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## Conceptualising Centres of Clinical Excellence: A scoping review

Journal:	BMJ Open
Manuscript ID	bmjopen-2023-082704
Article Type:	Original research
Date Submitted by the Author:	01-Dec-2023
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Keywords:	Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Protocols & guidelines < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, International health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT





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Title: Conceptualising Centres of Clinical Excellence: A scoping review

Article type: Research – Scoping Review

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**Keywords:** Centre of Clinical Excellence, excellence in health, healthcare model, delivery of healthcare

**Author Contributors:** All authors were involved in the screening of records and data extractions. TK was the main author of this work and was responsible for the study design and coordination of the team. TK and EL were responsible for drafting the manuscript and all authors helped with the critical review of the manuscript.

 **Funding:** This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors. TK received Research Training Program scholarship through Flinders University as part of PhD.

Competing Interest: None declared.

Patient consent for publication: Not applicable.

**Ethics and Dissemination:** This study does not require human ethics committee approval. All sources will be adequately referenced. The findings of our scoping review will be disseminated through presentations at conferences and relevant forums. The completed scoping review will be submitted in a peer-reviewed journal and will form part of a PhD thesis.

Supplemental material: Attached supplemental file.

## Strengths and Limitations of this study

- The study used inclusive search strategies (peer-reviewed journals and grey literature) and a stringent review process using two independent reviewers throughout the process.
- The nature of CoCE may mean that relevant information published in non-indexed sources will have been missed.
- The study used Arksey and O'Malley's framework with enhancement from Levac and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.
- There is a potential to miss centres that have not published any studies or records but are an established CoCE.

#### Word count: 3088 + 279 (Abstract)

#### **Tables and Figures**

- Table 1: Inclusion and exclusion criteria
- Table 2: Characteristics of included records
- Table 3: Characteristics of CoCE initiatives
- Table 4: Outline of Selection/Nomination Process of CoCE.
- Figure 1: PRISMA flow diagram

# ABSTRACT

## Background

Centres of Clinical Excellence (CoCE) are nominally healthcare facilities that provide excellent, patient-centred, evidence-based care. However, despite the increasing prevalence of CoCE internationally, there is a lack of clarity on how these centres are identified, described and monitored.

## Objectives

To explore how CoCE have been described in the literature; the defining characteristics, the selection criteria and processes, and the monitoring and evaluation protocols that have been used.

## Design

Scoping review using Arksey and O'Malley's framework with enhancement from Levac. We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. A comprehensive search using MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify relevant published studies between January 2010 and June 2022.

## Results

Fifty records describing 45 initiatives were included. With the exception of one initiative, all focussed on one clinical condition/population, and most were published in the USA (n=25, 56%). These clinical conditions were mostly cardiovascular disease (n=8, 17%), spinal surgeries (n=4, 9%), and pituitary tumours (n=4, 9%). More than half of the initiatives (n=30, 67%) described a structured process to establish CoCE. The definitions of CoCE were not uniform. Common defining features included the volume of patients treated, a concentration of medical expertise, a highly skilled multi-disciplinary team, delivery of high-quality care, and achievement of excellent patient outcomes. The selection process as a CoCE varied from self-identification with no explicit criteria or assessment process, to application and assessment by an approval panel.

## Conclusion

Despite a growing prevalence of CoCE, there are inconsistencies in how these centres are established, identified, monitored and evaluated. Common (but not uniform) features of CoCEs are highly skilled staff, high-quality care delivery and optimal patient outcomes.

Word count: 279 words

# INTRODUCTION

Healthcare facilities worldwide have a shared goal to continually improve healthcare delivery, often using stringent standards and indicators.(1, 2) Improvements in healthcare delivery can take the form of defining best clinical practice or effectively demonstrating important aspects of care, such as safety, access, affordability, equity, effectiveness and efficiency.

Most healthcare organisations must meet national quality and safety standards to address clinical practice and organisational performance.(1) Accreditation is instrumental in achieving a baseline standard of care, but it has inherent limitations when it comes to achieving care that strives to be excellent or seeks to optimise patient-reported outcomes and experience. Recognising this gap between care that meets standards for accreditation and "excellent" care, some healthcare facilities are taking proactive steps to engage in self-improvement and seeking recognition for delivering exceptional care.

This aspiration for excellence within healthcare is often labelled as 'clinical excellence'(3) with organisations that deliver exceptional patient care being termed Centres of Excellence or Centres of Clinical Excellence (CoCE).(4-6) Additionally, terms such as 'research excellence',(7) 'service excellence'(8) and 'operational excellence'(9) are also used to delineate various other dimensions of excellence within healthcare. A recently published review(6) summarised evidence pertaining to Centres of Excellence in healthcare, education, research, industry and information technology. The authors of this review concluded that there are inconsistencies in how healthcare facilities are designated as Centres of Excellence and ambiguity between Centres of Excellence and regular healthcare facilities, with limited information on how these Centres were evaluated.

Attaining recognition as a CoCE could be a source of inspiration, as it encourages healthcare facilities and health professionals to pursue the best clinical care for their patients as well as being recognised as the lead in healthcare provision.(10) This motivates healthcare facilities to aspire to promote high-quality up-to-date evidence-based care to their community.(10) Despite the increasing use of the term CoCE, there is a lack of clarity about how this term is defined, how sites are nominated and selected as CoCE and how CoCE are evaluated and monitored.

The primary aim of this scoping review was to map evidence on CoCE in healthcare. We sought to explore and answer the following questions systematically:

- 1. What Centres of Clinical Excellence have been described in the literature?
- 2. What are the defining characteristics of Centres of Clinical Excellence?
- 3. How are Centres of Clinical Excellence selected or nominated?
- 4. What monitoring processes are employed to remain as Centres of Clinical Excellence?

Through conducting this review, we planned to explore the multifaceted dimensions of Centres of Clinical Excellence.

## METHOD

## **Protocol and Registration**

We registered the scoping review protocol on Open Science Framework. We employed the scoping review framework proposed by Arksey and O'Malley(11) with the refinement outlined by Levac, Colquhoun and O'Brien(12) to evaluate the evidence on CoCE. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).(13)

## Information sources and searches

We developed a search strategy with the support of a research librarian (Supplementary file 1). We searched MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify recent published records between January 2010 and June 2022. We also searched for grey literature (government reports, policies, protocols, conference proceedings, unpublished studies) and relevant websites using Google and Google Scholar. Reference lists of included records were searched to check for further relevant records.

Inclusion and exclusion criteria are presented in Table 1. We included records that discussed CoCE that provided clinical care for people with any health condition in any setting (primary care, inpatient, outpatient or community). To be included, records had to describe how a CoCE was defined, established, monitored or evaluated. We excluded records that used the term "CoCE" without outlining any criteria. Centres of Excellence that were not designed to provide clinical care (such as Centres of Research Excellence) were excluded. Given the exploratory nature of the research questions, there was no limitation to study populations or interventions.

Insert Table 1

## Selection of records

The search results were imported into Covidence, and duplicates were removed. As recommended by Levac,(12) two reviewers independently screened titles and abstracts and reviewed full-text documents using the inclusion criteria (see Table 1). One reviewer (TK) conducted the online search for relevant websites (first 20 pages on Google search) and two reviewers (TK and LB) completed the screening and review of the grey literature independently. The inclusion and exclusion criteria were reviewed periodically throughout the title and abstract screening process to ensure the criteria facilitated the identification and inclusion of relevant studies.

# Data charting process

A data extraction form was developed for the study (supplementary file 2). We pilot-tested the extraction form with the first 15 eligible records to ensure consistent data collection. Two

reviewers independently (TK and EL) extracted data on all included studies using the extraction form on Covidence. Quality of individual records were not assessed due to the descriptive nature of the review aims.

#### Synthesis of results

We synthesised the research findings according to the research questions and presented data from all included studies in tabular form. Study characteristics was presented descriptively, and the research questions were presented narratively. The CoCE will be identified as initiatives and the search results will be defined as records. The centres will be described either as a theoretical or physical centre. A theoretical centre is a centre that describes aspirational criteria/framework to develop a CoCE. Comparatively, a physical centre is a centre that have documented criteria/framework/description used to establish a CoCE. Initiatives that described a framework (that was developed or is aspirational) were tabled as 'Framework adapted/created'.

#### Patient and public involvement

Patients were not involved in the design or completion of this study.

Insert Figure 1

## RESULTS

#### Selection of sources of evidence

Overall, 9077 records were identified from database search and 36 records were identified through grey literature search. A further three records were identified by reviewing reference lists of included records. 50 records describing 45 initiatives relating to CoCE were included in the analysis (Figure 1). The complete search results and strategies are available in the Supplemental material.

## Characteristics of sources of evidence

Most records (n=43, 86%) were published in or after 2015. Nearly all of the included records (n=44, 88%) were published in peer-reviewed journals, but only 15 (30%) were research articles, the remaining 28 (56%) records were other article types such as editorials or case reports. Two websites were identified as additional records for initiatives identified through the literature search. See Tables 2 and 3.

Insert Table 2

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## Synthesis of results

Less than half (n=20, 47%) centres identified were physical CoCE. With the exception of one CoCE which provided care for people with diabetes and cardiovascular disease (14), all identified CoCE treated a single clinical condition or population. The commonly described conditions were cardiovascular disease(15-22) (n=8, 17%), spinal surgeries(23-26) (n=4, 9%), pituitary tumours(27-30) (n=4, 9%), diabetes(14, 31, 32) (n=3, 6%), and obstetrics(33, 34) (n=2, 4%).

Some CoCE (n=6, 13%) were located across several countries,(16, 20, 24, 27, 35, 36) whereas the majority were described as stand-alone clinical centres, such as wards, surgical centres or clinics. Eight CoCE (18%) were located in low-and middle-income countries.(19, 31, 37-42) More than half of CoCE were located in the USA (n=25, 53%). CoCEs established in high-income countries were typically described in terms of high-quality of care delivery, such as standardised care and optimal outcome (n=12, 27%),(18, 20-22, 24, 32, 34, 37, 38, 43-45) comprehensive multi-disciplinary care (n=8, 18%)(15, 27, 30, 31, 39, 46-48) or accessible patient-centred care (n=7, 16%).(4, 14, 28, 35, 41, 49-51)

More than half of the initiatives (n=30, 67%) described a structured process that was used, or could be used, to establish the CoCE. While many initiatives reported that the CoCE was established using a framework or series of developmental stages, details regarding the developmental stages were rarely available. Five initiatives reported using published frameworks (Elrod and Fortenberry,(28, 36, 44) Christmas(52) and National Cancer Institute(22)) to guide their process to establish the CoCE. See Table 3 for further details.

Insert Table 3

## **Defining characteristics of CoCE**

Less than one fifth (n=19, 42%) of the initiatives explicitly defined the characteristics of the CoCE. Seven (16%) initiatives(19, 23, 25, 28, 36, 44, 53) used the definition from Elrod and Fortenberry "a program within a healthcare institution which is assembled to supply an exceptionally high concentration of expertise and related resource centred on a particular area of medicine, delivering associated care in a comprehensive, interdisciplinary fashion to afford the best patient outcomes possible".<sup>(4)(p16)</sup>

High volumes of patients treated/procedures performed, staffing and infrastructure resources and above-average quality of care and patient outcomes were the most commonly described defining features of CoCEs. Key components that were reported regarding staffing were medical expertise, highly skilled multi-disciplinary teams and staff: patient ratios. Other resources that were described as part of the CoCEs were infrastructure (n=15, 33%) such as building space and examination rooms, and specialised equipment (n=9, 20%). High quality of care delivery was described in terms of standardised care and optimal outcome (n=12, 27%),(18, 20-22, 24, 32, 34, 37, 38, 43-45) comprehensive multi-disciplinary care (n=8,

18%)(15, 27, 30, 31, 39, 46-48) or accessible patient-centred care (n=7, 16%)(4, 14, 28, 35, 41, 49, 50). Availability of treatment protocols were described as an important feature in 7 initiatives (15%). See Table 3 for details.

There were differences noted in defining characteristics of CoCE located in low- and middleincome countries, compared to CoCE in high-income countries. While most CoCE had common features regarding staff expertise, equipment and patient outcomes, CoCE in lowand middle-income countries tended to be established by collaborating with larger local or international healthcare facilities and to provide a healthcare service that otherwise was not available in the region, for instance neurosurgery in Peru and comprehensive dental care in Guwahati, India.

#### Selection or nomination process of Centres of Clinical Excellence

No details were available about how sites were selected as CoCE in half (n=24, 53%) of the included initiatives. While 21 initiatives reported that there was a selection or nomination process to be recognised as a CoCE, the details of the selection/nomination process were inconsistently reported. Processes used to select centres as CoCEs were varied and included application and assessment by an approval panel (n=9, 45%)(4, 8, 22, 33, 42, 44, 53-55), self-identification as a CoCE with no explicit criteria or external assessment (n=6, 30%)(14, 15, 18, 28, 40, 49) and site-visit by funding body to assess suitability (n=1, 5%)(17). Only four (20%)(35, 45, 47, 56) initiatives presented the process used to select the CoCE in its entirety, which are presented in Table 4.

The bodies providing oversight of nomination or selection of the CoCE were professional bodies (e.g., Infectious Diseases Society of America,(53) Society of Obstetric Anaesthesia and Perinatology,(33) Lymphatics Education and Research Network,(47) American Academy of Orthopaedic Surgeons(25)), National Cancer Institute National standards,(22) insurers,(44, 54), organisation(4, 37, 45) and REAL- PANLAR (Pan American League of Associations for Rheumatology).(35)

#### Insert Table 4

#### Monitoring protocols to remain a designated Centre of Clinical Excellence

Only 24 (53%) of the included initiatives reporting a monitoring process for the CoCE. Monitoring was mandatory for 6 (25%)(33, 35, 47, 51, 53, 56) initiatives through a recertification process. Other initiatives reported the importance of monitoring outcomes such as productivity (n=5, 21%),(16, 18, 38, 42, 49) patient outcomes (n=9, 36%),(14, 15, 26, 28, 31, 44, 46, 48) quality metrics (n=3, 13%)(23, 25, 36) and efficiency and cost effectiveness of the program (n=1, 4%),(39) but there was no evidence that this monitoring process was routinely performed or overseen by any parties.

## DISCUSSION

#### Summary of evidence

To our knowledge, this is the first scoping review completed on CoCE in healthcare. This scoping review provides an in-depth insight on CoCEs reported in the literature.

Despite being able to identify numerous initiatives describing CoCE, we were unable to identify processes used to select more than half of the identified initiatives. When selection processes were documented, they were inconsistent between initiatives. Further, there were inconsistencies in monitoring CoCE performance. Without consensus on what defines a CoCE, and without a recognised body to monitor the performance within each CoCE, there is no guarantee that care being delivered by sites claiming to be CoCEs are actually delivering excellent (or even better-than-usual) healthcare.

The most common defining feature of CoCEs included in this review was resource availability, specifically personnel, infrastructure and equipment. It is well established that there are associations between staffing levels, skill mix infrastructure and patient outcomes(57-61) Further, infrastructure and specialised expertise are key factors in establishing Centres of Excellence in Healthcare and other industries.(8) Therefore these findings regarding features of CoCE are not at all surprising, but reinforce that CoCE described in the literature have been designed to align with what is known about healthcare delivery that leads to improved patient outcomes.

While frameworks or processes used to establish or describe a CoCE serve as valuable guides to others in the field, they may have limitations when they have been developed for a specific healthcare facility or disease group. For example, the Willis-Knighton Health System is a nonfor-profit healthcare network in Louisiana, USA that operates eleven self-nominated centres of excellence. The framework used to establish these centres of excellence, was described by Elrod and Fortenberry and was cited by authors of eight initiatives in our review to describe or establish their centres. While this framework was used as guidance, consideration should be given as to whether this framework is fit for purpose beyond the state of Louisiana and in countries with different healthcare models to USA. Additionally, it is not clear that this framework meets a universally agreed definition of excellence in healthcare. Empirical research to define "excellent care" from patient's, healthcare facilities' or funders' perspectives could increase the validity of the frameworks, and subsequently the CoCEs.

Selection procedures for CoCE were inconsistently reported and were not available for nearly half the included initiatives. The description of excellent care provided by the CoCE varied, seemingly associated with which agency was responsible for creating the definition. Descriptions of excellence encompassed patient-centric outcomes (e.g. optimising clinical outcomes and quality of life), service-centric outcomes (e.g. staff skill development, resource availability and meeting quality and safety accreditation) and economic outcomes (e.g. cost of treatment, length of stay). The concept of excellence was sometimes conflated with high

volume of patients who received care at the centre. Excellence for some centres from lowand middle-income countries was defined (either by self-nomination or by the government or collaborating international institution) in terms of providing a particular healthcare service when none was previously available in the region. Many of these aspects of excellence reflect commonly measured quality indicators of healthcare in high income countries, namely effectiveness, access, safety and efficiency.(62) However, cost is not included as a quality metric in countries such as Australia, Canada or the UK, but is included a measure of quality in the US Commonwealth Fund framework.(62) The inclusion of cost as a feature of some CoCE could be reflective of the different funding models (e.g. fee-for-service versus universal healthcare) or healthcare priorities within the centres or by the bodies determining a site's excellence. The centres that reported economic outcomes as a measure of clinical excellence were predominantly located in the USA and were nominated by healthcare funders.(63, 64)

Benchmarking is a well-recognised process to identify best-performing healthcare facilities in term of patient outcomes and system performance.(65) However, while there is an implicit assumption that a CoCE will deliver care that is superior to another (non-excellent) centre, most of the included initiatives in our review did not benchmark with other services using transparent criteria. While a minority of the initiatives reported a certification process, there was no evidence that this process included healthcare facilities being benchmarked against other facilities. Benchmarking allows tracking of performance overtime while comparing performance against other facilities, thereby demonstrating what is feasible to achieved in terms of quality of care.(65) For the initiatives included in this review, without comparison to other healthcare facilities and without a standardised set of explicit, evidence-based and measurable criteria, it raises disparity and challenges on how these centres can claim to be legitimate CoCEs.

It is recognised that healthcare performance can be variable,(65) so healthcare facilities should monitor and evaluate their programs to ensure continued excellence. This process needs to be feasible within the time and resource constraints. Just over half the initiatives included in this review reported monitoring their service, and described various processes including measuring patient outcomes, service productivity and quality metrics to maintain the designation of CoCEs. Only six initiatives reported a structured process, where their ongoing performance was reviewed and assessed by an overseeing body to maintain their status as CoCE. Clearly more attention should be paid to demonstrate the sustainability of excellence initiatives.

#### CONCLUSION

Although CoCE are increasingly reported in the literature, there are inconsistencies in how these CoCEs are established, monitored and evaluated. Processes used range from self-designation or adapting criteria from other centres to using external evaluation and periodic

recertifications. Features of CoCE centred around skilled medical and multi-disciplinary teams and other resources such as infrastructure and equipment. More work is required to develop transparent systems and processes to ensure that centres claiming to be "excellent" can demonstrate that they are delivering the highest quality care.

#### IMPLICATION FOR PRACTICE AND FUTURE RESEARCH

This review highlights the need for clear criteria that healthcare facilities use to identify or establish a CoCE. The processes used also need to be transparent, so they are easily available for certification or auditing purposes. The concept of a healthcare centre promoting "excellence" can also vary depending on different perspectives: patient, systems or funding. There needs to be clear guidelines that highlights the impact of "excellence" from these perspectives to ensure transparency why a centre was nominated as a CoCE, and the monitoring processes used. The findings from this review will contribute to international efforts to establish CoCE using robust, transparent criteria and key performance indicators.

#### STRENGTHS AND LIMITATIONS

The strengths of our scoping review include the inclusive search strategies (peer reviewed journals and grey literatures) and stringent review process using two independent reviewers throughout the process. There is a potential that there may be established CoCE that have not published any studies or reports, which we then have not identified. Whilst we sought assistance from an academic librarian to ensure the search strategies were clear and comprehensive, centres that describe excellence using different terms and relevant information published in non-indexed sources may have been missed. This is a particular challenge of this focus of work which straddles healthcare organisation, clinical practice and academic research.

 Table 1 Inclusion and Exclusion Criteria

Table 1: Eligibility criteria for article selection

#### **Inclusion criteria**

- Available in the English language
- Information on CoCE
- > Healthcare organisations or services providing clinical care to people with any healthcare condition
- Published from January 2010
- Any geographical location
- Studies describing the development/defining/monitoring/evaluation/frameworks of CoCE

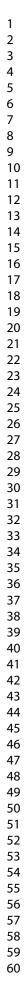
#### **Exclusion criteria**

- Records that describe a study conducted at CoCE (e.g. using participants from CoCE)
- Centres that do not provide clinical care (e.g. Centres of Research Excellence or Centres of Leadership Excellence)
- Conference abstracts/papers, letters, NICE guidelines, JBI guidelines
- Only looking at costs associated within one CoCE (no comparator)
- Only looking at clinical outcomes for people receiving care at CoCE (no comparator)
- Using term "CoCE" without outlining the criteria

Abbreviation: CoCE- Centres of Clinical Excellence; NICE- National Institute for Health and Care Excellence; JBI- Joanna Briggs Institute

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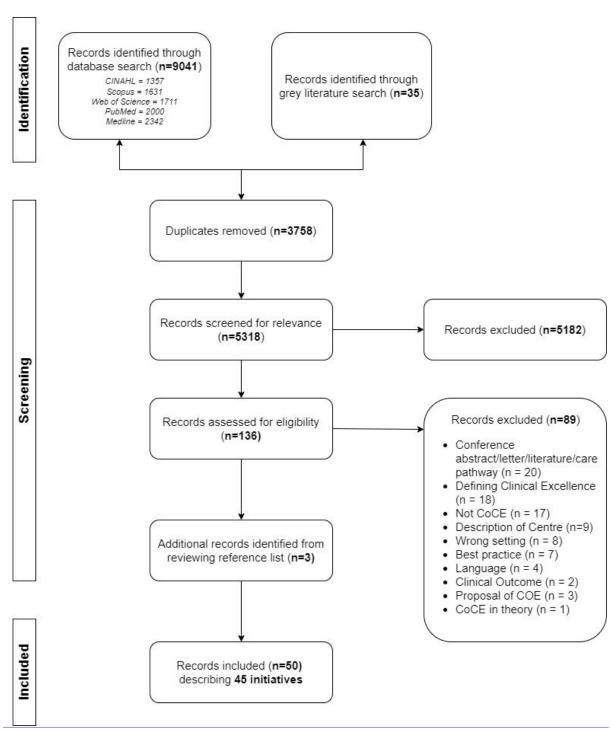


Figure 1 PRISMA flow diagram. Abbreviation: CoCE- Centres of Clinical Excellence; COE- Centre of Excellence

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Types of literature from included records (n=50)	N(%)
Research articles	15 (30%)
Others (Editorial, reports, case reports) from peer reviewed journals	28 (56%)
Book chapters	3 (6%)
Websites	2 (4%)
Systematic review	1 (2%)
Government report	1 (2%)
Country of Centre or initiatives described (n=45)	
USA	25 (56%)
Others	20 (44%)
Clinical Conditions from initiatives described (n=45)	0 (4 00()
Cardiovascular disease	8 (18%)
Spinal surgery	4 (9%)
Pituitary tumours	4 (9%)
Diabetes	3 (7%)
Pregnancy related Others	2 (4%) 24 (53%)

Table 3 Characteristics of CoCE initiatives						by copyright, including	1.000 jopen-2023-082704			
	Theoretical			Resourc	ces	din	O Process	Processes used or suggested for CoCE		
1 <sup>st</sup> Author of main record describing initiative	Centre (T) or Physical Centre (P)	Framework adapted / created	Personnel	Infrastructure	Equipment		Criteria described X X X X X X X X X X X X X	Processes to establish a CoCE	Processes monitor a CoCE	
Bitzer et al(46)	Т	Х	Х	Х		reig	<u>d</u> X		Х	
Burkett et al(23)	Т		Х			nen atec	202 X		Х	
Campbell et al(37)	Р	Х	Х	Х		d to	ΪX	Х		
Carvalho and Jill(33)	Т	Х	Х		Х	tex t	<b>ĕ</b> X	Х	Х	
Casanueva et al(27) & Tritos(30)	Т	Х	Х			an	<b>∄</b> X			
Chang et al(47) & Lymphatic Education & Research Network(66)	Р	x	Х			X dat	aded X	х	Х	
Choque-Velasquez et al(38)	Р		Х		Х	XaB	fron		Х	
Coon et al(67)	Р	Х	Х			inir	X			
Creehan et al(68)	т	Х	X				<b>X</b>			
Daming et al(18)	Р	Х	X	Х		Al train	X	X	Х	
Deshmukh et al(39)	Р	Х	X				<u>å</u> ×		Х	
Dietz et al(43)	Т	Х	Х	10.	Х	X ĝ,	X			
Distiller and Brown(31)	Р		Х			Xand	X		Х	
Draznin et al(32)	Т	Х	Х	X		d si	<mark>8</mark> X			
El-Eshmawi et al(15)	Р	Х	Х	Х		mila	X	Х	Х	
Elrod and Fortenberry(4)	Р	Х	Х	Х		similar technologies	₹×	Х		
Ferguson and Froehlich(49)	Р		Х			schi	une	Х	Х	
Frara et al(28)	Т	Х	Х	Х		nolo	±×	Х	Х	
Geetha et al(52)	Р	Х				ogie	<b>20</b> χ <b>25</b> χ			
Haider et al(36)	т	Х	Х			Ň			Х	
King, Jamieson and Berg(44)	Р	Х					nt Agen X	Х	Х	
Kullar et al(53)	Р	Х	Х				gen X	Х	Х	
Lancellotti, Dulgheru and Sakalihasan (16) & Chambers et al(17)	т		Х	Х			x X X Bibliographique de		Х	
Li et al(54)	Т						stix	Х		

Page 17 of	f 57			BMJ Oper	1		d by copyright, including for	jopen-2023-0827			
1 2							right, i	23-082			
3	Marinoff and Heiberger(40)	Р		X	X			. 704		Х	
4	Martin et al(24)	Т	X					- <b>-</b>	Х		
5 6	McLaughlin et al(29)	Т		X		Х	ق X خ		Х		X
7	Nakov et al(19)	Р		X				_ <u>~</u>	Х		
8	Piccini et al(20)	т	Х	Х	x		Xes	Ens	Х		
9	Pronovost et al(48)	т	X				rei	eigr	Х		X
10 11	Safer Care Victoria(50)	Т	Х				ated	1-20 December 2024. Enseigneme	Х		
12	Sandhu et al(21)	т	Х	Х			5	ent D			
13	Santos-Moreno et al(35, 69, 70)	Р	Х	Х	Х	Х	text	nent Superieur (ABES)	Х	Х	X
14	Sheha and Iyer(25)	Т		Х			ano	<del>ilo</del> a peri	Х		X
15 16	Shikora, Delegge and Van Way III(56)	Р	X	Х	Х	Х	<u>a</u> 0%	eur	Х	Х	X
17	Shommu et al(71)	Т					l ta r		Х		
18	Silver et al(34)	Т	MN2	Х	Х		nin	ES I	Х		
19	Steiner et al(72)	Т		X			ing,	Ţ.	Х	Х	
20 21	Tapela et al(41)	Р		X	Х	Х	XÞ		Х		
22	Thomas et al(14)	Р		X			trail	. njo	1	Х	X
23	Vivian et al(45)	Р	Х	X	X	Х	training, and a	ben	Х	Х	
24	Williams(22)	Т	Х	Х		Х	j, ar	.bm	Х	Х	
25 26	Wirth et al(51)	Т	Х	Х			l d s	. <u>j</u>	Х	Х	Х
20	Wu et al(26)	Т	Х					, i			Х
28	Yao and Zhou(42)	Р	Х	Х			Xar	9 <b>3</b>		Х	X
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#### Table 4 Outline of Selection/Nomination Process of CoCE.

Chang et al(47) & Lymphatic       1. Applications will be reviewed by the LE&RN Global Oversight Committee (GOC). All applications will be scored, using the following three individual criteria:         Lymphatic       a. The quality of the overall application/services.         Education & Research       b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic.         Network(66)       c. Miscellaneous (e.g., lymphatic disease community citizenship, research).         Santos- Moreno et al(35)       1. Implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of centre of excellence.         2.       Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.         3.       Requesting and preparing for a verification visit.         4.       Receiving a verification visit from REAL-PANLAR.         5.       Official notice of the results of the assistance and verification visit.         Van Way       1.       Online application completed by surgeon or facility.         2.       Successful application results in provisional status.         3.       Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome.         4.       Mandatory submission of all patient data to a database.         Vivian et al(45)       1.       Establishing the foundation (leadership structure and purpose).	1 <sup>st</sup> Author	Steps outlined
Moreno et al(35)in accordance with the requirements of each type of centre of excellence.2.Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.3.Requesting and preparing for a verification visit.4.Receiving a verification visit from REAL-PANLAR.5.Official notice of the results of the assistance and verification visit.Shikora, Delegge and Van Way III(56)1.2.Successful application completed by surgeon or facility. Successful application results in provisional status.3.Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome.Vivian et al(45)1.1.Establishing the foundation (leadership structure and purpose).2.Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).3.Solidifying the Centre of Excellence status (certification/accreditation by external institute).	al(47) & Lymphatic Education & Research	<ul><li>applications will be scored, using the following three individual criteria:</li><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>
<ul> <li>Delegge and Van Way III(56)</li> <li>2. Successful application results in provisional status.</li> <li>3. Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome.</li> <li>4. Mandatory submission of all patient data to a database.</li> <li>Vivian et al(45)</li> <li>2. Establishing the foundation (leadership structure and purpose).</li> <li>2. Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).</li> <li>3. Solidifying the Centre of Excellence status (certification/accreditation by external institute).</li> </ul>	Moreno et	<ul> <li>in accordance with the requirements of each type of centre of excellence.</li> <li>Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.</li> <li>Requesting and preparing for a verification visit.</li> <li>Receiving a verification visit from REAL-PANLAR.</li> </ul>
<ul> <li>al(45)</li> <li>2. Formalising the Centre of Excellence program (clinical education training, multi-disciplinary team involvement).</li> <li>3. Solidifying the Centre of Excellence status (certification/accreditation by external institute).</li> </ul>	Delegge and Van Way	<ol> <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> </ol>
		<ol> <li>Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).</li> <li>Solidifying the Centre of Excellence status (certification/accreditation by external</li> </ol>

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1	Supplemental file
2 3 4	Search Strategy
5 6	Databases search: MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus
7 8 9 10 11	<b>Keywords used:</b> "centre of clinical excellence" OR "networks of excellence" OR "best practice" OR "clinical exemplars" OR "integrated healthcare delivery" OR "excellence" OR "clinical protocols" OR "clinical competence" as search terms, subject headings, concepts or keywords.
12 13 14 15 16 17 18 19 20 21 22 23	MEDLINE Ovid (((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence).ti,ab,kf.
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	(((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence).ti,ab,kf.
<ol> <li>39</li> <li>40</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> <li>50</li> <li>51</li> <li>52</li> </ol>	
52 53 54 55 56 57 58 59 60	CoE – Centre of Excellence

CoL – Centre of Excellence \*Research article in peer reviewed journal "Other in peer reviewed journal ^Case report in peer reviewed journal

#### Table 1: Description of the aim and type of publication and information on how CoCE were described in the initiatives.

	Country /	Aim of publication	Type of publicatio n				y .		
1 <sup>st</sup> Author	Region			Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE	Clinical focus area of CoCE	Resources
Bitzer et al <sup>1</sup>	Europe	Describing the framework and characteristics of an "ideal" CoE of Sexual Medicine and Sexual Therapy	Other#	Centre of Excellence for Sexual Medicine	Not reported	Created by authors	<ul> <li>Diagnosis and treatment of second dysfunction. Aim to</li> <li>To provide a frame for the second centred and relationship of the second care</li> <li>To provide multidiscipling of the second diagnostic assessment, data for potions, documentation for the second follow-up of patients</li> <li>Provide training for medical students, residents and sellows</li> </ul>	I Sexual medicine	<ul> <li>Personnel</li> <li>Multi-disciplinary team</li> <li>Infrastructure</li> <li>A room for counselling/therapy</li> <li>Examination room</li> </ul>
Burkett et al²	Not reported	To present the concept of "centers of excellence" and how they are applied to spine care. Provided an overview of spinal CoE.	Book chapter	Spine Centre of Excellence	Not reported	Not reported	<ul> <li>To achieve exceptional guality of spine care at lower cosed and a robust patient population.</li> <li>To demonstrate that the organization meets high performance standards of the standards of the standards of the stand out among other areas institutions.</li> </ul>	surgeries	Personnel • Specialties involved may include neurosurgery, orthopaedic surgery, rehabilitation, occupational therapy and physical therapy pain management, specialized nursing, radiology, behaviour medicine, and psychiatry
Campbell et al <sup>3</sup>	India	Examines the evolution of a Centre of excellence as an innovative model for	Research article*	Operation Smile Guwahati	2009	Created by authors and collaborators	To provide standardized and comprehensive cleft care at one institution, with vision of making or about/guidelines.xhtml	Cleft palate	<ul><li>Personnel</li><li>Healthcare professionals in multiple disciplines</li></ul>

Page 2	25 of 57					BN	1J Open	ıjopen-2 1 by cop		
1 2 3 4 5 6 7 8 9 10 11			sustainable cleft care in the developing world		Comprehensiv e Cleft Care Center (GCCCC)		from Operation Smile	Jopen-2023-082704 on 20 December 2024. Enseignement Sugnement Sugn		<ul> <li>Infrastructure</li> <li>Modern surgical suite and clinical space</li> <li>Modern integrated operating suite, advanced surgical equipment, sophisticated anaesthesia and monitoring capabilities</li> </ul>
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	Carvalho and Jill <sup>4</sup>	USA	To describe designation process of Centres of Excellence in obstetric ant	Other# & Website	CoE for Anaesthesia Care of Obstetric Patients	2018	The criteria for Centres of Excellence designation, which covers all aspects of obstetric anaesthesia care, were generated by expert consensus and incorporate evidence-based recommendation s.	CoE designation process designed to recognize institutions and programs that demonstrating excellence in obstetric and the sia care, to set a benchmark the sia care, to set a benchmark the sia improve the standards nationally, and to provide a broad surage quality metric of institution providing obstetric anaesthesia card.	Obstetric Anaesthesia and Perinatology	<ul> <li>Personnel</li> <li>Obstetric anaesthesiologist</li> <li>24/7 coverage of obstetric patients by at least 1 anaesthesiologist</li> <li>Equipment</li> <li>Includes access to blood transfusion equipment and supplies, access to resuscitation and intubation equipment and supplies</li> </ul>
33 34 35 36 37 38 39	Casanueva et al <sup>5</sup> & Tritos <sup>6</sup>	Internation al	To describe the criteria for developing Pituitary Tumors CoE	Other#& Website	Pituitary Tumor Centers of Excellence (PTCOE)	Criteria disseminate d 2017	Expert working group drafted framework. The draft was modified and	<ul> <li>Provide the best multidisciplinary care for patients with pituitary tumours and related pathologies.</li> <li>Advance pituitary science</li> <li>Provide adequate patient</li> </ul>	Patients with pituitary tumours	<ul> <li>Personnel</li> <li>Medical specialists</li> <li>Multidisciplinary supports</li> <li>Basic requirements for surgical training and</li> </ul>
40 41 42 43 44 45	CoE – Centre of Exce *Research article in "Other in peer review ^Case report in peer	peer reviewed journa ved journal	1	For pee	er review only -	http://bmjop	en.bmj.com/site/	about/guidelines.xhtml <b>de</b>		

					BI	MJ Open	open-20 by copy		Pag
			~			approved by the Board of Directors of the Pituitary Society. The document was presented to international groups, modified and endorsed.	education and commun <b>r</b> outreach. • Act as a training centre residents in the treatment of 20 pituitary • Pathologies • Advise health administret to the treatment of 20 provide the treatment of 20 Pathologies • Advise health administret to the treatment of 20 • Centre to the treatment o		endocrinologist training liste
Chang et al <sup>7</sup> & Lymphatic Education & Research Network <sup>8</sup>	USA	To describe the steps taken to establish standards for Centres of Excellence for Lymphatic Disease Described 5 categories of Centres of Excellence: • Comprehensive Centre of Excellence • Network of Excellence • Network of Excellence • Referral Network of Excellence • Lymphatic Disease Surgery Centre of Excellence • Lymphatic Disease Conservative Care Centre of Excellence.	Research article*, website	Lymphatic Education and research network CoE	Criteria published 2021	Lymphatic Education and Research Network initiated a Centres of Excellence program to designate institutions that provide services for lymphatic disease patients	<ul> <li>Provide multidisciplinaret and similar technologies.</li> <li>Provide professional and at a menoperiod of the education</li> <li>Involvement in clinical minimum on June 11, 2025 at Agen technologies.</li> </ul>	Lymphatic disease	<ul> <li>Personnel</li> <li>Multi-disciplinary input</li> <li>Suggested expertise requirements listed in detail</li> <li>Resources</li> <li>Assessment tools listed</li> </ul>
DE – Centre of Excel Research article in p Dther in peer review Case report in peer	eer reviewed journa ved journal	I	For pee	er review only -	http://bmjop	oen.bmj.com/site/	ce Bibliographique about/guidelines.xhtml de l		

27 of 57					ВΛ	/J Open	by copyright To improve the treatment		
Choque- Velasquez et al <sup>9</sup>	Peru	To describe the development of Neurosurgical Centre of Excellence in Peru	Research article*	Specialized Neurosurgical Centre of Excellence	2016	Not specified what process used	neurosurgical diseases in the 2704 region, thus optimising there on outcomes and decreasing	Specialty neurosurgical centre, Peru	<ul> <li>Personnel</li> <li>Staff training by neurosurgeons and nurses from Finland</li> <li>Equipment</li> <li>Equipment provided/repaired</li> <li>Other</li> <li>Neurosurgical protocols developed</li> </ul>
Coon et al <sup>10</sup>	USA	Introduced key aspects of coordinated care for patients with MSA and their caregivers, discuss various outcome measures, and share experiences from two centers with multidisciplinary clinics.	Other <sup>#</sup>	Multiple System Atrophy CoE	Multiple Centres discussed. Established between 2015 - 2019.	Created by authors but process not described	transfers to the neurosurgical Detect departments in the capitad SEnseignement Superieur (ABES) . Not reported data mining, Al training, and similar	Multiple System Atrophy	Personnel <ul> <li>Multi-disciplinary team</li> </ul>
Creehan et al <sup>11</sup>	USA	Describe the development of a framework for Centres of Pressure Ulcer Prevention Excellence	Research article*	Centers for Pressure Ulcer Prevention Excellence	The process developed in 2014	Framework developed using Donabedian model. Systematic literature reviews, analysis of exemplars, and nominal	Inspirational centre - to develop a framework. Aim to achieve and sustain reductions in avoidable hospital-acquired pressures at Agence Bibliog	Pressure ulcer	<ul> <li>Personnel</li> <li>Frontline staff engagement and hospital</li> <li>Administrator</li> <li>Leadership</li> </ul>
CoE – Centre of Exce *Research article in p *Other in peer reviev ^Case report in peer	peer reviewed journa wed journal	al	For pee	er review only -	http://bmjop	en.bmj.com/site/	about/guidelines.xhtml	1	1

						group process techniques were used to create the framework, based on 4	jopen-2023-082704 on 20 I 1 by copyright, including f		
						Magnet Model domains.	ing for uses related to the test of the test of the test of te		
Daming et	USA	A guide for creating a center of excellence for prenatal care for women with cardiovascular disease.	Other#	Maternal Cardiac CoE	2014	Developed a 3 staged framework (vision-> design and development -> implement, monitor and review).	To manage pregnant word to the system of the	Maternal cardiac health	<ul> <li>Personnel</li> <li>Program coordinator</li> <li>Multi-disciplinary team (recommendation provided for speciality</li> <li>Infrastructure:</li> <li>Dedicated outpatient clinic</li> </ul>
Deshmukh et al <sup>13</sup>	India	To evaluate the impact of the Centre of Excellence at Vidya Shikshan Prasarak Mandal Dental College and Research Centre	Research article*	Centre of Excellence at Vidya Shikshan Prasarak Mandal Dental College and Research Centre	2016	The present CoE model was planned and executed with consensus building for 12 months using several methods to involve stakeholder	<ul> <li>To provide comprehensible of all healthcare for economistic of all healthcare for economistic of a sale of a sale</li></ul>	Oral healthcare	<ul> <li>Personnel</li> <li>Academic faculty, consultants and post-graduate students</li> </ul>

						groups (staff, students and patients)	d by copyright, includi		
Dietz et al <sup>14</sup>	USA	Summary of best practices for the prevention and treatment of PJI within the context of a CoE.	Case report^	Centers of Excellence in Addressing Periprosthetic Joint Infection	Not reported	Creating a basis for framework within the literature, based on work on musculoskeletal infection symposium	Centers of Excellence provide 2 better overall outcomes and lower financial, physical, and error of the costs to the patient, regime thus providing a greater value decreasing variability in transforment pathways and incorporation practices based on evide the provide the provide the practices based on evide the provide the provide the practices based on evide the provide the transforment the provide the provide the practices based on evide the provide the transforment the provide the provide the transforment the provide the provide the provide the transforment the provide the provide the provide the provide the transforment the provide	Periprosthetic joint infection	Personnel         • Multi-disciplinary teams         Equipment         • Electronic medical records         Others         • Protocols for pre-operative screening and evaluation         • Risk reduction protocols a processes
Distiller and Brown <sup>15</sup>	South Africa	Not reported	Book Chapter	Centres for Diabetes Excellence	1994	Not reported	To improve diabetes many ment and provide "one-stop shops" for patients. With all services in or place, and a well-managen appointment system, patients experienced minimal waiting and optimal consultation times.	Diabetes	<ul> <li>Personnel</li> <li>Trained medical staff (specialists, GPs or physicians)</li> <li>Other</li> <li>every centre must provide direct 24-h emergency telephone number ("Hotling")</li> </ul>
Draznin et al <sup>16</sup>	USA	Proposing a framework to guide advancement for clinical CoE	Other <sup>#</sup>	Diabetes Center of Excellence	Not reported	6 domains or pillars to serve as guiding principles	To improve population halth, 20 patient care experience (including quality and satisfaction) and reducing healthcare costs. Diagnosis and management of diabetes.	Diabetes	<ul> <li>Personnel</li> <li>Adequate in terms of num skills, experience</li> <li>Multi-disciplinary professi teams guided by clinician diabetologists experience</li> </ul>

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							jopen-2023-082704 on 1 by copyright, includi		managing complex, high-ris individuals
							Jopen-2023-082704 on 20 December Enseignement Provides a structure for a generation multidisciplinary heart teage		<ul><li>Infrastructure</li><li>appropriate to qualify as a centre and technologies</li></ul>
El-Eshmawi et al <sup>17</sup>	USA	To define the structure of a mitral center of excellence and to review current clinical outcomes	Other#	Mitral Valve Center of Excellence	Not Reported	Description of functioning of self-nominated Centre of Excellence	Provides a structure for a relation multidisciplinary heart teaching provide state of the art capen for patients with degenerative valve disease Al training , Al training	Mitral valve disease	<ul> <li>Personnel</li> <li>Crucial - surgeons trained i mitral valve repair; anaesthesia team, intensive care team, interventional cardiologist</li> <li>Infrastructure         <ul> <li>Mitral valve clinic; access to advanced cardiac imaging; data monitoring team</li> </ul> </li> </ul>
Elrod and Fortenberry <sup>18</sup>	USA	To guide healthcare establishments to replicate noted processes to realize their own CoE	Other#	Willis-Knighton Health System CoE (has 11 CoE in different clinical areas)	1980's	Based on information and insights gleaned from 1 healthcare provider's (Willis-Knighton Health System) experience assembling and operating Centers of	To deliver innovative, high-quantity healthcare that would attract increasing number of patientiar technologies.	11 clinical areas by this healthcare provider	Personnel         • Skilled and experienced personnel         Infrastructure         • Appropriate accommodation necessary to deliver continuum of care

						Excellence.	jopen-2023-08 I by copyright		
Ferguson	USA	Describe the	Case	The Total Joint	2010	Not reported.	To provide state-of-the-arc hig	Joint	Personnel
and		development of the	report^	Centre		Intuitive quality	quality, patient-centric,	replacements	Multi-disciplinary team
Froehlich <sup>19</sup>		program, its guiding				improvement			Patient navigators employ
		principles, challenges and				process with	for		
		early results				assistance from	Len Use		
						external	nber s reig		
						consultant	latec		
Frara et al <sup>20</sup>	Authorship	Not reported. Discussion	Case	Pituitary	Not	Adapted from	To provide a high-level care	Pituitary	Personnel
	team from	paper	report^	tumors centers	reported	Elrod and	pituitary patients, to advance	tumors	Specialist medical staffing
	Spain			of excellence		Fortenerry	pituitary science.		and nursing
							led dat		
				6	0		a m		Infrastructure
					Sr.		pituitary patients, to advante ericur pituitary science. pituitary science. data mining		Physical place availability
Geetha et	USA	Apply the definition of	Other#	Miller-Coulson	2015	Adapted clinical	Not reported	Nephrology	Not reported
<b>al</b> <sup>21</sup>		clinical excellence to		Academy of		excellence	rain		
		nephrology		Clinical		framework from	ing		
				Excellence		Christmas	Not reported AI training, and		
Haider et	LMIC	To explore the role of	Case	Not reported	Not	Used Elrod and	To contribute to health synthesize	Urology	Personnel
al <sup>22</sup>		international urologic	report^		reported	Fortenberry	strengthening through international	Surgery	Staff with depth and break
		organisations in					partnerships feet up		of knowledge and
		developing CoE in					partnerships echnologies.		qualifications
		patient care, training					, 2025 ogies.		
		and dissemination of					•.		
		knowledge.					at A		
		To explore strategies					Agen		
		used to improve the					E		
		standard of care and					Biblio		

I		outcomes of urologic					jopen-2023-082704 on 1 by copyright, includir		
1	1	conditions in LMIC.	1	'			)827 it, in		
1	1	To provide a roadmap	1	'			104 c		
1	1	on how similar	1	'			ding		
1	1	international surgical	1				j fo		
1	1	organizations can	1	'			ς ece Ε		
I	1	contribute to	1				mbe es r		
1	1	developing CoE in	1	'			r 20 elat		
1	1	LMIC through health					)24. ed t		
I	1	system strengthening.					o te S		
King,	USA	To use the example of	Other#	Presents 9	Not reported	Elrod and	Providing best outcomes as best	e Hepatology	Not reported
Jamieson		transplant programs (with		Centres of		Fortenberry	to people undergoing organic	100000-0,	
and Berg <sup>23</sup>	1	extensive national-level	1	Excellence	· · ·		transplantation		
	1	data) as examples of the	1	designations			min		
1	1	strategic planning	1	within solid-			http://		
1	1	required to accomplish	1	organ			A I		
1	1	comprehensive.	1	transplantation	/	evia	trair		
1	1	Interdisciplinary care	1	'		10	l ling		
I	1	affording the best	1	'			, an		
1	1	possible outcomes, and	1	'		-	d si co		
1	1	rightfully claim to serve as	1	'					
I		centres of Excellence.	1				iopen-2023-082704 on 20 December 2024. DownBie         by copyright, including for uses related to text specifieur (ABES) .         Enseignement Supprised to text specifieur (ABES) .         Providing best outcomes and similar technologies to people undergoing orgalata mining, Al training, and similar technologies.         Providing best outcomes and similar technologies.         Effectively implement of antimicrobial stewardshing programs		
Kullar et al <sup>24</sup>	USA	To describe the process	Research	Antimicrobial	2017	Built on core	Effectively implement of	Infectious	Personnel
1	1	and purpose of	article*	Stewardship		elements of	antimicrobial stewardship	Disease	Clinical expertise
1	1	designating institutions	1	Centres of		Centers for	programs S		
1	1	as Antimicrobial	1	Excellence		Disease Control	at at		
1	1	Stewardship Centres of	1	(program)		and Prevention.	Agen		
1	1	Excellence CoEs.	1	'		Added aspects	C e		
I	1	<ul> <li>To provide awareness to</li> </ul>	ĺ	'		of meaningful	Bibliographique		
]	<u> </u>		/	<u> </u>		1			
CoE – Centre of Excell *Research article in p		urnal					aph		

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		clinicians on				differentiation by	oyrig		
		opportunities available				workgroup of	-082		
		through Infectious				infectious	704		
		<ul> <li>Diseases Society of</li> </ul>				diseases	udir		
		America with this CoE				physicians and	עם 10 ביו 20 10 ליו		
		designation				pharmacists.	or u		
						F	To perform durable mitra		
Lancellotti,	Multiple	Chambers: to discuss	Other#&	Heart Valve	Not	Not reported	To perform durable mitra	Heart Valve	Personnel
Dulgheru	European	Standards for mitral and	Research	Centre of	reported		repair at close to zero risk ing o	Surgery	<ul> <li>Multi-disciplinary team</li> </ul>
and	countries	aortic valve	article*	Excellence			patients with asymptomate gevere		(medical and nursing)
Sakalihasan		multidisciplinary team					mitral regurgitation cause		proficient in diagnosing and
25		practice within a 'Heart					prolapse.		treating all cardiac valve
&		Valve Center of					mitral regurgitation cause by prolapse. The intention was that investigation		syndromes and disorders
Chambers		Excellence'.					valve interventions should not T		
et al <sup>26</sup>							occur outside Heart Valve		Infrastructure
				Pe			of Excellence		• Facilities to treat and refer
							Alt		patients for valvular
							l finite train		surgery/intervention.
							of Excellence g, Al training,		Access to expert imaging
Li et al <sup>27</sup>	USA	To evaluate the current	Research	Not reported	Not	Not reported		Multiple area	Not reported
		status of defining and	article*		reported		sin Sin		
		using CoE designation					Not reported and similar te		
Marinoff	China	To share	Case	Center of	2010	Not reported	Treatment of people with by	Low vision and	Personnel
and		accomplishments and	report^	Excellence in			vision ologies.	vision	Trained doctors and nurses
Heiberger <sup>28</sup>		limitations from creating a		Low Vision			vision ologies.	rehabilitation	
		Centre of Excellence in		and Vision					Infrastructure
		Low Vision rehabilitation		Rehabilitation			t Agen		Occupies 6,240 square fee
		in China					enc		and is equipped with four le
							Ce B		vision examination rooms,
							iblic		special testing room, an
#Other in peer revi	n peer reviewed journa	al	For per		http://bmion		Bibliog raphique quidelines.xhtml de	1	1

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							jopen-2023-082704 on 20 De 1 by copyright, including for		assistive technology room, a dispensing area, and a classroom, access to multiple low vision devices
Martin et al <sup>29</sup>	Various countries	Utilize available literature to better characterize the features of a spine COE at a tertiary care center and determine the impact of CoEs on patient satisfaction and outcomes.	Systemati c Review & Case report^	Spine CoE	2021	The COE's (Midwest academic tertiary care) mission entails three primary emphases: value, quality, and accountability.	Standardisation of protoces south works up of suspected space of the compression across the new of the hospital system to improve the Superieur diagnosis, transport and data mining, intervention.	Spine	Not reported
McLaughlin et al <sup>30</sup>	USA	Review the literature supporting the establishment of pituitary CoEs, suggest criteria for COE recognition, consider the development of standards of care, and discuss potential pitfalls.	Other#	Pituitary Centre of excellence	NA	Not reported for pituitary tumour, however provided examples of other models e.g., bariatric	Treatment of pituitary tume described primary mission criteria for verification on June 11, 2025 at Agence Biblio Biblio	Pituitary	<ul> <li>Personnel</li> <li>Multi-disciplinary approach related to pituitary tumours and hormonal disorders.</li> <li>At least 1 neurosurgeon with transsphenoidal surgical experience</li> <li>Training for team</li> <li>Equipment equipment and instrumentation for endonasa cranial base surgery includin endoscopic equipment</li> </ul>

							jopen-2023-082704 on 20 4 by copyright, including		Others <ul> <li>Clinical pathways and standard operating procedures</li> </ul>
Nakov et al <sup>31</sup>	Bulgaria	Focus on the importance of performing the most appropriate testing strategies for ATTR amyloidosis and establishing a CoE for this rare disease. Highlights experience in establishing a CoE in Sofia, Bulgaria and define the fundamental steps needed to successfully launch a program.	Other#	CoE for ATTR amyloidosis	2016	Not reported	ng for Amyloidosis related to text and data mining, Al training	Transthyretin Amyloidosis	Personnel • Dedicated team of experts specialized in the range of medical fields required to diagnose the patients effectively and education/training for staff
Piccini et al <sup>32</sup>	Not specifically identified	HRS hopes to accelerate this evolution by reviewing the rationale for AF CoEs, the available evidence for integrated and multidisciplinary care, and future challenges and opportunities. The document also defines the key priorities to be used as a guide for HRS and its diverse	Other*	Atrial Fibrillation CoE	Not reported	Fundamentals of team-based integrated care models in atrial fibrillation	To improve outcomes by providing a better patient experience and delivering high-quality, guideling- recommended, state of the art of the rechnologies. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art of the art of the art of the s. Agence Bibliographique delivering high-quality, guideling- recommended, state of the art o	Atrial Fibrillation	<ul> <li>Personnel</li> <li>Multi- disciplinary team</li> <li>Infrastructure</li> <li>Dedicated lab with fluoroscopy</li> <li>Electrophysiology recordin system</li> <li>Emergency equipment</li> <li>Others</li> <li>Complication standard operating procedure</li> </ul>

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		stakeholders to build consensus on defining the core components of an AF CoE.					jopen-2023-082704 on 20 4 by copyright, including		
Pronovost et al <sup>33</sup>	USA	Defines explicit criteria for provider-based CoEs and how to apply them within a healthcare organization	Case report^	General description of CoE	Not reported	Reported used a framework based on University Hospital, USA and listed the criteria used to establish CoE as a framework.	Have access to multi-D team and seek to improve patient esses and outcomes and reduce of the text and data mint Contribute to the low attained	NA	Not reported specifically. Used examples from other CoE
Safer Care Victoria <sup>34</sup>	Australia	Discuss approaches to engaging clinicians and consumers to improve the quality and safety of health care in Vitoria. Spells out the purpose, role and structure of the CoCE.	Website – grey literature	Safer Care Victoria Centres of Clinical Excellence	2021	Aligns with Safe Care Victoria Strategic Plan 2020-2023.	Contribute to the key strateger domains of leadership, partnership and planning, monitoring and improvement with the aimoo improving healthcare across Victoria, so it is safe, mor effective and person-cented.	Multiple setting	Not reported
Sandhu et al <sup>35</sup>	USA	To gain a better understanding from key stakeholder groups on current practices needs and potential barriers to implementing optimal integrated AF care.	Other*	Atrial Fibrillation CoE	2022	AF CoE task force provides recommendation s on defining, developing, implementing and evaluating an AF CoE	To standardise the care of AF patients based on guideling directed care to achieve s outcomes. about/guidelines.xhtml	Atrial Fibrillation	Personnel  Identified the need for multidisciplinary team

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e 37 of 57				BN	1J Open	jopen-20 1 by copy		
Santos- Moreno et al <sup>36-38</sup>	<ul> <li>To define the minimum standard of care.</li> <li>To describe the history and current context of the CoE in comprehensive care in patients with RA with suggestions on how to create CoE in RA</li> <li>Proposed a systematic and progressive methodology that will help all the institutions to develop successful models without faltering in the process</li> </ul>	Research article* & Other#	Centre of Excellence in Rheumatoid Arthritis	Not stated	Created own framework and integrated healthcare models and endorsed by REAL-PANLAR Based on 3 pillars - the volume of patients with a specific condition or entity - continuous improvement - the quality of healthcare	The ultimate goal of the Gibi E is to define a model of comprehensive care that meets the need of the region in order to improve the accessibility, quality, and of timeliness of care, and accessibility appropriate diagnosis and treatment. This is to facilitate the treatment of the access to better quality the to the treatment of the improve their quality of life appropriate reduce long-term disability data mining, Al training, RA patients.	Rheumatoid Arthritis	Three CoE Modes were presented and each model (standard CoE, Optimal CoE, Model CoE) had different requirements of staff, equipment and infrastructure <b>Personnel (at minimum)</b> • Multi-disciplinary team led by rheumatologist <b>Infrastructure</b> • Access to radiology • Access to pathology <b>Equipment</b> • Standardised tools
Sheha and USA Iyer <sup>39</sup>	General description of CoE and applying general principles of healthcare CoE to spine surgery	Other#	Spine CoE	Multiple centres that was previously established was discussed in the study	Not reported	An opportunity to accurate of the true value of technologies.	Ambulatory spinal surgery	<ul><li>Personnel</li><li>Multi-disciplinary team</li><li>Education</li></ul>
	Describes the creation,	Case	Nutrition	2003 -	Consideration	Not reported Bibliographique	Nutritional	Specified BSCoE and how this

Delegge and Van	implementation, and	report^	Support	creation of	for adaption of	)23 /ri(	Support	can be adapted to NSCoE
	benefits of the BSCoE	report	Center of	the Surgical	BSCoE to	jopen-2023-082704 on 20 December 2024. Downloaded from http://bmjopen.bmj.com/ on June 11, 2025 Enseignement Superieur (ABES) . I by copyright, including for uses related to text and data mining, Al training, and similar technologies.		Personnel
Vay III <sup>40</sup>	(Bariatric Surgery COE)		Excellence	Review	NSCoE	incl		Surgeons specific criteria for
	and the benefits of			Corporation	NO COL	udii		BSCoE
	creating an NSCOE			(SRC).	The SRC	20   119 fr		
	(Nutritional Support CoE).				Formulate and	or u		Infrastructure
	Description of the CoE in				establish	ses		Specific to BSCoE
	Bariatric Surgery and how				guidelines and	reign		
	this can be adapted to				criteria for	1024 ted		Equipment     Not specifically outlined
	Nutritional Support. The				assessing	to t		Not specifically outlined
	report contains				bariatric	ext		
	description of resources,				surgical	and		
	how it was created the		Pe		practices.	dat		
	certification process and		0		<ul> <li>Evaluate and</li> </ul>	a m		
	benefits of BSCoE				investigate	inin		
					applicants to	ца, р.//		
					ensure that	l tra		
					they met the	ainir ope		
					established	n.b		
					standards to	and mj.c		
					become a	sim p		
					BSCOE.	ilar on		
					Creating a	Jur		
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					bariatric	1, 20 logi		
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					data collected from the BSCOEs	jopen-2023-082704 ou I by copyright, includ		
Shommu et Canada al <sup>41</sup>	To develop a multi- disciplinary consensus of nutrition care priorities for implementation in an IBD nutrition CoE	Research article*	Inflammatory Bowel Disease Nutrition CoE	2019	Not reported		Inflammatory Bowel Disease	Raised as a concern/barrier <ul> <li>Lack of infrastructure</li> <li>Lack of staffing</li> </ul>
Silver et al <sup>42</sup> USA	To outline criteria for centers of excellence and suggested indications for referral in cases of suspected placenta accreta.	Other*	Accreta CoE	Not reported	Not reported	Optimal management of performing accreta with placenta accreta Providing specialist care to patients	Placenta Accreta Intensive care unit	<ul> <li>Personnel</li> <li>Multi-disciplinary team with specialised staff for placent accreta</li> <li>Infrastructure</li> <li>Intensive Care unit and facilities</li> </ul>
Steiner et USA al <sup>43</sup>	To suggest criteria that the headache centres might be recognised as centres of excellence in the headache community. Set out recommendations for 10 suggested role and performance-defining standards.	Other#	Specialized headache centre	Not reported	Not reported	Providing specialist care to natients with primary or secondary is adache disorders that are difficult ta diagose or treat, refractory or rare, at for other reasons require specifist intervention on June 11, 2025 a	Headache	Personnel  • Multi-disciplinary care
Tapela et Rwanda al <sup>44</sup>	Report program level description of implementing Butaro	Research article*	Butaro Cancer CoE	2012	Not reported	To deliver accessible cancer services in a resource- constrained setting	Cancer	Provided by Rwanda Ministry Health. <b>Personnel</b>

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		Cancer CoE, its preliminary impact and					histology-based diagnosignternet imaging, surgical, pall cate and socioeconomic supports uding		Doctors and nurses received training
		challenges faced in order to share lessons and inform service delivery in similar setting					socioeconomic supports of 04 on 20 Decemb Enset		Infrastructure <ul> <li>To support surgical</li> <li>procedures and palliative</li> <li>care</li> </ul>
			F0	<u>-</u>			20 December 2024. Downloaded Enseignement Superieur r ng for uses related to text and da		Equipment • X-ray and ultrasounds imaging
				pe	er,	, Q,	aaded from http://bmjc rieur (ABES) . nd data mining, Al trai		Others  • Treatment protocol  • Finance  • Partnership with other services from USA
Γhomas et al <sup>45</sup>	USA	Establishing Cardiometabolic CoE for secondary prevention in patients with T2D and CVD	Other <sup>#</sup>	Cardiometabol ic Center of Excellence	2018	Not reported	To deliver patient-centrece collaborative model of car focused on aggressive and comprehensive secondaria cardiovascular risk reduction in patients with T2D and CV	T2DM + CVD	Personnel      Nurse navigator      Cardiometabolic Center     Advisory Committee      Training
∕ivian et al <sup>46</sup>	USA	To outline the framework for a Pancreas CoE	Research article*	Pancreas CoE	2013	Outlined framework using 3 developmental domains. • Establishing	To improve the care and putcomes of patients and families affected by pancreatic disease using a multidisciplinary team approach to deliver about/guidelines.xhtml	Management of pancreatic disease	<ul> <li>Personnel</li> <li>Management – leadership support</li> <li>Surgeons trained in robotic surgical approach</li> </ul>

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						<ul><li>the foundation</li><li>Formalising the program</li><li>Solidifying the</li></ul>	Jopen-2022 by copyright, including for us care		<ul> <li>Multi-disciplinary staff trained</li> <li>Specific – nurse navigator and dietician</li> </ul>
						CoE status	20 Decemb Ense ng for uses i		<ul> <li>Infrastructure</li> <li>To establish and maintain robotic surgical approach</li> </ul>
			E.				er 2024. Dowr ignement Su elated to text		<ul> <li>Equipment</li> <li>Minimally invasive technology (robotic)</li> </ul>
				r pe	0,		nloaded from perieur (ABES t and data mir		<ul><li>Advanced endoscopic technology</li><li>Clinical Information Systems</li></ul>
					ST P	evi	December 2024. Downloaded from http://bmjopen. Enseignement Superieur (ABES) . for uses related to text and data mining, Al training		dashboards. Others • Certification
Williams <sup>47</sup>	USA	To discuss the evolution of the concept of Centers of Excellence and the components of an HCM center	Book Chapter	Hypertrophic Cardiomyopat hy Centre	1971 for the first 15 centers	Adapted model from National Cancer Institute	Network of referral centres established for adult and saed atric HCM patients' regional calitres encourage consistency of treatment algorithms and outcomes access to world class clinical care within driving listance, as well as collaborative research	Hypertrophic Cardiomyopat hy	Personnel • Multi-disciplinary team that includes specialists in adult and paediatric cardiology, electrophysiology, interventional cardiology, cardiac surgery and genetic counselling, all with particula
CoE – Centre of Exce	allence						between institutions. Also a resource and offer second opinions for providers and patients.		expertise in treating the patient with HCM.
	peer reviewed journa wed journal	I	For pee	er review only -	http://bmjop	en.bmj.com/site/	about/guidelines.xhtml		

							jopen-2023-082704 on 20 De 4 by copyright, including for		<ul> <li>Cardiac imaging (echocardiography and cardiac magnetic resonance imaging)</li> <li>Electrophysiology</li> </ul>
Wirth et al <sup>48</sup>	Europe (Barcelona)	To develop the concept of the European Prostate Cancer Centers of Excellence with the specific aim to identifying European Centers characterised by high- quality care, research and education	Research article*	European Prostate Cancer Centres of Excellence	Criteria agreed upon in 2019	Created by authors	To enable high-quality management of prostate management of prostate management of prostate management Superieur (ABES) · education the fields of clinics, researed to text and data mining, Al training, Al training, and similar technological to text and similar technological to become a best demonstrated	Prostate Cancer	Resources requirements are outlined in detail in the study and specific requirement <b>Personnel</b> • Core team, associated services and multi- disciplinary approach
Wu et al <sup>49</sup>	USA	<ul> <li>To evaluate</li> <li>Patient outcomes at nominated CoE</li> <li>Whether the revamped designation criteria would result in improved patient outcomes.</li> </ul>	Research article*	Blue Distinction Plus Centres	2016	Value framework	Not reported <b>19</b> , Al training, and similar tech	Inpatient spinal surgery	Not reported
Yao and Zhou <sup>50</sup>	China	To describe the impact of the introduction of a mentor-based CoE program	Research article*	Peritoneal Dialysis CoE	2003	Created using mentor-mentee system	To become a best demorperate practice unit es 2025 at Agence Bibliog	Peritoneal dialysis	<ul> <li>Personnel</li> <li>Physicians from mentor sites</li> <li>Other</li> <li>Standardized teaching materials to deliver lectures, lead PD case discussions</li> </ul>

Page	43 of 57	BMJ Open Sp 72	
1 2 3 4 5		BMJ Open BMJ Open 2023-082704 on 20 I including for the second secon	and ward rounds, suggest key performance indicators, and initiate a continuous quality improvement program.
$\begin{array}{c} 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 21\\ 22\\ 23\\ 24\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ 32\\ 33\\ 45\\ 36\\ 37\\ 38\\ 39\\ 40\\ 41\\ 42\\ 43\\ 44\\ 45\\ \end{array}$	CoE – Centre of Excellence *Research article in peer reviewed journal "Other in peer reviewed journal ^Case report in peer reviewed journal	Tor uses related to text and data mining, At training, and similar technologies.	

4 of A	Country /		PROCESSES DESCRIBED	-0827 jht, in
1 <sup>st</sup> Author	Region	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 Prder to audit outcomes, the number of patients, gender, diagnoses, and interventions would be tracked, as well as magent follow-up and satisfaction. Lastly, a cost analysis is regiment solution.
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	The point that centers of excellence are held to specific quality to the point of excellence are held to specific quality to the point of excellence designation, and the point of excellence designation, and the point of excellence designation, and the point of excellence are held to specific quality to the point of excellence are held to specific quality to the point of excellence are held to specific quality to the point of excellence are held to specific quality to the point of excellence are held to specific quality and the point of excellence are held to specific quality and the point of excellence are held to specific quality and the point of excellence are held to specific quality and the point of excellence are held to specific quality and the point of excellence are held to specific quality and the point of excellence are held to specific quality are point of excellence are point of excellence are held to specific quality are point of excellence are point of excell
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.	. Al training, and sin
Carvalho and Jill⁴	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>	Perinatology applications reviewed and graded by the COE Subcommittee. If successful, granted CoE	- tech

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Casanueva et al <sup>5</sup> & Tritos <sup>6</sup>	Internation al	<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> <li>Include tumour data on national registries</li> </ul>	Not reported	yright, includir	Arrently, no formal accreditation for PTCOE exists. The Sernal body may or may not perform the final step of Addation of the centre
17 18 19 20 21 22 23 24 25 26 27 28 29	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</li> <li>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 particulal characteristics that add to the Lymphatic disease clinic.</li> </ul> </li> <li>C. Miscellaneous (e.g., lymphatic disease community citizenship, research).</li> </ul>	Es) <u>Uning, Al training, and similar te</u>	Reignation is valid for 3 years
30 31 32 33 34	Choque- Velasquez et al <sup>9</sup>	Peru	Not reported	Not reported	nologies.	Alluated using volume of neurosurgery
35 36 37 38 39 40 41 42 43 44 45 46	CoE – Centre of Excel *Research article in p *Other in peer review ^Case report in peer	eer reviewed journa ved journal		njopen.bmj.com/site/about/guidelines.xhtm		Agence Bibliographique de l

		BMJ Open	by cop	Page 40
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	h	Page 44 Preported 082704 on 20 December
Creehan et USA al <sup>11</sup>	Domains of ANCC model for the Magnet Recognition Program     transformational leadership     structural empowerment     exemplary professional practice     new knowledge, innovation and improvement	Not reported	nement Superieur (/	20 December 2007eported 4. Downloaded from the second seco
Daming et USA al <sup>12</sup>	<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>		ES) . •	onitoring productivity and streamlining communication between hospital management and stakeholders are the role of a program prector.
Deshmukh India et al <sup>13</sup>	<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> <li>Criteria for pillars of excellence (Academics, Research, Clinical, Faculty development, Technology, Social) – what consisted of the</li> </ul>		and similar technologies.	Aluation based on public health program evaluation ria - assessing and documenting program commentation, outcomes, efficiency and cost-effectiveness activities. June 11, 2025 at Agence
CoE – Centre of Excellence *Research article in peer reviewed journal *Other in peer reviewed journal ^Case report in peer reviewed journal	criteria was not described, however the outcome was outlined in		-	e Bibliographique de

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1			the study)		vrinh	.20 20 23 -0
2 3 4 5 6 7 8 9	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>			82 reported 004 on 20 December 2
10 11 12 13 14 15 16 17 18	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>		ent Superieur (ABE	Come-based monitoring protocol Gycaemic control Bospital admission Gycaese outcomes Gycaese outcomes
19 20 21 22 23 24 25	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	Σ.	
26 27 28 29 30 31	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.	similar technolo	for the second strength s
32 33 34 35 36 37 38	Elrod and Fortenberry	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)		at Agence Bib
39 40 41 42 43 44	CoE – Centre of Exce *Research article in   *Other in peer reviev ^Case report in peer	peer reviewed journa wed journal		mjopen.bmj.com/site/about/guidelines.xhtml		liographique de l

erguson	USA	Not reported.	Self-nominated	P Sength of stay
and				• Nacreased Patient volume
Froehlich <sup>19</sup>				• Monthly snapshot of - financial (includes caseload, cost
				<ul> <li>Booth of stay</li> <li>Booth of</li></ul>
				Beneficial (includes length of stay, discharge to
				c _ @habilitation)
				operational (includes length of stay, discharge to enhabilitation)
				ୁ କୁ କୁ ଗୁଙ୍କୁ - guality (includes process measures, infections, falls,
		$\sim$		Telepide Control Contr
Frara et al <sup>20</sup>	Authorship	"Explicit and practical definitions for a degree of excellence have	Most are self-appointed without any formal	이 아이
	team from	not yet been defined"	acknowledgement	Biocuss measuring effect via patient outcomes, cost of an entry of the second
	Spain	Require an integrated multidisciplinary group in a single location		a efferts (e.g. scientific meetings, health registries)
				ad fr
Cootho of	USA	A Abiaving a lavel of mastery related to	Net reported	data mining A training A training
Geetha et	054	<ul><li>Achieving a level of mastery related to</li><li>Patient care</li></ul>	Not reported	
u- ·		<ul> <li>Fatient care</li> <li>Explicitly modelling this mastery to medical trainees</li> </ul>	0	
		Collaborating with investigators to advance science and		
		discovery	10.	ling,
laider et	LMIC	Patient care: must provide safe, effective and accessible care to	Not reported	Recommend data collection to quantify impact and identify areas for change on June 11, 2028
1 <sup>22</sup>		the highest possible standards depending on geography,		areas for change
		resources, infrastructure, patient population and local culture with		nilar
		site-specific management guidelines		June
		• Training: provides leadership in best practices, research, support		hno
		and training for focus area		logi
		Dissemination of knowledge is essential function of the centre		2025 a
ing,	USA	Reviewed criteria of designated Centres of Excellence within Solid	Formally designated by insurers and employers	Nation of the second se
amieson		organ Transplant Networks- common features include		Batient factors
nd Berg <sup>23</sup>		Number of patients treated		• Bocility and program structure
		Good patient and graft outcomes compared to national average		ansplant centre processes
E – Centre of Excel			1	<u> </u>
esearch article in p ther in peer review	peer reviewed journal ved journal			aphique

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1 2 3 4 5 6 7			on Scientific Registry of Transplant Recipients <ul> <li>Centres of Medicare and Medicaid Services certified</li> <li>+/- cost-effective care</li> </ul>		ht, including for	Waiting list management Set transplant care Gost effectiveness Beam experience Grgan donation environment
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	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>	documentation of core criteria. A committee of 6 ID pharmacists and physicians with extensive AMS experience reviewed applications.	gnement Superieur (ABES) lated to text and data mini	CoE designation is valid for 2 years, after which the dution must re-apply 24. Downloaded from http://bmjo
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	Lancellotti, Dulgheru and Sakalihasan <sup>25</sup> & Chambers et al <sup>26</sup>	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> <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>	Not reported	Ing, and similar technologies.	Agence Bible
39 40 41 42 43 44 45	CoE – Centre of Excel *Research article in p "Other in peer review ^Case report in peer	oeer reviewed journ ved journal		njopen.bmj.com/site/about/guidelines.xhtm		iographique de l

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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>		-202 Enseignem	2022
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	nt Superieur	Preported
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	(ABES) . fa mining Altraining and	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	p p lar technologies	ed to develop - suggested recognition or verification cess be an ongoing process that is updated biannually
Nakov <sup>31</sup>	Bulgaria	Elements that should be considered: • Establish a dedicated team of multidisciplinary experts • Engage with patient advocacy group	Not reported	Ngence	Preported
CoE – Centre of Exce *Research article in "Other in peer review ^Case report in peer	peer reviewed jourr wed journal	• Engage with patient advocacy group	mjopen.bmj.com/site/about/guidelines.xhtml		

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Al training, and similar technologies.
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		<ul> <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>		Juipr	Page 52
Sandhu et al <sup>35</sup>	USA	Focus area • Access to care • Stroke prevention • Education • AF quality improvement • AF barrier	Not reported	Enseignement Superieur ses related to text and da	0 December reported 2024. Downloaded f
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 the disease, functional disability, and the achievement of remission goals must be quantified using clinimetric scales.</li> </ul> </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</li> </ul>	Steps to implement CoE for RA <b>Step 1:</b> implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of center of excellence <b>Step 2:</b> filling the self-assessment form of each type of center of excellence and implementing improvement actions <b>Step 3:</b> requesting and preparing for a verification visit	ABES)	he follow-up should take place according to the following picharacteristics: Clinimetrics Decision-making factors based on the results of the inimetrics Opportunities to access treatment or follow-up Patient education Clinical care guidelines Evaluation system furst be assessed and accredited cyclically based on andards, evaluators and evaluation and qualification process.
CoE – Centre of Exce *Research article in "Other in peer reviev ^Case report in peer	oeer reviewed journa ved journal		njopen.bmj.com/site/about/guidelines.xhtm		Bibliographique de

3 of 57	criteria for each type) - Standard - Optimum - Model		jopen-2023-082704 on 2
Sheha and USA Iyer <sup>39</sup>	<ul> <li>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.</li> </ul>	Not reported	Accreditation Association for Ambulatory Health Care have Accreditation Association for Ambulatory Health Care have by the compared of the second sec
Shikora, USA Delegge and Van Way III <sup>40</sup>	<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> </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</li> </ul>	Reportification is required every 3 years and includes an onthe application followed by a site visit.

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		Institute Specific Criteria to ensure that the facility is committed to the program	<ul><li>on-site inspection and indicates has excellent outcome</li><li>Mandatory submission of all patient data to a database</li></ul>	open-2023-082704 on 20 by copy <u>right, including</u>
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	ng for uses related to
Silver et al	USA	Suggested Criteria • Multidisciplinary team • Intensive care unit and facilities • Blood services – blood bank with 24/7 service	Not reported	t Sourceported t Sour
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.	Ting, Al training, and similar techno
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> </ul>	Not reported	Note the second
CoE – Centre of Exce *Research article in "Other in peer reviev ^Case report in peer	peer reviewed jourr wed journal		l njopen.bmj.com/site/about/guidelines.xhti	graphique

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1		An equity-driven agenda to serve those most in need		vriah
2 3 Thomas et 4 al <sup>45</sup>	USA	Not reported	Appears self-nominated	Outpome-based – site-specific patient outcomes (not
5 Vivian et 7 al <sup>46</sup> 8 9 10 11 12 13 14 15 16 17 18 19	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>	Poperend Pop
20 Williams <sup>47</sup> 21 22 23 24 25	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	Noreported
26 Wirth et al <sup>48</sup> 27 Wirth et al <sup>48</sup> 29 30 31 32 33	Europe (Barcelona)	Criteria with specific requirements are outlined in the study <ul> <li>Core team</li> <li>Associated services</li> <li>Multi-disciplinary team</li> <li>Diagnostic pathway</li> <li>Therapeutic pathway</li> </ul>		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.
34 35 Wu et al <sup>49</sup> 36 37 38 39	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.	Not reported	Facilities receiving a value designation were associated with lower costs (16-19% lower) and equal or better quality outgomes, compared with all other facilities.
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		Facilities that met predetermined clinical requirements and had spine surgery costs below the threshold received the value designated BDC+ designation.		Jopen-Page 5 Page 5 Popen-2023-082704 on
Yao and Zhou⁵⁰	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>	Contre.
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CoE – Centre of Excellence \*Research article in peer reviewed journal "Other in peer reviewed journal ^Case report in peer reviewed journal

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	*Research article in peer reviewed journal #Other in peer reviewed journal

# **BMJ Open**

## Conceptualising Centres of Clinical Excellence: A scoping review

Journal:	BMJ Open
Manuscript ID	bmjopen-2023-082704.R1
Article Type:	Original research
Date Submitted by the Author:	29-Oct-2024
Complete List of Authors:	Kandasamy, Thoshenthri; Flinders University, College of Nursing and Health Sciences Stockley, Rachel; University of Central Lancashire, School of Nursing Hendriks, Jeroen; Flinders University, Caring Futures Institute, College of Nursing and Health Science; Royal Adelaide Hospital, Centre for Heart Rhythm Disorders Fini, Natalie; The University of Melbourne Melbourne School of Health Sciences, Physiotherapy Department Bulto, Lemma ; Flinders University, Caring Futures Institute, College of Nursing and Health Sciences Lynch, Elizabeth ; Flinders University, Caring Futures Institute, College of Nursing and Health Science
<b>Primary Subject Heading</b> :	Health services research
Secondary Subject Heading:	Health services research
Keywords:	Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Protocols & guidelines < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, International health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Title: Conceptualising Centres of Clinical Excellence: A scoping review

Article type: Research – Scoping Review

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**Keywords:** Centre of Clinical Excellence, excellence in health, healthcare model, delivery of healthcare

**Author Contributors:** All authors were involved in the screening of records and data extractions. TK was the main author of this work and was responsible for the study design and coordination of the team. TK and EL were responsible for drafting the manuscript and all authors helped with the critical review of the manuscript. TK is the guarantor.

**Funding:** This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors. TK received a Research Training Program scholarship through Flinders University as part of her PhD.

Competing Interest: None declared.

Patient consent for publication: Not applicable.

**Ethics and Dissemination:** This study does not require human ethics committee approval. All sources will be adequately referenced. The findings of our scoping review will be disseminated through presentations at conferences and relevant forums. The completed scoping review will be submitted in a peer-reviewed journal and will form part of a PhD thesis.

**Supplemental material:** Attached Supplemental file, Table S1, Table S2.

## Word count: 3238 + 282 (Abstract)

#### **Tables and Figures**

- Table 1: Inclusion and exclusion criteria
- Table 2: Characteristics of included records
- Table 3: Characteristics of CoCE initiatives
- Table 4: Outline of Selection/Nomination Process of CoCE
- Figure 1: PRISMA flow diagram

# ABSTRACT

#### Objectives

Centres of Clinical Excellence (CoCE) are healthcare facilities that provide excellent healthcare. However, despite their increasing prevalence, it is unclear how CoCE are identified and monitored. This paper explores how CoCE has been described in the literature, including its defining characteristics and selection and monitoring processes.

#### Design

Scoping review using Arksey and O'Malley's framework with enhancement from Levac. We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.

## Data sources

A comprehensive search using MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus was conducted to identify relevant literature from January 2010 to June 2022.

## Eligibility criteria for selecting studies

We included published studies and grey literature that described how a CoCE was defined, established, monitored or evaluated.

## Data extraction and synthesis

Two independent reviewers completed the title and abstract screening, reviewed the full texts and extracted data.

## Results

Fifty records describing 45 initiatives were included. More than half were published in the USA (n=25, 56%). All but one initiative focussed on one clinical condition/population, most commonly cardiovascular disease (n=8, 17%), spinal surgeries (n=4, 9%), and pituitary tumours (n=4, 9%). Most initiatives (n=30, 67%) described a structured process to establish CoCE. The definitions of CoCE were not uniform. Common defining features included the volume of patients treated, medical expertise, a highly skilled multi-disciplinary team, high-quality care, and excellent patient outcomes. Identification as a CoCE varied from self-identification with no explicit criteria to application and assessment by an approval panel.

## Conclusion

Despite a growing prevalence of CoCE, there are inconsistencies in how CoCE are established, identified, monitored and evaluated. Common (but not uniform) features of CoCE are highly skilled staff, high-quality care delivery and optimal patient outcomes.

Word count: 282 words

# Strengths and Limitations of this study

- The study used inclusive search strategies (peer-reviewed journals and grey literature) and a stringent review process using two independent reviewers throughout the process.
- The study used Arksey and O'Malley's framework with enhancement from Levac and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.
- We may have missed established CoCE that have not published any studies or reports or published in non-indexed sources.

# INTRODUCTION

Healthcare facilities worldwide have a shared goal to continually improve healthcare delivery, often using stringent standards and indicators.<sup>1, 2</sup> Improvements in healthcare delivery can take the form of defining best clinical practice or demonstrating important aspects of care, such as safety, access, affordability, equity, effectiveness and efficiency.

Most healthcare organisations must meet national quality and safety standards to address clinical practice and organisational performance.<sup>1</sup> Accreditation is instrumental in achieving a baseline standard of care, however, it is not usually designed to recognise excellent care or to optimise patient-reported outcomes and experience. Recognising this gap between care that meets accreditation standards and "excellent" care, some healthcare facilities are taking proactive steps to engage in self-improvement and seek recognition for delivering exceptional care.

Excellence within healthcare is often labelled 'clinical excellence'<sup>3</sup>, and organisations that deliver exceptional patient care have been called Centres of Excellence or Centres of Clinical Excellence (CoCE).<sup>4-6</sup> Other dimensions of excellence that have been described in healthcare include 'research excellence',<sup>7</sup> 'service excellence'<sup>8</sup> and 'operational excellence'<sup>9</sup>. A recently published review<sup>6</sup> summarised evidence pertaining to Centres of Excellence in healthcare, education, research, industry and information technology. The authors of this review concluded that there are inconsistencies in how healthcare facilities are designated as Centres of Excellence and ambiguity between Centres of Excellence and regular healthcare facilities, with limited information on how these Centres were evaluated. Similarly, research excellence has been reviewed from education and clinical research perspectives, and frameworks are frequently not comprehensive,<sup>6</sup> with unclear methods used to determine excellence.

Attaining recognition as a CoCE could be a source of inspiration to facilities that are recognised as leads in healthcare provision.<sup>10</sup> Health professionals within the facilities can be inspired to pursue and maintain the best clinical care for their patients by promoting high-quality, up-to-date, evidence-based care to their community.<sup>10</sup> Additionally, CoCE can work with accreditation bodies to set higher benchmarks that encourage innovative patient-centred care. Accreditation bodies can adopt and maintain advanced standards of care over time, helping healthcare centres to continually raise the standards of patient outcomes. <sup>11</sup>

Despite the increasing use of the term CoCE, there is a lack of clarity about how this term is defined, how sites are nominated and selected as CoCE and how CoCE are evaluated and monitored. Therefore, the primary aim of this scoping review was to map evidence on CoCE in healthcare. We sought to explore and answer the following questions systematically:

- 1. What Centres of Clinical Excellence have been described in the literature?
- 2. What are the defining characteristics of Centres of Clinical Excellence?
- 3. How are Centres of Clinical Excellence selected or nominated?
- 4. What monitoring processes are employed to remain as Centres of Clinical Excellence?

Through conducting this review, we planned to explore the multifaceted dimensions of Centres of Clinical Excellence.

# METHOD

# **Protocol and Registration**

We registered the scoping review protocol on Open Science Framework. We employed the scoping review framework proposed by Arksey and O'Malley<sup>12</sup> with the refinement outlined by Levac, Colquhoun and O'Brien<sup>13</sup> to evaluate the evidence on CoCE. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).<sup>14</sup>

# Identifying relevant studies

We developed a search strategy with the support of a research librarian (Supplemental file). We searched MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify published records between January 2010 and June 2022. We also searched for grey literature (government reports, policies, protocols, conference proceedings, unpublished studies) and relevant websites using Google and Google Scholar. We also searched the reference lists of included records to check for further relevant records.

Inclusion and exclusion criteria are presented in Table 1. We included records that discussed CoCE that provided clinical care for people with any health condition in any setting (primary care, inpatient, outpatient or community). To be included, records had to describe how a CoCE was defined, established, monitored or evaluated. We excluded records that used the term "CoCE" without outlining any criteria. Centres of Excellence that were not designed to provide clinical care (such as Centres of Research Excellence) were excluded. Given the exploratory nature of the research questions, there was no limitation to study populations or interventions.

Insert Table 1

# Study selection

The search results were imported into Covidence, and duplicates were removed. As recommended by Levac,<sup>13</sup> two reviewers independently screened titles and abstracts and reviewed full-text documents using the inclusion criteria (see Table 1). One reviewer (TK) conducted the online search for relevant websites (first 20 pages on Google search) and two reviewers (TK and LB) independently completed the screening and review of the grey literature. The inclusion and exclusion criteria were reviewed periodically throughout the title and abstract screening process to ensure the criteria facilitated the identification and inclusion of relevant studies.

## Charting the data

A data extraction form was developed for the study (Table S1 and Table S2). We pilot-tested the extraction form with the first 15 eligible records to ensure consistent data collection. Two reviewers (TK and EL) independently extracted data on all included studies using the extraction form on Covidence. Quality of individual records were not assessed due to the descriptive nature of the review aims.

## Collating, summarising and reporting the results

We synthesised the research findings according to the research questions and presented data from all included studies in tables. Study characteristics were presented descriptively, and the research questions were presented narratively. Henceforth, the CoCE will be identified as initiatives and the search results will be defined as records. Each initiative will be described either as a theoretical centre (describing aspirational criteria/frameworks to develop a CoCE) or a physical centre where clinical care is provided. Initiatives that described a framework were classified as 'creating' a framework, 'using' or 'adapting' a pre-existing framework.

## **Patient and Public Involvement**

Patients were not involved in the design or completion of this study.

Insert Figure 1

# RESULTS

## Selection of sources of evidence

Overall, 9077 records were identified from a database search, and 36 records were identified through a grey literature search. A further three records were identified by reviewing reference lists of included records. 50 records describing 45 CoCE initiatives were included in the analysis (Figure 1). The complete search results and strategies are available in the Supplemental file. Among the records excluded at full-text review, 25 (n=28%) records described or labelled a centre as a CoCE but did not provide any selection criteria or any details about how the centres were nominated or monitored.

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## Characteristics of sources of evidence

Most records (n=43, 86%) were published in or after 2015. Nearly all the included records (n=44, 88%) were published in peer-reviewed journals, but only 15 (30%) were research articles, the remaining 28 (56%) records were other article types such as editorials or case reports. Two websites were identified as additional records for initiatives identified through the literature search. See Tables 2 and 3.

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Insert Table 2

# Synthesis of results

Less than half (n=20, 47%) of the identified initiatives were physical CoCE. With the exception of one CoCE which provided care for people with diabetes and cardiovascular disease <sup>15</sup>, all identified CoCE treated a single clinical condition or population. The most commonly described conditions were cardiovascular disease<sup>16-23</sup> (n=8, 17%), spinal surgeries<sup>24-27</sup> (n=4, 9%), pituitary tumours<sup>28-31</sup> (n=4, 9%), diabetes<sup>15, 32, 33</sup> (n=3, 6%), and obstetrics<sup>34, 35</sup> (n=2, 4%).

Some CoCE (n=6, 13%) were located across several countries,<sup>17, 21, 25, 28, 36, 37</sup> whereas the majority were described as stand-alone clinical centres, such as wards, surgical centres or clinics. Eight CoCE (18%) were located in low-and middle-income countries.<sup>20, 32, 38-43</sup> More than half of the included CoCE were located in the USA (n=25, 53%). CoCE established in high-income countries were typically described in terms of high-quality of care delivery, such as standardised care and optimal outcome (n=12, 27%),<sup>19, 21-23, 25, 33, 35, 38, 39, 44-46</sup> comprehensive multi-disciplinary care (n=8, 18%)<sup>16, 28, 31, 32, 40, 47-49</sup> or accessible patient-centred care (n=7, 16%).<sup>4, 15, 29, 36, 42, 50-52</sup>

More than half of the initiatives (n=30, 67%) described a structured process to establish a CoCE. While many initiatives reported that the CoCE was established using a framework or series of developmental stages, details regarding the developmental stages were rarely available. Five initiatives reported using published frameworks (Elrod and Fortenberry,<sup>29, 37, 45</sup> Christmas<sup>53</sup> and National Cancer Institute<sup>23</sup>) to guide their process to establish the CoCE. See Table 3 for further details.

Insert Table 3

# Defining characteristics of CoCE

Less than half (n=19, 42%) of the initiatives explicitly defined the characteristics of the CoCE. Seven (16%) initiatives<sup>20, 24, 26, 29, 37, 45, 54</sup> used the definition from Elrod and Fortenberry<sup>4</sup>: "a program within a healthcare institution which is assembled to supply an exceptionally high concentration of expertise and related resource centred on a particular area of medicine, delivering associated care in a comprehensive, interdisciplinary fashion to afford the best patient outcomes possible."<sup>4(p.16)</sup>

High volumes of patients treated or numbers of procedures performed, staffing, infrastructure, high quality of care and above-average patient outcomes were the most commonly described defining features of CoCE. Staffing components included medical expertise, highly skilled multi-disciplinary teams and staff-to-patient ratios. Other resources that were described as part of the CoCEs were infrastructure (n=15, 33%), such as building space and examination rooms, and specialised equipment (n=9, 20%). High quality of care

delivery was described in terms of standardised care and optimal outcome (n=12, 27%),<sup>19, 21-23, 25, 33, 35, 38, 39, 44-46</sup> comprehensive multi-disciplinary care (n=8, 18%)<sup>16, 28, 31, 32, 40, 47-49</sup> or accessible patient-centred care (n=7, 16%)<sup>4, 15, 29, 36, 42, 50, 51</sup>. Availability of treatment protocols was described as an important feature in 7 initiatives (15%). See Table 3 for details.

There were differences noted in the defining characteristics of CoCE in low-, middle- and highincome countries. Universally, most CoCE had common features regarding staff expertise, equipment and patient outcomes. However, CoCE in low- and middle-income countries tended to provide a healthcare service that otherwise was not available in the region, for instance, neurosurgery in Peru<sup>39</sup> and comprehensive dental care in Guwahati, India<sup>38</sup>.

#### Selection or nomination process of Centres of Clinical Excellence

No details were available about how sites were selected as CoCE in half (n=24, 53%) of the included initiatives. While 21 initiatives reported that there was a selection or nomination process to be recognised as a CoCE, the details of the selection or nomination process were inconsistently reported. When reported, processes used to select centres as CoCE were varied and included application and assessment by an approval panel (n=9, 45%)<sup>4, 8, 23, 34, 43, 45, 54-56</sup>, self-identification as a CoCE with no explicit criteria or external assessment (n=6, 30%)<sup>15, 16, 19, 29, 41, 50</sup> and site visit by funding body to assess suitability (n=1, 5%)<sup>18</sup>. Only four (20%)<sup>36, 46, 48, 57</sup> initiatives presented the process used to select the CoCE in its entirety, which are presented in Table 4. The bodies providing oversight of the nomination or selection of the CoCE were professional bodies<sup>23, 26, 34, 36, 48, 54</sup>, insurers<sup>45, 55</sup>, and organisations<sup>4, 38, 46</sup>.

Insert Table 4

#### Monitoring protocols to remain a designated Centre of Clinical Excellence

Only 24 (53%) of the included initiatives reported a monitoring process for the CoCE. Monitoring was mandatory for 6  $(25\%)^{34, 36, 48, 52, 54, 57}$  initiatives through recertification process. Other initiatives reported the importance of monitoring outcomes such as productivity (n=5, 21%),<sup>17, 19, 39, 43, 50</sup> patient outcomes (n=9, 36%),<sup>15, 16, 27, 29, 30, 32, 45, 47, 49</sup> quality metrics (n=3, 13%)<sup>24, 26, 37</sup> and cost-effectiveness of the program (n=1, 4%),<sup>40</sup> but there was no evidence that this monitoring process was routinely performed or overseen by any parties.

#### DISCUSSION

#### Summary of evidence

To our knowledge, this is the first scoping review to summarise what is known about CoCE in healthcare.

Despite identifying numerous CoCE initiatives, we were unable to identify selection processes used in more than half of the included initiatives. When selection processes were documented, they varied between initiatives. Further, there were inconsistencies in monitoring CoCE performance. Without consensus on what defines a CoCE, and without a recognised body to monitor the performance within each CoCE, there is no guarantee that care being delivered by sites claiming to be CoCE are delivering excellent (or even better-thanusual) healthcare.

The most common defining feature of CoCE included in this review was resource availability, specifically personnel, infrastructure and equipment. These findings are not surprising; it is well-established that there are associations between staffing levels, skill mix, infrastructure and patient outcomes.<sup>58-62</sup> For example, higher nursing staffing levels and employment of more skilled staff are associated with better patient outcomes such as reduced rates of pressure injuries, mortality and falls.<sup>58, 60</sup> Features such as infrastructure and specialised expertise are also key factors in Centres of Excellence in other industries.<sup>8</sup> The inclusion of these features within CoCE reinforces that the included CoCE were designed to align with what is known about healthcare delivery that leads to improved patient outcomes.

While frameworks or processes used to establish or describe CoCE may be valuable to guide others in the field, they may have limitations if these processes were developed for a specific healthcare facility, stakeholder cohort or disease group. For example, the Willis-Knighton Health System is a not-for-profit healthcare network in Louisiana, USA, that operates eleven self-nominated centres of excellence. The framework used to establish these centres of excellence was described by Elrod and Fortenberry and cited by authors of eight initiatives in our review to describe or establish their centres. Consideration should be given as to whether this framework is fit for purpose beyond the state of Louisiana and in countries with different healthcare models from the USA. Additionally, it is unclear whether this framework meets a universally agreed definition of excellence in healthcare. Empirical research to define "excellent care" from the perspectives of patients, healthcare facilities, or funders could increase the validity of the frameworks and, subsequently, the CoCE. A recent study (published after our review was completed) has identified defining criteria of "aspirational" (versus pragmatic, feasible or cost-effective) CoCE in stroke recovery and rehabilitation from the perspective of healthcare providers, survivors and caregivers and researchers. These criteria and the underpinning indicators could be used by facilities seeking recognition as CoCE in stroke healthcare provision.<sup>63</sup>

Selection procedures for CoCE were inconsistently reported and were unavailable for nearly half the included initiatives. The description of excellent care provided by the CoCE varied, seemingly associated with which agency was responsible for creating the definition. Descriptions of excellence encompassed patient-centric outcomes (e.g. optimising clinical outcomes and quality of life), service-centric outcomes (e.g. staff skill development, resource availability and meeting quality and safety accreditation) and economic outcomes (e.g. cost of treatment, length of stay). The concept of excellence was sometimes conflated with high

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 volume of patients who received care at the centre. Excellence for some centres from lowand middle-income countries was defined (either by self-nomination or by the government or collaborating international institutions) in providing a particular healthcare service when none was previously available in the region. Many of these aspects of excellence reflect commonly measured quality indicators of healthcare in high-income countries, namely effectiveness, access, safety and efficiency.<sup>64</sup> However, cost is not included as a quality metric in countries such as Australia, Canada, or the UK, but it is included as a measure of guality in the US Commonwealth Fund framework.<sup>64</sup> The difference between healthcare systems that generate income and those that do not is likely to influence many aspects of excellence. The inclusion of cost as a feature of some CoCE could be reflective of the different funding models (e.g. fee-for-service versus universal healthcare) or healthcare priorities within the centres or by the bodies determining a site's excellence. Whilst cost is considered in universal healthcare funding models, it is rarely highlighted beyond ensuring that healthcare providers function within their budget, which markedly differs from financial models that seek to produce profit in fee-for-service healthcare systems. Indeed, the centres that reported economic outcomes as a measure of clinical excellence were predominantly located in the USA and were nominated by healthcare funders suggesting that cost and cost efficiency is overtly considered as an important facet of excellence in fee-for-service centres.<sup>65, 66</sup>

Benchmarking is a well-recognised process that identifies the best-performing healthcare facilities in terms of patient outcomes and system performance.<sup>67</sup> However, while there is an implicit assumption that CoCE will deliver care that is superior to another (non-excellent) centre, most of the included initiatives in our review did not benchmark with other services. Benchmarking allows tracking of performance over time while comparing performance against other facilities, thereby demonstrating what is feasible to achieve in terms of quality of care.<sup>67</sup> For the initiatives included in this review, without comparison to other healthcare facilities and without a standardised set of explicit, evidence-based and measurable criteria, it raises disparity and challenges on how these centres can claim to be legitimate CoCE.

It is recognised that healthcare performance can be variable,<sup>67</sup> so healthcare facilities should monitor and evaluate their programs to ensure continued excellence. This process needs to be feasible within the time and resource constraints. Just over half the initiatives included in this review reported monitoring their service, and described various processes including measuring patient outcomes, service productivity and quality metrics to maintain the designation of CoCE. Only six initiatives reported a structured process, where their ongoing performance was reviewed and assessed by an overseeing body to maintain their status as CoCE. Clearly more attention should be paid to demonstrate the sustainability of excellence initiatives.

## CONCLUSION

Although CoCE are increasingly reported in the literature, there are inconsistencies in how these CoCE are established, monitored and evaluated. Processes used range from self-

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designation with no explicit criteria to using external evaluation and periodic recertifications. Features of CoCE centred around skilled medical and multi-disciplinary teams and other resources such as infrastructure and equipment. More work is required to develop transparent systems and processes to ensure that centres claiming to be "excellent" can demonstrate that they are delivering the highest quality care.

## IMPLICATION FOR PRACTICE AND FUTURE RESEARCH

This review highlights the need for clear criteria healthcare facilities can use to identify or establish a CoCE. The processes used also need to be transparent so they are easily available for certification or auditing purposes. The concept of a healthcare centre promoting "excellence" can also vary depending on different perspectives: patient, systems or funding. There needs to be clear guidelines that highlight the impact of "excellence" from these perspectives to ensure transparency on why a centre was nominated as a CoCE, and the monitoring processes used. It is recognised that staff wellbeing and retention contribute to more consistent healthcare delivery and better patient outcomes, so including staff wellbeing into a CoCE framework may be of value. The findings from this review will contribute to international efforts to establish CoCE using robust, transparent criteria and key performance indicators.

## STRENGTHS AND LIMITATIONS

The strengths of our scoping review include the inclusive search strategies (peer-reviewed journals and grey literature) and stringent review process using two independent reviewers throughout the process. There is a potential that there may be established CoCE that have not published any studies or reports, which we then have not identified. Whilst we sought assistance from an academic librarian to ensure the search strategies were clear and comprehensive, centres that describe excellence using different terms and relevant information published in non-indexed sources may have been missed. This is a particular challenge of this focus of work which straddles healthcare organisation, clinical practice and academic research.

 Table 1 Inclusion and Exclusion Criteria

Table 1: Eligibility criteria for article selection

#### **Inclusion criteria**

- Available in the English language
- Information on CoCE
- > Healthcare organisations or services providing clinical care to people with any healthcare condition
- Published from January 2010
- Any geographical location
- Studies describing the development/defining/monitoring/evaluation/frameworks of CoCE

#### **Exclusion criteria**

- Records that describe a study conducted at CoCE (e.g. using participants from CoCE)
- Centres that do not provide clinical care (e.g. Centres of Research Excellence or Centres of Leadership Excellence)
- Conference abstracts/papers, letters, NICE guidelines, JBI guidelines
- Only looking at costs associated within one CoCE (no comparator)
- > Only looking at clinical outcomes for people receiving care at CoCE (no comparator)
- Using term "CoCE" without outlining the criteria

Abbreviation: CoCE- Centres of Clinical Excellence; NICE- National Institute for Health and Care Excellence; JBI- Joanna Briggs Institute

#### Table 2 Characteristics of included records

Types of literature from included records (n=50)	N(%)
Research articles	15 (30%)
Others (Editorial, reports, case reports) from peer reviewed journals	28 (56%)
Book chapters	3 (6%)
Websites	2 (4%)
Systematic review	1 (2%)
Government report	1 (2%)
Country of Centre or initiatives described (n=45)	
USA	25 (56%)
Others	20 (44%)
Clinical Conditions from initiatives described (n=45)	
Cardiovascular disease	8 (18%)
Spinal surgery	4 (9%)
Pituitary tumours	4 (9%)
Diabetes	3 (7%)
Pregnancy related	2 (4%)
Others	24 (53%)

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#### Table 3 Characteristics of CoCE initiatives

	Theoretical			Resources	by copyright, including	jopen-2023-082704 on 2	Processes	used or suggeste	d for CoCE
1 <sup>st</sup> Author of main record describing initiative	Centre (T) or Physical Centre (P)	Framework adapted / created	Personnel	Infrastructure	Equipment uses reared to text and ontaining, All tailing, All tail tailing, All tai	20 Decem	eria cribed	Processes to establish a CoCE	Processes to monitor a CoCE
Bitzer et al <sup>47</sup>	Т	Х	Х	x	e e				Х
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Campbell et al <sup>38</sup>	Р	Х	Х	Х	5	SX-		Х	
Carvalho and Jill <sup>34</sup>	Т	Х	Х		X EX	ເ ໂ ໂ ໂ S S S S S S S S S S S S S S S S		Х	Х
Casanueva et al <sup>28</sup> & Tritos <sup>31</sup>	Т	Х	Х		2				
Chang et al <sup>48</sup> & Lymphatic Education & Research Network <sup>68</sup>	Р	Х	Х		<u>a</u>	exe e		Х	Х
Choque-Velasquez et al <sup>39</sup>	Р		Х		X ata	nd fr			Х
Coon et al <sup>69</sup>	Р	X	Х			Щ В Щ			
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Dietz et al <sup>44</sup>	Т	Х	X		Х	X			
Distiller and Brown <sup>32</sup>	Р		X		Ģ,	Xe			Х
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El-Eshmawi et al <sup>16</sup>	Р	Х	Х	X	0	· X		Х	Х
Elrod and Fortenberry <sup>4</sup>	Р	Х	Х	X		Xg		X	
Ferguson and Froehlich <sup>50</sup>	Р		Х		lec	ل ا		X	Х
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Geetha et al <sup>53</sup>	Р	Х			000	X			
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King, Jamieson and Berg <sup>45</sup>	Р	Х			•	∣ Хछ		X	Х
Kullar et al <sup>54</sup>	Р	Х	Х			Xð		Х	Х
Lancellotti, Dulgheru and Sakalihasan <sup>17</sup> & Chambers et al <sup>18</sup>	Т		Х	Х		Agence			Х
Li et al <sup>55</sup>	Т					XB		Х	
Marinoff and Heiberger <sup>41</sup>	Р		Х	Х		X Bibliographique de		Х	

	Theoretical			Resources		4 Process	es used or suggeste	ed fo
1 <sup>st</sup> Author of main record describing initiative	Centre (T) or Physical Centre (P)	Framework adapted / created	Personnel	Infrastructure	Equipment	is be including for uses related to text and data mining. All training, and similar	Processes to establish a CoCE	Pro mo Co
Martin et al <sup>25</sup>	Т	Х				Ens		
McLaughlin et al <sup>30</sup>	Т		Х		Х			Х
Nakov et al <sup>20</sup>	Р		Х			nen 202		
Piccini et al <sup>21</sup>	Т	Х	Х	Х				
Pronovost et al <sup>49</sup>	Т	Х						Х
Safer Care Victoria <sup>51</sup>	т	Х						
Sandhu et al <sup>22</sup>	Т	Х	Х			ade ieu		
Santos-Moreno et al <sup>36, 71, 72</sup>	P	Х	Х	Х	Х	nd fr	Х	Х
Sheha and Iyer <sup>26</sup>	Т	0.	Х					Х
Shikora, Delegge and Van Way III <sup>57</sup>	Р	Х	Х	Х	Х		X	Х
Shommu et al <sup>73</sup>	Т							
Silver et al <sup>35</sup>	Т		Х	Х				
Steiner et al <sup>74</sup>	Т		X				X	
Tapela et al <sup>42</sup>	Р		X	X	X			
Thomas et al <sup>15</sup>	Р		Х			nj.c	Х	Х
Vivian et al <sup>46</sup>	Р	Х	Х	Х	Х		Х	
Williams <sup>23</sup>	Т	Х	Х	L L	X	Xon	Х	
Wirth et al <sup>52</sup>	Т	Х	Х			June Xune	Х	Х
Wu et al <sup>27</sup>	Т	Х				ne 1		Х
Yao and Zhou <sup>43</sup>	Р	Х	Х				Х	Х
Total	21 (P) 24 (T)	30	37	15	9	June 11, 2035 at	20	24

#### Table 4 Outline of Selection/Nomination Process of CoCE.

& Lymphatic       applications will be scored, using the following three individual criteria:         Education &       applications will be scored, using the following three individual criteria:         Besearch       b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic.         Network <sup>68</sup> c. Miscellaneous (e.g., lymphatic disease community citizenship, research).         Santos-       1. Implementing an attention model for the patients diagnosed with rheumatoid arthritis in accordance with the requirements of each type of centre of excellence.         2. Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.       3. Requesting and preparing for a verification visit.         4. Receiving a verification visit from REAL-PANLAR.       5. Official notice of the results of the assistance and verification visit.         Shikora,       1. Online application completed by surgeon or facility.         2. Successful application results in provisional status.         3. Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome.         4. Mandatory submission of all patient data to a database.         Vivian et al <sup>146</sup> 1. Establishing the foundation (leadership structure and purpose).         2. Formalising the Centre of Excellence program (clinical education training, multidisciplinary team involvement).	1 <sup>st</sup> Author	Steps outlined
<ul> <li>Moreno et al<sup>36</sup> <ul> <li>in accordance with the requirements of each type of centre of excellence.</li> <li>Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.</li> <li>Requesting and preparing for a verification visit.</li> <li>Receiving a verification visit from REAL-PANLAR.</li> <li>Official notice of the results of the assistance and verification visit.</li> </ul> </li> <li>Shikora,         <ul> <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> </li> <li>Vivian et al<sup>46</sup> <ul> <li>Establishing the foundation (leadership structure and purpose).</li> <li>Formalising the Centre of Excellence program (clinical education training, multidisciplinary team involvement).</li> <li>Solidifying the Centre of Excellence status (certification/accreditation by externa</li> </ul> </li> </ul>	& Lymphatic Education & Research	<ul> <li>applications will be scored, using the following three individual criteria:</li> <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>
<ul> <li>Delegge and Van Way III<sup>57</sup></li> <li>2. Successful application results in provisional status.</li> <li>3. Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome.</li> <li>4. Mandatory submission of all patient data to a database.</li> <li>Vivian et al<sup>46</sup></li> <li>1. Establishing the foundation (leadership structure and purpose).</li> <li>2. Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).</li> <li>3. Solidifying the Centre of Excellence status (certification/accreditation by external</li> </ul>		<ul> <li>in accordance with the requirements of each type of centre of excellence.</li> <li>Filling the self-assessment form of each type of centre of excellence and implementing improvement actions.</li> <li>Requesting and preparing for a verification visit.</li> <li>Receiving a verification visit from REAL-PANLAR.</li> </ul>
<ol> <li>Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).</li> <li>Solidifying the Centre of Excellence status (certification/accreditation by external</li> </ol>	Delegge and	<ol> <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> </ol>
	Vivian et al <sup>46</sup>	<ol> <li>Formalising the Centre of Excellence program (clinical education training, multi- disciplinary team involvement).</li> <li>Solidifying the Centre of Excellence status (certification/accreditation by external institute).</li> </ol>

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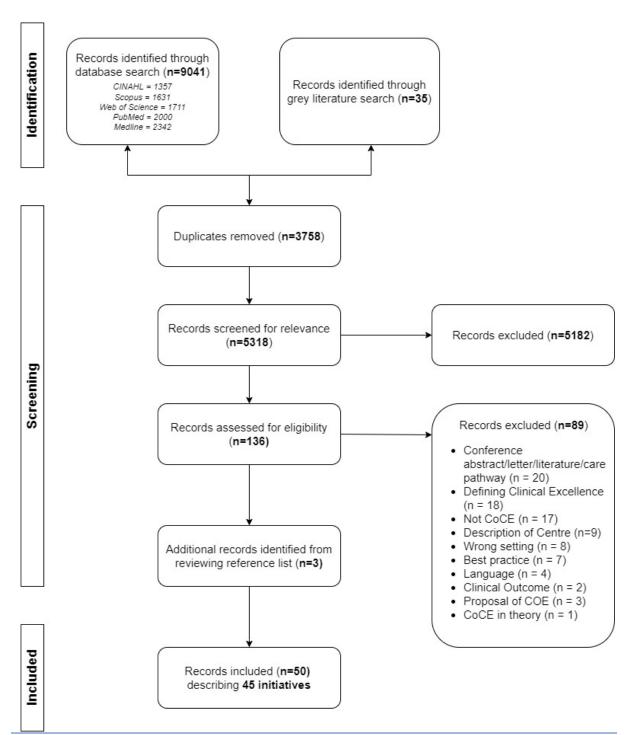


Figure 1 PRISMA flow diagram. Abbreviation: CoCE- Centres of Clinical Excellence; COE- Centre of Excellence

<u>)</u>	Supplemental file
	Search Strategy
	Databases search: MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus
	<b>Keywords used:</b> "centre of clinical excellence" OR "networks of excellence" OR "best practice" OR "clinical exemplars" OR "integrated healthcare delivery" OR "excellence" OR "clinical protocols" OR "clinical competence" as search terms, subject headings, concepts or keywords.
	MEDLINE Ovid (((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence).ti,ab,kf.
	excellence).ti,ab,kf.

CoE – Centre of Excellence \*Research article in peer reviewed journal "Other in peer reviewed journal ^Case report in peer reviewed journal

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#### Table S1: Description of the aim and type of publication and information on how CoCE were described in the initiatives.

	Orienters		Transf			Ho	itiatives. 7: 23 5 5 5 5 5 5 5 7 7 7 7		
1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE don 20 E	Clinical focus area of CoCE	Resources
Bitzer et al <sup>1</sup>	Europe	Describing the framework and characteristics of an "ideal" CoE of Sexual Medicine and Sexual Therapy	Other#	Centre of Excellence for Sexual Medicine	Not reported	Created by authors	Diagnosis and treatment for the second dysfunction. Since the second dysfunction. Since the second dysfunction. Since the second dysfunction is to a second dysfunction in the second dysfunction is to a second dysful dys	Sexual medicine	<ul> <li>Personnel</li> <li>Multi-disciplinary team</li> <li>Infrastructure</li> <li>A room for counselling/therapy</li> <li>Examination room</li> </ul>
Burkett et al <sup>2</sup>	Not reported	To present the concept of "centers of excellence" and how they are applied to spine care. Provided an overview of spinal CoE.	Book chapter	Spine Centre of Excellence	Not reported	Not reported	<ul> <li>To achieve exceptional quality of spine case at gradient on une to spine case at gradient patient population of the spatient population of the spatient population of the spatient population meets high performance standards of the spatient area institutions.</li> </ul>	Spinal surgeries	<ul> <li>Personnel</li> <li>Specialties involved may include neurosurgery, orthopaedic surgery, rehabilitation, occupation therapy and physical therapy, pain manageme specialized nursing, radiology, behaviour medicine, and psychiatry</li> </ul>

	Country /		Type of			Hov	w is CoCE described in the study		
1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE nc 104	Clinical focus area of CoCE	Resources
Campbell et al <sup>3</sup>	India	Examines the evolution of a Centre of excellence as an innovative model for sustainable cleft care in the developing world	Research article*	Operation Smile Guwahati Comprehensive Cleft Care Center (GCCCC)	2009	Created by authors and collaborators from Operation Smile	To provide standard and comprehensive cleft same one institution, with Science state. CoE designation progess	Cleft palate	<ul> <li>Personnel</li> <li>Healthcare professionals multiple disciplines</li> <li>Infrastructure         <ul> <li>Modern surgical suite and clinical space</li> <li>Modern integrated operating suite, advanced surgical equipment, sophisticated anaesthesia and monitoring capabilitie</li> </ul> </li> </ul>
Carvalho and Jill <sup>4</sup>	USA	To describe designation process of Centres of Excellence in obstetric ant	Other# & Website	CoE for Anaesthesia Care of Obstetric Patients	2018	The criteria for Centres of Excellence designation, which covers all aspects of obstetric anaesthesia care, were generated by expert consensus and incorporate evidence-based recommendations.	CoE designation programs designed to recognize institutions and programs demonstrate excellence in obstetric anaesthesia set a benchmark level of on expected care to improve the standard nationally, and to provide broad surrogate quality metric of institutions providing obstetric anaesthesia care	Obstetric Anaesthesia and Perinatology	<ul> <li>Personnel</li> <li>Obstetric anaesthesiologi</li> <li>24/7 coverage of obstetric patients by at least 1 anaesthesiologist</li> <li>Equipment</li> <li>Includes access to blood transfusion equipment an supplies, access to resuscitation and intubatio equipment and supplies</li> </ul>

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	Country /		Turne of			How	w is CoCE described in the study		
1 <sup>st</sup> Author	Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE in clud in	Clinical focus area of CoCE	Resources
Casanueva et al <sup>5</sup> & Tritos <sup>6</sup>	International	To describe the criteria for developing Pituitary Tumors CoE	Other#& Website	Pituitary Tumor Centers of Excellence (PTCOE)	Criteria disseminated 2017	Expert working group drafted framework. The draft was modified and approved by the Board of Directors of the Pituitary Society. The document was presented to international groups, modified and endorsed.	<ul> <li>Provide the best of multidisciplinary care from patients with pituitary care from patients with pituitary early early</li></ul>	Patients with pituitary tumours	Personnel  Medical specialists Multidisciplinary supports Basic requirements for surgical training and endocrinologist training listed.
Chang et al <sup>7</sup> & Lymphatic Education & Research Network <sup>8</sup>	USA	To describe the steps taken to establish standards for Centres of Excellence for Lymphatic Disease Described 5 categories of Centres of Excellence: • Comprehensive Centre of Excellence	Research article*, website	Lymphatic Education and research network CoE	Criteria published 2021	Lymphatic Education and Research Network initiated a Centres of Excellence program to designate institutions that provide services	Provide multidisciptinary of unitidisciptinary of unitidisciptinary of unitidisciptinary of unitidisciption of unitidial and any education     Involvement in clinical and international CoCEs to continually improve the lives of or unitidial international coCEs to continually improve the lives of the	Lymphatic disease	<ul> <li>Personnel</li> <li>Multi-disciplinary input</li> <li>Suggested expertise requirements listed in detail</li> <li>Resources</li> <li>Assessment tools listed</li> </ul>

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1		Country /		Type of	How is CoCE described in the study						
2 3 4	1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE 104 on	Clinical focus area of CoCE	Resources	
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	Choque- Velasquez et al <sup>9</sup>	Peru	<ul> <li>Network of Excellence</li> <li>Referral Network of Excellence</li> <li>Lymphatic Disease Surgery Centre of Excellence</li> <li>Lymphatic Disease Conservative Care Centre of Excellence.</li> <li>To describe the development of Neurosurgical Centre of Excellence in Peru</li> </ul>	Research article*	Specialized Neurosurgical Centre of Excellence	2016	for lymphatic disease patients Not specified what process used	people with LD and Beir December 2024. Downloaded from http: families. uses related to text and data mining. Alternational data mining. Alternational data mining. Alternational data mining there is independent of the second se	Specialty neurosurgical centre, Peru	Personnel • Staff training by neurosurgeons and nurses from Finland Equipment	
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44	CoE – Centre of Excelle *Research article in pe *Other in peer reviewe ^Case report in peer re	er reviewed journal d journal		For pee	r review only - ht	:tp://bmjopen	.bmj.com/site/abou	district r technologies. r technologies. ut/guidelines.xhtml		<ul> <li>Equipment provided/repaired</li> <li>Other</li> <li>Neurosurgical protocols developed</li> </ul>	

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established		w is CoCE described in the study Function of CoCE in Cluding Not reported for De		Resources	
Coon et al <sup>10</sup>	USA	Introduced key aspects of coordinated care for patients with MSA and their caregivers, discuss various outcome measures, and share experiences from two centers with multidisciplinary clinics.	Other#	Multiple System Atrophy CoE	Multiple Centres discussed. Established between 2015 - 2019.	Created by authors but process not described	Not reported Not r	Multiple System Atrophy	Personnel • Multi-disciplinary team	
Creehan et al	USA	Describe the development of a framework for Centres of Pressure Ulcer Prevention Excellence	Research article*	Centers for Pressure Ulcer Prevention Excellence	The process developed in 2014	Framework developed using Donabedian model. Systematic literature reviews, analysis of exemplars, and nominal group process techniques were used to create the framework, based on 4 Magnet Model domains.	Inspirational centre mitting develop a framework Aintito achieve and sustain Freductions in avoidable hospitating, and similar technologies.		<ul> <li>Personnel</li> <li>Frontline staff engageme and hospital</li> <li>Administrator</li> <li>Leadership</li> </ul>	

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1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE nc. 2704	Clinical focus area of CoCE	Resources
Daming et al <sup>12</sup>	USA	A guide for creating a center of excellence for prenatal care for women with cardiovascular disease.	Other#	Maternal Cardiac CoE	2014	Developed a 3 staged framework (vision-> design and development -> implement, monitor and review).	To manage pregnant worth nearly and system of the second system of the s	Maternal cardiac health	<ul> <li>Personnel</li> <li>Program coordinator</li> <li>Multi-disciplinary team (recommendation provide for speciality</li> <li>Infrastructure:</li> <li>Dedicated outpatient clinit</li> </ul>
Deshmukh et al <sup>13</sup>	India	To evaluate the impact of the Centre of Excellence at Vidya Shikshan Prasarak Mandal Dental College and Research Centre	Research article*	Centre of Excellence at Vidya Shikshan Prasarak Mandal Dental College and Research Centre	2016	The present CoE model was planned and executed with consensus building for 12 months using several methods to involve stakeholder groups (staff, students and patients)	<ul> <li>To provide compressive oral healthcare for the economically disadvantation economically disadvantation economically disadvantation groups in rural Inden: To foster organisational development through an integrated approach.</li> <li>To stand out as a moneer in Central Indian region in the fields of maxillofactation rehabilitation and goal implantology.</li> </ul>	Oral healthcare	Personnel • Academic faculty, consultants and post- graduate students
Dietz et al <sup>14</sup>	USA	Summary of best practices for the prevention and	Case report^	Centers of Excellence in Addressing	Not reported	Creating a basis for framework within the	Centers of Excellence progide better overall outcomes and graphi graphi graphi que ut/guidelines.xhtml	Periprosthetic joint infection	Personnel <ul> <li>Multi-disciplinary teams</li> </ul>

	O		Turk			Но	w is CoCE described in the study	/	
1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Column	Clinical focus area of CoCE	Resources
		treatment of PJI within the context of a CoE.	F.	Periprosthetic Joint Infection		literature, based on work on musculoskeletal infection symposium	lower financial, physeral, end emotional costs to the prefent, thus providing a great of the prefert by decreasing variation of the treatment pathways and the incorporating best precipes		Equipment <ul> <li>Electronic medical record</li> <li>Others</li> <li>Protocols for pre-operative screening and evaluation</li> <li>Risk reduction protocols and processes</li> </ul>
Distiller and Brown <sup>15</sup>	South Africa	Not reported	Book Chapter	Centres for Diabetes Excellence	1994	Not reported	based on evidence. Experienced from an agement and privily "one-stop shop" for Are and a well-managed appointment system particular techno waiting and optimal similar techno waiting and optimal similar techno	Diabetes	Personnel  Trained medical staff (specialists, GPs or physicians)  Other  every centre must provide a direct 24-h emergency telephone number ("Hotline")
Draznin et al <sup>16</sup>	USA	Proposing a framework to guide advancement for clinical CoE	Other#	Diabetes Center of Excellence	Not reported	6 domains or pillars to serve as guiding principles	To improve population headth, patient care experience at (including quality and satisfaction) and reducing healthcare costs. Diagnoses and management of diabetes.	Diabetes	<ul> <li>Personnel</li> <li>Adequate in terms of number, skills, experience</li> <li>Multi-disciplinary professional teams guide by clinician diabetologists</li> </ul>

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1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Including	Clinical focus area of CoCE	Resources
			50	h.,			n 20 December 2024. Downloaded fi Enseignement Superieura (A Provides a structure at a structure		experienced in managi complex, high-risk individuals Infrastructure • appropriate to qualify a centre and technologie
El-Eshmawi et al <sup>17</sup>	USA	To define the structure of a mitral center of excellence and to review current clinical outcomes	Other#	Mitral Valve Center of Excellence	Not Reported	Description of functioning of self- nominated Centre of Excellence	Provides a structure of the add multidisciplinary head for to provide state of the add for to patients with degent ative. mitral valve disease I training, and similar technolo , and similar technolo	Mitral valve disease	<ul> <li>Personnel</li> <li>Crucial - surgeons train in mitral valve repair; anaesthesia team, intensive care team, interventional cardiolog</li> <li>Infrastructure</li> <li>Mitral valve clinic; acce to advanced cardiac</li> </ul>
		To suide booltboore	Other#	Willia Kaishtaa	1090/2	Paged on	on June 11, J		imaging; data monitorir team
Elrod and Fortenberry <sup>18</sup>	USA	To guide healthcare establishments to replicate noted processes to realize their own CoE	Other#	Willis-Knighton Health System CoE (has 11 CoE in different clinical areas)	1980's	Based on information and insights gleaned from 1 healthcare provider's (Willis-	To deliver innovative higho quality healthcare that would attract increasing number of patents	11 clinical areas by this healthcare provider	<ul> <li>Personnel</li> <li>Skilled and experienced personnel</li> <li>Infrastructure</li> </ul>
CoE – Centre of Excelle *Research article in pe		processes to realize		CoE in different		from 1 healthcare	patents gence Bibliographique		

Country (				Ho	w is CoCE described in t	Jdy	
1 <sup>st</sup> Author Country / Aim of p	ublication Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Tt. 082704 Function of CoCE Includii	Clinical focus area of CoCE	Resources
				System) experience assembling and operating Centers of Excellence.	Function of CoCE Function of CoCE Function of CoCE		Appropriate     accommodation necessar     to deliver continuum of     care
Ferguson USA Describe th and developmen Froehlich <sup>19</sup> program, its principles, o and early re	nt of the report <sup>^</sup> s guiding challenges	The Total Joint Centre	2010	Not reported. Intuitive quality improvement process with assistance from external consultant	To provide state-of-the approximate of the second state-of-the approximate of the second state of the seco	Joint replacements	<ul><li>Personnel</li><li>Multi-disciplinary team</li><li>Patient navigators employed</li></ul>
Frara et al <sup>20</sup> Authorship Not reporte team from Discussion Spain		Pituitary tumors centers of excellence	Not reported	Adapted from Elrod and Fortenerry	To provide a high-legel com/ for pituitary patients, an advance pituitary science similar technologies.	Pituitary tumors	<ul> <li>Personnel</li> <li>Specialist medical staffing and nursing</li> <li>Infrastructure</li> <li>Physical place availability</li> </ul>
Geetha et al <sup>21</sup> USA Apply the d clinical exce nephrology	ellence to	Miller-Coulson Academy of Clinical Excellence	2015	Adapted clinical excellence framework from Christmas	Not reported <b>Vologies</b> . 11, 2025 at Agence	Nephrology	Not reported

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1		Country /		Type of			How	v is CoCE described incite study		
2 3 4	1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE in 2704 on dir	Clinical focus area of CoCE	Resources
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 9 30 31 32 33 34 35 36	Haider et al <sup>22</sup>	LMIC	<ul> <li>To explore the role of international urologic organisations in developing CoE in patient care, training and dissemination of knowledge.</li> <li>To explore strategies used to improve the standard of care and outcomes of urologic conditions in LMIC.</li> <li>To provide a roadmap on how similar international surgical organizations can contribute to developing CoE in LMIC through health system strengthening.</li> </ul>	Case report^	Not reported	Not reported	Used Elrod and Fortenberry	To contribute to heads symplecember 2024. Downloaded from http://bmjopen.bmj.com/ on June 11, 2025 at Agen strengthening througs strengthening to text and data mining, AI training, and similar technologies.	Urology Surgery	Personnel  • Staff with depth and breadth of knowledge and qualifications
<ol> <li>37</li> <li>38</li> <li>39</li> <li>40</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>45</li> </ol>	CoE – Centre of Excelle *Research article in pe "Other in peer reviewe ^Case report in peer re	er reviewed journal d journal		For pee	r review only - ht	tp://bmjopen.	bmj.com/site/abou	e Bibliographique ut/guidelines.xhtml de		

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE nclud on	Clinical focus area of CoCE	Resources
King, Jamieson and Berg <sup>23</sup>	USA	To use the example of transplant programs (with extensive national-level data) as examples of the strategic planning required to accomplish comprehensive. Interdisciplinary care affording the best possible outcomes, and rightfully claim to serve as centres of Excellence.	Other#	Presents 9 Centres of Excellence designations within solid- organ transplantation	Not reported	Elrod and Fortenberry	Providing best outcoordinate of the possible to people user regement Superieur (ABES) . organ transplantation of the text and data mining, Al training, Al training, and training and the programs of antimicrobial steward will be the programs of the programs of the program of t	Hepatology	Not reported
Kullar et al <sup>24</sup>	USA	<ul> <li>To describe the process and purpose of designating institutions as Antimicrobial Stewardship Centres of Excellence CoEs.</li> <li>To provide awareness to clinicians on opportunities available through Infectious</li> </ul>	Research article*	Antimicrobial Stewardship Centres of Excellence (program)	2017	Built on core elements of Centers for Disease Control and Prevention. Added aspects of meaningful differentiation by workgroup of infectious diseases	g, and find the second	Infectious Disease	Personnel • Clinical expertise

	Country		Time of			Ho	w is CoCE described in the study		
1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE includin	Clinical focus area of CoCE	Resources
		<ul> <li>Diseases Society of America with this CoE designation</li> </ul>				physicians and pharmacists.	ğ for uses Enseignet relation To perform durable		
Lancellotti, Dulgheru and Sakalihasan <sup>25</sup> & Chambers et al <sup>26</sup>	Multiple European countries	Chambers: to discuss Standards for mitral and aortic valve multidisciplinary team practice within a 'Heart Valve Center of Excellence'.	Other#& Research article*	Heart Valve Centre of Excellence	Not reported	Not reported	To perform durable of the perform durable of the perform durable of the performance of th	Heart Valve Surgery	<ul> <li>Personnel</li> <li>Multi-disciplinary team (medical and nursing) proficient in diagnosing and treating all cardiac valve syndromes and disorders</li> <li>Infrastructure</li> <li>Facilities to treat and refer patients for valvular surgery/intervention.</li> <li>Access to expert imaging</li> </ul>
Li et al <sup>27</sup>	USA	To evaluate the current status of defining and using CoE designation	Research article*	Not reported	Not reported	Not reported	Not reported similar techn	Multiple area	Not reported
Marinoff and Heiberger <sup>28</sup>	China	To share accomplishments and limitations from creating a Centre of Excellence in Low	Case report <sup>^</sup>	Center of Excellence in Low Vision and Vision Rehabilitation	2010	Not reported	Treatment of people gies vision Second Secon	Low vision and vision rehabilitation	<ul> <li>Personnel</li> <li>Trained doctors and nurses</li> <li>Infrastructure</li> <li>Occupies 6,240 square fee and is equipped with four</li> </ul>

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE nc.lud in	Clinical focus area of CoCE	Resources
		Vision rehabilitation in China	F0,	-			2704 on 20 December 2024. Downloaded Enseignement Superieur of CoCE Function of CoCE		low vision examination rooms, a special testing room, an assistive technology room, a dispensing area, and a classroom, access to multiple low vision devices
Martin et al <sup>29</sup>	Various countries	Utilize available literature to better characterize the features of a spine COE at a tertiary care center and determine the impact of CoEs on patient satisfaction and outcomes.	Systematic Review & Case report <sup>^</sup>	Spine CoE	2021	The COE's (Midwest academic tertiary care) mission entails three primary emphases: value, quality, and accountability.	Standardisation of provide spinal cord compression provide to the spinal cord compression provid	Spine	Not reported
McLaughlin et al <sup>30</sup>	USA	Review the literature supporting the establishment of pituitary CoEs, suggest criteria for COE recognition, consider the development of standards of care, and	Other#	Pituitary Centre of excellence	NA	Not reported for pituitary tumour, however provided examples of other models e.g., bariatric	Treatment of pituitate tunger and described primady missions and criteriation verification ut/guidelines.xhtml	Pituitary	<ul> <li>Personnel</li> <li>Multi-disciplinary approach related to pituitary tumours and hormonal disorders.</li> <li>At least 1 neurosurgeon with transsphenoidal surgical experience</li> <li>Training for team</li> </ul>

Page 3	35 of 63					BMJ (	Open	Jopen-202 by copyright w is CoCE described in the study		
1		Country /		Type of			How	w is CoCE described in the study		
2 3 4	1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Function of CoCE	Clinical focus area of CoCE	Resources
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	Nakov et al <sup>31</sup>	Bulgaria	discuss potential pitfalls. Focus on the importance of performing the most appropriate testing strategies for ATTR amyloidosis and	Other#	CoE for ATTR amyloidosis	2016	Not reported	on 20 December 2024. Downloaded from http://amjopen.bmj.com/ on June 11, 2025 at Enseignement Superieur (ABES) . ding for uses related to text and data mining, Agtraining, and similar technologies. Treatment for Amylotration of the technologies of technologies o	Transthyretin       Amyloidosis	<ul> <li>Equipment</li> <li>Equipment and instrumentation for endonasal cranial base surgery including endoscopic equipment</li> <li>Others</li> <li>Clinical pathways and standard operating procedures</li> <li>Personnel</li> <li>Dedicated team of experts specialized in the range of medical fields required to diagnose the patients effectively and</li> </ul>
28 29 30 31 32 33 34 35 36 37 38 39 40 41	CoE – Centre of Excelle *Research article in per "Other in peer reviewer ^Case report in peer re	er reviewed journal d journal	establishing a CoE for this rare disease. Highlights experience in establishing a CoE in Sofia, Bulgaria and define the fundamental steps needed to successfully launch a program.					on June 11, 2025 at Agence Bibliographique lar technologies.		education/training for staff
42 43 44 45	Case report in peer re	viewed journal		For pee	r review only - ht	tp://bmjopen	.bmj.com/site/abou	ut/guidelines.xhtml de		

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Cludin	Clinical focus area of CoCE	Resources
Piccini et al <sup>32</sup>	Not specifically identified	HRS hopes to accelerate this evolution by reviewing the rationale for AF CoEs, the available evidence for integrated and multidisciplinary care, and future challenges and opportunities. The document also defines the key priorities to be used as a guide for HRS and its diverse stakeholders to build consensus on defining the core components of an AF CoE.	Other#	Atrial Fibrillation CoE	Not reported	Fundamentals of team-based integrated care models in atrial fibrillation	To improve outcome by performing a better patient of the component of the	Atrial Fibrillation	<ul> <li>Personnel</li> <li>Multi- disciplinary team</li> <li>Infrastructure</li> <li>Dedicated lab with fluoroscopy</li> <li>Electrophysiology recording system</li> <li>Emergency equipment</li> <li>Others</li> <li>Complication standard operating procedure</li> </ul>
Pronovost et al <sup>33</sup>	USA	Defines explicit criteria for provider-based CoEs and how to apply them within a healthcare organization	Case report^	General description of CoE	Not reported	Reported used a framework based on University Hospital, USA and listed the criteria used to establish CoE as a framework.	Have access to multiple taim and seek to improve atient experience and outcome 22 and reduce costs Agence Bibliog raphique ut/guidelines.xhtml	NA	Not reported specifically. Used examples from other CoE

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1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Includin	Clinical focus area of CoCE	Resources
Safer Care Victoria <sup>34</sup>	Australia	Discuss approaches to engaging clinicians and consumers to improve the quality and safety of health care in Vitoria. Spells out the purpose, role and structure of the CoCE.	Website – grey literature	Safer Care Victoria Centres of Clinical Excellence	2021	Aligns with Safe Care Victoria Strategic Plan 2020-2023.	Contribute to the key strategic domains of leadership of partnership and plarfing of monitoring and improvement with the aim of improving to healthcare across Viet Sup it is safe, more effective and person-centred.	Multiple setting	Not reported
Sandhu et al <sup>35</sup>	USA	To gain a better understanding from key stakeholder groups on current practices needs and potential barriers to implementing optimal integrated AF care.	Other#	Atrial Fibrillation CoE	2022	AF CoE task force provides recommendations on defining, developing, implementing and evaluating an AF CoE	To standardise the car brack patients based on guide directed care to acheve based outcomes.	Atrial Fibrillation	Personnel <ul> <li>Identified the need for multi-disciplinary team</li> </ul>
Santos- Moreno et al <sup>36-38</sup>	South America	<ul> <li>To define the minimum standard of care.</li> <li>To describe the history and current context of the CoE in comprehensive care in patients with RA with suggestions on</li> </ul>	Research article* & Other#	Centre of Excellence in Rheumatoid Arthritis	Not stated	Created own framework and integrated healthcare models and endorsed by REAL-PANLAR Based on 3 pillars - the volume of	The ultimate goal of the Constant is to define a model of the constant is comprehensive carechat 1, meets the needs of the ragion in order to improve the accessibility, quality, and timeliness of care, and access to appropriate diagnosis and treatment. This is to facilities	Rheumatoid Arthritis	Three CoE Modes were presented and each model (standard CoE, Optimal Co Model CoE) had different requirements of staff, equipment and infrastructu <b>Personnel (at minimum)</b> • Multi-disciplinary team le by rheumatologist

	Country /		Type of			Hov	,		
1 <sup>st</sup> Author	Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Cludir	Clinical focus area of CoCE	Resources
		<ul> <li>how to create CoE in RA</li> <li>Proposed a systematic and progressive methodology that will help all the institutions to develop successful models without faltering in the process</li> </ul>	40	- Dee	Pr re	patients with a specific condition or entity - continuous improvement - the quality of healthcare	access to better quairy treatment, achieve description quality of life and redited from http://bmjope term disability risk to to text and data mining, Al traini patients.		Infrastructure <ul> <li>Access to radiology</li> <li>Access to pathology</li> </ul> <li>Equipment <ul> <li>Standardised tools</li> </ul> </li>
Sheha and Iyer <sup>39</sup>	USA	General description of CoE and applying general principles of healthcare CoE to spine surgery	Other#	Spine CoE	Multiple centres that was previously established was discussed in the study	Not reported	An opportunity to ace, and opportunity to ace, and opportunity to ace, and opportunity to ace, and opportunity on June 11, 2025 at a standard structure of the surgery stru	Ambulatory spinal surgery	<ul><li>Personnel</li><li>Multi-disciplinary team</li><li>Education</li></ul>
Shikora, Delegge and Van Way III <sup>40</sup>	USA	Describes the creation, implementation, and benefits of the BSCoE (Bariatric Surgery	Case report^	Nutrition Support Center of Excellence	2003 - creation of the Surgical Review	Consideration for adaption of BSCoE to NSCoE	Not reported Agence Bibliographique de ut/guidelines.xhtml de	Nutritional Support	Specified BSCoE and how this can be adapted to NSCoE <b>Personnel</b>

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	of creating an NSCOE			(SRC).	Formulate and		ecel E		for BSCoE		
	(Nutritional Support				establish		nbe nse es r				
	CoE). Description of				guidelines and		elat		Infrastructure		
	the CoE in Bariatric				criteria for		)24. ed t		Specific to BSCoE		
	Surgery and how this				assessing				<b>–</b>		
	can be adapted to		6		bariatric		wnl sup		Equipment		
	Nutritional Support.		6		surgical		oad erie and		Not specifically outline		
	The report contains				practices.		led f ur ( dat				
	description of			5	Evaluate and		a m				
	resources, how it was				investigate		n <mark>ht</mark> inin				
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	Country / Region	RegionAim of publicationRegionCOE) and the benefits of creating an NSCOE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of	RegionAim of publicationpublicationRegionCOE) and the benefits of creating an NSCOE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of	RegionAim of publicationpublicationName of CoCECOE) and the benefits of creating an NSCOE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. 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The report contains description of resources, how it was created the certification process and benefits of BSCoE       Formulate and establish guidelines and criteria for assessing bariatric surgical practices.         BSCoE       Formulate and establish guidelines and criteria for assessing bariatric surgical practices.       Formulate and establish guidelines and criteria for assessing bariatric surgical practices.         Corporation       Corporation (SRC).       The SRC         Corporation       Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of BSCoE       Formulate and established standards to become a BSCOE.         BSCOE       Creating a national bariatric surgical database to collect,	Country/ Region       Aim of publication       Type of publication       Type of publication       Type of publication       Type of publication       Framework established       Framework adapted/created       Function of CoCE       Function of CoCE         COE) and the benefits of creating an NSCDE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of BSCOE       Corporation (SRC).       Corporation (SRC).       The SRC       - Formulate and established       - Formulate and established         BSCOE       String a national       - Formulate and established       - Formulate and established       - Formulate and established       - Formulate and established         CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains       - Formulate and established       - Formulate and established       - Formulate and established       - Formulate and established         BSCOE       Evaluate and investigate       - Formulate and established       - Formula	Country / Region         Aim of publication         Type of publication         Type of publication         Type of publication         Type of publication         How is CoCE         Framework adapted/oreated         Function of CoCE         Col Col I of creating an NSCOE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of BSCOE         Corporation (SRC).         The SRC Function of CoCE         The SRC (SRC).         The SRC (SRC).         Corporation (SRC).         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						data collected from the BSCOEs	n 20 December Enseigneign Enseigneign Enseigneign To provide excellented		
Shommu et al <sup>41</sup>	Canada	To develop a multi- disciplinary consensus of nutrition care priorities for implementation in an IBD nutrition CoE	Research article*	Inflammatory Bowel Disease Nutrition CoE	2019	Not reported	To provide excellented from http: care, conduct original text and data minipate data minipate care, conduct original text and data minipate optimal management Optimal management	Inflammatory Bowel Disease	Raised as a concern/barrier • Lack of infrastructure • Lack of staffing
Silver et al <sup>42</sup>	USA	To outline criteria for centers of excellence and suggested indications for referral in cases of suspected placenta accreta.	Other#	Accreta CoE	Not reported	Not reported	patients with placent and similar	Placenta Accreta Intensive care unit	<ul> <li>Personnel</li> <li>Multi-disciplinary team with specialised staff for placenta accreta</li> <li>Infrastructure</li> <li>Intensive Care unit and facilities</li> </ul>
Steiner et al <sup>43</sup>	USA	To suggest criteria that the headache centres might be recognised as centres of excellence in the headache community. Set out recommendations for 10 suggested role and	Other#	Specialized headache centre	Not reported	Not reported	Providing specialist care to une patients with primary br secondary headache coorders that are difficult to dienos or treat, refractory or raio, or tor other reasons require specialist intervention Agence Bibliographique ut/guidelines.xhtml de	Headache	Personnel <ul> <li>Multi-disciplinary care</li> </ul>

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		performance-defining standards.					g for uses Enseigne To deliver accessible to deliver accessible		
Tapela et al <sup>44</sup>	Rwanda	Report program level description of implementing Butaro Cancer CoE, its preliminary impact and challenges faced in order to share lessons and inform service delivery in similar setting	Research article*	Butaro Cancer CoE	2012	Not reported	constrained setting <b>6</b>	Cancer	<ul> <li>Provided by Rwanda Ministro of Health.</li> <li>Personnel         <ul> <li>Doctors and nurses received training</li> </ul> </li> <li>Infrastructure         <ul> <li>To support surgical procedures and palliative care</li> </ul> </li> <li>Equipment         <ul> <li>X-ray and ultrasounds imaging</li> </ul> </li> <li>Others         <ul> <li>Treatment protocol</li> <li>Finance</li> <li>Partnership with other services from USA</li> </ul> </li> </ul>
Thomas et al <sup>45</sup>	USA	Establishing Cardiometabolic CoE for secondary	Other <sup>#</sup>	Cardiometabolic Center of Excellence	2018	Not reported	To deliver patient-centred collaborative model of care focused on aggressive are	T2DM + CVD	Personnel <ul> <li>Nurse navigator</li> </ul>

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE Cludir	Clinical focus area of CoCE	Resources
		prevention in patients with T2D and CVD					comprehensive secondary cardiovascular risk r batients with T2D art e of the cardiovascular risk r cardiovascular r cardiovascular cardiovascul	1	<ul> <li>Cardiometabolic Center Advisory Committee</li> <li>Training</li> </ul>
Vivian et al <sup>46</sup>	USA	To outline the framework for a Pancreas CoE	Research article*	Pancreas CoE	2013	Outlined framework using 3 developmental domains. • Establishing the foundation • Formalising the program • Solidifying the CoE status	4. Downleaded from http://bmjopen.bmj.com/ on June 11, 2025 at Agence Bibliographique de compassionate care and co	Management of pancreatic disease	<ul> <li>Personnel</li> <li>Management – leadership support</li> <li>Surgeons trained in roboti surgical approach</li> <li>Multi-disciplinary staff trained</li> <li>Specific – nurse navigator and dietician</li> </ul> Infrastructure <ul> <li>To establish and maintain robotic surgical approach</li> </ul> Equipment <ul> <li>Minimally invasive technology (robotic)</li> <li>Advanced endoscopic technology</li> <li>Clinical Information Systems - dashboards.</li> </ul>

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1 <sup>st</sup> Author	Region	Aim of publication	publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE including	Clinical focus area of CoCE	Resources
							Network of referral Cart		Others <ul> <li>Certification</li> </ul>
Williams <sup>47</sup>	USA	To discuss the evolution of the concept of Centers of Excellence and the components of an HCM center	Book Chapter	Hypertrophic Cardiomyopathy Centre	1971 for the first 15 centers	Adapted model from National Cancer Institute	Network of referral catters established for adulter the setablished for adulter setablished for ad	Hypertrophic Cardiomyopathy	<ul> <li>Personnel</li> <li>Multi-disciplinary team that includes specialists in adult and paediatric cardiology, electrophysiology, interventional cardiology, cardiac surgery and genetic counselling, all with particular expertise in treating the patient with HCM.</li> <li>Equipment</li> <li>Cardiac imaging (echocardiography and cardiac magnetic resonance imaging)</li> <li>Electrophysiology</li> </ul>
Wirth et al <sup>48</sup>	Europe (Barcelona)	To develop the concept of the European Prostate Cancer Centers of Excellence with the specific aim to	Research article*	European Prostate Cancer Centres of Excellence	Criteria agreed upon in 2019	Created by authors	To enable high-quality management of prostate cancer in the fields of clines, research, and education graphique	Prostate Cancer	Resources requirements are outlined in detail in the study and specific requirement <b>Personnel</b>

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1 <sup>st</sup> Author	Country / Region	Aim of publication	Type of publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE CC	Clinical focus area of CoCE	Resources
		identifying European Centers characterised by high-quality care, research and education					20 December 202 Enseigner 19 for uses relate	-	Core team, associated services and multi- disciplinary approach
Wu et al <sup>49</sup>	USA	<ul> <li>To evaluate</li> <li>Patient outcomes at nominated CoE</li> <li>Whether the revamped designation criteria would result in improved patient outcomes.</li> </ul>	Research article*	Blue Distinction Plus Centres	2016	Value framework	To become a best Not reported Not reported Not reported Not reported Not reported Not reported Not reported Not reported Not reported To become a best demonstrated practices	Inpatient spinal surgery	Not reported
Yao and Zhou⁵	China	To describe the impact of the introduction of a mentor-based CoE program	Research article*	Peritoneal Dialysis CoE	2003	Created using mentor-mentee system	To become a best demonstrated practice similar technologies. ut/guidelines.xhtml		<ul> <li>Personnel</li> <li>Physicians from mentor sites</li> <li>Other</li> <li>Standardized teaching materials to deliver lectures, lead PD case discussions and ward rounds, suggest key performance indicators, and initiate a continuous</li> </ul>

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			publication	Name of CoCE	Year CoCE established	Framework adapted/created	Function of CoCE	082704 on : ht, includin	Clinical focus area of CoCE	Resources
								20 December 2024. Downloaded from http://bmjopen.bmj.com/ on June 11, 2025 Enseignement Superieur (ABES) . ng for uses related to text and data mining, Al training, and similar technologies.		quality improvemen program.
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1 <sup>st</sup> Author	Region	Criteria described	Processes used to establish a CoCE	C C	Cocesses 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>		for uses r	Forder to audit outcomes, the number of patients, gende gnoses, and interventions would be tracked, as well as tient follow-up and satisfaction. Lastly, a cost analysis i ecessary.
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	ment Su	port that centers of excellence are held to specific ality metrics to maintain "center of excellence" eignation, 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>		l training.	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	ilar technologies.	Accentify every 4 years using the same process

^Case report in peer reviewed journal 

International et al <sup>5</sup> Provide the best standard of care to patients with pituitary tumors and disorders         Not reported         Provide the dest standard of care to patients with pituitary tumors and disorders         Not reported         Provide the dest standard of care to patients with pituitary tumors and disorders         Not reported         Provide the dest standard of care to patients with pituitary tumors and disorders         Not reported         Provide the dest standard of care to patients with pituitary tumors and disorders         Not reported         Provide the dest standard of the centre           Liaison between experienced neurosurgeons and expert neuroendocrinology         Specialised staff training         Provision of educational courses         Comprehensive patient information and data management         Support endocrine units outside PTCoE         Advise health administrators and authorities on specific problems         Advance the science and scholarship of pituitary tumours         Advance the science and scholarship of pituitary tumours         Include tumour data on national registries           Chang et al <sup>7</sup> USA         Minimum criteria for comprehensive centers of excellence:         Applications will be reviewed by the LE&RN Globard         Dissignation is valid for 3 years	Country /	y / PROCESSES DESCRIBED		jopen-2023-082
et al 5       tumors and disorders       et al 5         & Tritos <sup>6</sup> • Organise multi-D clinical management       • Liaison between experienced neurosurgeons and expert         neuroendocrinology       • Specialised staff training       • Provision of educational courses         • Comprehensive patient information and data management       • Sharing information with scientific bodies and administrators         • Support endocrine units outside PTCoE       • Advance the science and scholarship of pituitary tumours         • Advance the science and scholarship of pituitary tumours       • Include tumour data on national registries         Chang et al <sup>7</sup> USA       • Minimum criteria for comprehensive centers of excellence:	1 <sup>™</sup> Autnor Region	Criteria described	Processes used to establish a CoCE	N N Processes to monitor a CoCE
& Lymphatic       • Mandatory list of staffing including surgeons and therapist       Oversight Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (GOC). All applications will be scored, using the following three individual criteria:       Image: Committee (GOC) and Committee (COC). All applications will be scored, using the following three individual criteria:       Image: Committee (COC) and Committee (COC). All applications will be scored, using the following three individual criteria:       Image: Committee (COC) and Committee (COC). All applications will be scored, using the following three individual criteria:       Image: Committee (COC) and Committee (COC). All applications will be scored applications will be scored applications. The application (Committee (COC) applications will be scored applications will be scored applications will be scored applications will be scor	et al <sup>5</sup> & Tritos <sup>6</sup> Chang et al <sup>7</sup> & Lymphatic Education & Research	<ul> <li>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> <li>Include tumour data on national registries</li> <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,</li> </ul>	Not reported Applications will be reviewed by the LE&RN Globad Oversight Committee (GOC). All applications will be scored, using the following three individuad criteria: a. The quality of the overal application/services. b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic. C. Miscellaneous (e.g., lymphatic disease	Product 2024. Downloaded from http://bmjoppsignation is valid for 3 years Dissignation on June 11, 2025 at

1 <sup>st</sup> Author	Country /		PROCESSES DESCRIBED	open-2023-08
	Region	Criteria described	Processes used to establish a CoCE	
Choque- Velasquez et al <sup>9</sup>	Peru	Not reported	Not reported	din 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	December reported Ensemption 2024. Downloaded from Ensemption 2024. Downloaded from
Creehan et al <sup>11</sup>	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	ning, Al training, and
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	Monitoring productivity and streamlining communication     Setween hospital     Alanagement and stakeholders are the role of a programinector.
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> </ul>	Not reported	Exaluation based on public health program evaluation coveria - assessing and documenting program insplementation, outcomes, efficiency and cost- effectiveness of activities.

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1 <sup>st</sup> Author Region		Criteria described		<del></del> 6	bcesses to monitor a CoCE
		<ul><li>Research initiatives</li><li>Collaborations and networking</li></ul>	i i i i i i i i i i i i i i i i i i i	ul pr	
		Criteria for pillars of excellence (Academics, Research, Clinical, Faculty development, Technology, Social) – what consisted of the criteria was not described, however the outcome was outlined in the study)		Enseignement S	reported
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>		ng, Al	t 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	ing, and similar tec	
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>		hnologies.	
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1 <sup>st</sup> Author	Region	Criteria described	Processes used to establish a CoCE	Poocesses to monitor a CoCE
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>	Processes used to establish a CoCE Self-nominated -The center was formed and then discussed the criteria used in this study.	Menitoring 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>	committee vets the proposed Centre of excellence (assesses financial resources, culture and leadership support)	r reported 72824. Download the Superied
Ferguson and Froehlich <sup>19</sup>	USA	Not reported.	Self-nominated	<ul> <li>Gength of stay</li> <li>Gength of stay</li> <li>Gength of stay</li> <li>Monthly snapshot of - financial (includes caseload, cost and labour/case)</li> <li>Goperational (includes length of stay, discharge to rehabilitation)</li> </ul>
Frara et al <sup>20</sup>	Authorship team from Spain	<ul> <li>"Explicit and practical definitions for a degree of excellence have not yet been defined"</li> <li>Require an integrated multidisciplinary group in a single location</li> </ul>	Most are self-appointed without any formal acknowledgement	becuss measuring effect via patient outcomes, cost of treatment, research outputs, and contribution to scientific emotion to 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> </ul>	Not reported	t Ngt reported n ce Bibliographique de

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1 <sup>st</sup> Author	Region	Criteria described	Processes used to establish a CoCE	incl	Decesses to monitor a CoCE
		Collaborating with investigators to advance science and discovery		F including for	on 20 D
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	Enseignement Superieur	Commend data collection to quantify impact and identiin as for change 2024. Downloaded
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	BES) · · · · · · · ·	ed to monitor quality of care: Patient factors acility and program structure ransplant centre processes Vaiting list management Post transplant care linical and patient centred outcomes cost effectiveness eam 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> </ul>	Infectious Diseases Society of America (IDSA) solicited applications. Centres required to submit	hnologies.	The CoE designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age Coe designation is valid for 2 years, after which the distitution must re-apply at Age coe designation is valid for 2 years, after which the distitution must re-apply at Age coe designation is valid for 2 years, after which the distitution must re-apply at Age coe designation is valid for 2 years, after which the distitution must re-apply at Age at
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1 <sup>st</sup> Author	Region	Criteria described	Processes used to establish a CoCE	Reducesses to monitor a CoCE	
		<ul> <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>	Processes used to establish a CoCE including for uses related t	on 20 December 2024. Enseigneme	
Dulgheru and E	fultiple iuropean ountries	<ul> <li>Involvement in national databases</li> </ul>	xt and data mining, Al training, and simila	omj.com/ o	
Li et al <sup>27</sup> U	JSA	<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</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.	Nune 11, 2025 at Agence	
Li et al <sup>27</sup> U	viewed journal rrnal	<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</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.	Nhine 11, 2025 at	

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1 <sup>st</sup> Author Region		Criteria described	Processes used to establish a CoCE		∞ N bocesses to monitor a CoCE
		measures such as hospital readmissions, complication rates, and volume. Cost sometimes considered		ng f	0 20 De
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	Enseignem uses related	Ret reported ber 202
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	lent Superieur (ABES)	reported Percent reported Pe
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	rainin	et to develop - suggested recognition or verification cess be an ongoing process that is updated biannua of the second se
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> </ul>		logies.	In reported In 1, 2025 at Agence Bibliographique de

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1 <sup>st</sup> Author	Region	Criteria described		
		Schedule regular team meetings to ensure an individual plan for patient diagnosis, treatment and follow up	Processes used to establish a CoCE	
Piccini et al <sup>32</sup>	Not specifically identified	<ul> <li>Identification and referral of patients</li> <li>Appropriate staffing and dedicated clinics that focus on AF patients</li> <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>	Not reported	Enseignement Superieur (ABES
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 similar technologies.	Optcome-based evaluation process
CoE – Centre of Exceller Research article in pee Other in peer reviewed Case report in peer rev	er reviewed journal I journal		jopen.bmj.com/site/about/guidelines.xhtml	gence Bibliographique de

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1 <sup>st</sup> Author	Country /		BMJ Open 6000000000000000000000000000000000000		ionen
	Region	Criteria described	Processes used to establish a CoCE		5 pocesses to monitor a CoCE
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>	Processes used to establish a CoCE		Preported
Sandhu et al <sup>35</sup>	USA	Focus area • Access to care • Stroke prevention • Education • AF quality improvement • AF barrier	Not reported	ES) .	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</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>be follow-up should take place according to the pollowing 6 characteristics:</li> <li>Clinimetrics</li> <li>Decision-making factors based on the results of the polymetrics</li> <li>Opportunities to access treatment or follow-up Patient education</li> <li>Clinical care guidelines</li> <li>Evaluation system</li> </ul>

	Ocumt- 1		PROCESSES DESCRIBED	by copyright,	2023-
1 <sup>st</sup> Author	Country / Region	Criteria described	Processes used to establish a CoCE	ht, inc	b pocesses to monitor a CoCE
Sheha and Ver <sup>39</sup>	USA	<ul> <li>evaluated. The progression of 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) <ul> <li>Standard</li> <li>Optimum</li> <li>Model</li> </ul> </li> <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> </ul>	Not reported	Enseignement Superieur (ABES) ··· ·· g for uses related to text and data mining, Al training, and similar technologies.	mber 2024. Downloaded fr

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1 <sup>st</sup> Author	Country /		PROCESSES DESCRIBED		
	Region	Criteria described	Processes used to establish a CoCE	Jop pen- 	
Shikora, US. Delegge and Van Way III <sup>40</sup>	SA	<ul> <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> <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</li> </ul>	Based on BSCoE • Online application completed by surgeon or facility • Successful application results in provisional status • Within 2 years must seek full approval and pass	Record from http://bm/component Superior (ABES) Record from http://bm/component.superior (ABES) Record from http://bm/componen	
Shommu et Car al <sup>41</sup>	inada	to the program 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	outcome • Mandatory submission of all patient data to a database	Lune 11, 2025 attreported Not reported	
		Novel Discovery and Research		Bibliographique de	

4-4 4 41	Country /		BMJ Open 60 60 70 70 70 70 70 70 70 70 70 70 70 70 70	
1 <sup>st</sup> Author	Region	Criteria described		
		Knowledge translatio	Processes used to establish a CoCE	0 0 2
Silver et al <sup>42</sup>	USA	Suggested Criteria <ul> <li>Multidisciplinary team</li> <li>Intensive care unit and facilities</li> </ul>	Net reported 5	
		Blood services – blood bank with 24/7 service	ated	nem
Steiner et al <sup>43</sup>	USA	Suggested standards <ul> <li>Competence of staff - staffed by headache specialists</li> <li>Provision of care – management of headache</li> </ul>	Agencies with appropriate competence and authority of might use these standards as a basis for centre accreditation.	ent Boom Superieu
		<ul> <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> </ul>	lata mining,	d from http: r (ABES) .
		<ul> <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>	Al training, a	//bmjopen.br
「apela et al⁴⁴	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	Enseignement Superieur (ABES) .
Thomas et al <sup>45</sup>	USA	Not reported	Appears self-nominated	Octoome-based – site-specific patient outcomes (not benchmarked to other services)
Vivian et al46	USA	Objectives	Process outlined.	Ngr reported

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Region	Criteria described     Provide the highest standard of care, services and support to	PROCESSES DESCRIBED		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Provide the highest standard of care, services and support to	±		4
	<ul> <li>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</li> </ul>	<ul> <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>	Enseigne	on 20 December 2024. Downloaded
ISA	<ul> <li>practices</li> <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	(ABĒS) . ta mining. Al tra	fro
,	Criteria with specific requirements are outlined in the study <ul> <li>Core team</li> <li>Associated services</li> <li>Multi-disciplinary team</li> <li>Diagnostic pathway</li> <li>Therapeutic pathway</li> </ul>	When an institution successfully achieves all the steps, it will be certified as an EPCCE.	and similar	certification will be reviewed every 3 years, The creditation team will be prespecified, and it will be mposed of seven members of the EPCCCM.
	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	Not reported	ທ 	Bilities receiving a value designation were associated in lower costs (16-19% lower) and equal or better quality comes, compared with all other facilities.
iu Ba	irope arcelona) SA	<ul> <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> <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> <li>Criteria with specific requirements are outlined in the study</li> <li>Core team</li> <li>Associated services</li> <li>Multi-disciplinary team</li> <li>Diagnostic pathway</li> <li>Therapeutic pathway</li> <li>SA</li> <li>The BDC+ program encompasses quality criteria on structure, process, and outcomes and cost criteria</li> <li>A cost threshold was set at 1.05 times the national average cost of surgery.</li> </ul>	SA       Key components of an HCM centre include.       A centre must meet various criteria set forth by the NCI both in terms of clinical expertise and research capabilities         · HCM multi-disciplinary team and an administrative HCM coordinator.       · Administrative support for marketing and programmatic development.       NCI both in terms of clinical expertise and research capabilities         urope       Criteria with specific requirements are outlined in the study       When an institution successfully achieves all the steps, it will be certified as an EPCCE.         Associated services       Multi-disciplinary team       Diagnostic pathway         · Therapeutic pathway       · Therapeutic pathway       Not reported         SA       The BDC+ program encompasses quality criteria on structure, process, and outcomes and cost criteria       Not reported         A cost threshold was set at 1.05 times the national average cost of surgery.       Not reported	SA       Key components of an HCM centre include.       A centre must meet various criteria set forth by the coordinator.         • HCM multi-disciplinary team and an administrative HCM coordinator.       NCI both in terms of clinical expertise and research capabilities         • Administrative support for marketing and programmatic development.       When an institution successfully achieves all the study arcelona)         • Criteria with specific requirements are outlined in the study       When an institution successfully achieves all the steps, it will be certified as an EPCCE.       T         • Associated services       • Multi-disciplinary team       • Diagnostic pathway       The rapeutic pathway       T         SA       The BDC+ program encompasses quality criteria on structure, process, and outcomes and cost criteria       Not reported       Not reported         For Urgery.       For Urgery.       For Urgery.       For Urgery.       For Urgery.

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1 <sup>st</sup> Author	Region	Criteria described		ț incl	expecses to monitor a CoCE
		spine surgery costs below the threshold received the value designated BDC+ designation.		ding	5n 2
Yao and Zhou <sup>50</sup>	China	Not reported	Mentee sites were selected based on   Using drop-out rate and time on therapy  Willingness to improve PD outcomes.  Mentor sites were selected based on  PD clinical outcome  Willingness to participate in the program	Éhseignement Superieur (ABES) . In uses related to text and data mining, Al training, and .	ntinuous quality improvement in managing PD centre.
CoE – Centre of Excelle *Research article in ped *Other in peer reviewed ^Case report in peer re	er reviewed journal d journal			gies.	m/ on June 11, 2025 at Agence Bibliographique de
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CoE – Centre of Excellence \*Research article in peer reviewed journal "Other in peer reviewed journal ^Case report in peer reviewed journal

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