- insufficient use of evidence,
- limited governance and regulatory capacity,
- insufficient networking,
- inefficient administration and management,
- inadequate material capacity,
- limited human capacity with knowledge and skills,
- limited practical experiences,
- lack of research leaders,
- lack of mentors and role models,
- lack of research culture,
- low motivation.

An extended literature search reveals similar barriers in developed countries [5]. In brief, the general critical hindrance to clinical research network capacity building is the lack of resources and support that include research system and networking, material support, regulation and management, evaluation, human resources, and evidence and experiences. A successful capacity building process will involve the joint efforts from all stakeholders to ensure sufficient and optimal resources and support.

Some insights on how to overcome the key barriers to clinical research network capacity building

To address the key barriers, we propose five principles for good practice in clinical research network capacity strengthening. Table 1 shows the principles, corresponding examples of activities, barriers being addressed and some key resources for further reading. *The first principle is to understand the local context and accurately assess the existing research capacity*. This is a critical step as an initial evaluation of the current background and available baseline resources for the future realistic and feasible capacity building [6]. The first endeavor for successful capacity building processes generally requires comprehensive assessment of local situations or needs, strong partnership with local stakeholders to determine agenda, and identification of local champions or leaders.

A second principle is to use the most up-to-date research evidence in practice and policy. Building capacity in use of evidence among practitioners and policy-makers is a critical component of successful capacity building [4]. In general, use of research evidence needs to work towards integrating evidence into regulatory, legislative, and policy frameworks, establish platforms to support evidence uptake at all levels, and foster dialogue and engagement between researchers and users of research evidence.

Thirdly, one would secure sufficient collaboration and networking for effective communication and experience sharing and to establish strong partnership with funders. For example, the CANadian Network and Centre for Trials Internationally (CANNeCTIN) is a national network for Canadian-led trials in cardiovascular diseases

Table 1 Insights on how to overcome the key barriers in building research network capacity

Principle	Examples of activities	Barriers being addressed	Key reference
Understand the local context and accurately assess the existing research capacity	Conduct an initial evaluation of the current background; Assess for available baseline resources; Evaluate feasibility of capacity building activities	Fragmented research systems; Insufficient use of evidence; Inefficient administration and management	[5, 6]
Use research evidence in practice and policy	Work towards integrating evidence into regulatory, legislative, and policy frameworks; Establish platforms to support evidence uptake at all levels; Foster dialogue and engagement between researchers and users of research evidence	Insufficient use of evidence; Limited practical experiences; Lack of research culture; Limited governance and regulatory capacity	[4, 5]
Secure sufficient collaboration and network and establish strong partnership with funders	Build local, national and international collaborative network by involving numerous hospitals and clinical centers; Develop collaborative communication; Advance experience-sharing processes; Procure long-term and joint funding	Fragmented research systems; Insufficient networking; Insufficient funding; Limited practical experiences	[7, 8]
Increase human resources factors including the supervision and mentorship, and the skills and experiences	Foster and incentivize collaborations; Establish platforms for exchange of ideas and cross-fertilization; Create strong supervision and mentorship systems; Expand collaborative network to secure maximum human resources support; Enhance experience- and skill-sharing activities	Fragmented research systems; Insufficient networking; Limited practical experiences; Limited human capacity with knowledge and skills; Lack of mentors and role models	[9, 10]
Identify institutional leadership and environment evaluation	Support research infrastructure; Align incentives or rewards with institutional goals and curricula with local and (inter)national needs; Foster co-op or experiential learning	Fragmented research systems; Lack of research leaders; Low motivation; Inadequate material capacity	[11, 12]