lower costs (16-19% lower) and equal or better quality outcomes, compared with all other facilities.
Yao and Zhou <sup>50</sup>	China	Not reported	<ul> <li>Mentee sites were selected based on</li> <li>Using drop-out rate and time on therapy</li> <li>Willingness to improve PD outcomes.</li> <li>Mentor sites were selected based on</li> <li>PD clinical outcome</li> <li>Willingness to participate in the program</li> </ul>	Continuous quality improvement in managing PD centre. Volume of patients.

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