

STUDY GUIDE

Clinical practice guidelines for telesurgery, 2nd Edition : Committee for the Promotion of Remote Surgery Implementation, Japan Surgical Society.

Committee for the Promotion of Remote Surgery Implementation, Japan Surgical Society · 2026

Clinical Practice Guidelines for Telesurgery: A Comprehensive Study Guide

This study guide is based on the second edition of the *Clinical Practice Guidelines for Telesurgery* (2026). It synthesizes the technical, clinical, legal, and organizational frameworks necessary for the safe implementation of remote surgical systems.

I. Key Concepts and Frameworks

1. Classification of Telesurgery

The guidelines categorize remote surgery into three distinct types based on the level of involvement of the remote physician and the physical presence of medical staff at the patient's site.

Type	Description	Operating Authority	Legal/Ethical Status (Japan)
Telementoring	Remote supervisor provides verbal/graphical guidance via tablets or ICT.	Local Surgeon (100%)	Feasible (D to D category)
Telesurgical Support	Remote supervisor operates the robot to assist or perform parts of the surgery collaboratively.	Switched between Local and Remote	Feasible (D to P with D category)
Full Telesurgery	Remote surgeon performs the entire procedure; no surgeon is present at the local facility.	Remote Surgeon (100%)	Not currently approved

2. Personnel Requirements for Telesurgical Support

Specific qualifications are required to ensure the safety and efficacy of remote procedures.

- **Remote Surgeon:** Must hold certification as a robot-assisted surgery instructor/proctor, be certified for the specific robot used, and complete the "Training Program for Remote Surgery."
- **Local Surgeon:** Must be the primary operating surgeon, hold board certification, complete manufacturer training, and receive the society-managed remote surgery training.
- **Clinical Engineers:** Required at **both** local and remote facilities. They must be experienced in robot maintenance and troubleshooting.
- **Nurses:** Desirable at the local facility with robot-specific training; not mandatory at the remote facility.

3. Technical and Communication Standards

The stability of the communication network is critical to prevent surgical errors or system failures.

- **Latency:** The sum of round-trip network transmission delay and information processing delay must be **within 100 ms** for telesurgical support.
- **Bandwidth:** Utilization of guaranteed bandwidth or "assured forwarding" lines is preferred over "best-effort" lines.
- **Redundancy:** To mitigate risks of line disconnection, redundant communication carriers and line types are recommended.
- **Telementoring Quality:** Requires Full HD (1920x1080) resolution at 60fps, 44.1 kHz audio, and full-duplex communication with echo cancellation.

4. Information Security and Governance

Security measures must protect patient data and prevent unauthorized access to the surgical system.

- **Network Isolation:** Remote surgical environments must be physically or logically isolated from the hospital's internal medical information systems (e.g., EMR).
 - **Closed Networks:** The use of Layer-3/Layer-2 Virtual Private Networks (VPNs) is desirable to separate traffic from the public Internet.
 - **Registry-Based Governance:** Facilities must participate in a registry system and report performance to a central Remote Surgery Management Organization.
 - **Cloud Security:** Services must undergo risk assessments, including third-party certifications like ISMAP registration.
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II. Short-Answer Practice Questions

1. What is the maximum acceptable combined delay (transmission and processing) for telesurgical support according to the guidelines?

Answer: 100 milliseconds (0.1 seconds).

2. How does "Full Telesurgery" differ from "Telesurgical Support" regarding local staffing?

Answer: In Full Telesurgery, no surgeon is present at the local medical facility, whereas Telesurgical Support requires a local surgeon capable of responding to emergencies and completing the surgery if the remote connection fails.

3. What is the specific Japanese legal hurdle mentioned regarding Full Telesurgery?

Answer: It faces challenges related to Article 20 of the Medical Practitioners Act, which prohibits non-examination treatment, and currently lacks a defined relationship within the Guidelines for Online Clinical Practice.

4. What are the three categories of security measures required for telecommunication lines?

Answer: Inter-facility connections, connections for surgical equipment maintenance/management, and intra-facility connections.

5. Who bears the primary responsibility for medical outcomes and postoperative complications in a telesurgical support scenario?

Answer: In principle, the local surgeon and the local facility administrator bear this responsibility.

6. What audio specification is required for effective telementoring?

Answer: A sampling rate of 44.1 kHz or higher (equivalent to CD quality), full-duplex communication, and echo cancellation functionality.

7. Why is "best-effort" internet connectivity discouraged for remote surgery?

Answer: Because communication bandwidth, delay, jitter, and packet loss can fluctuate significantly from moment to moment, potentially differing from the environment during prior testing.

III. Essay Prompts for Deeper Exploration

1. The Ethical and Legal Allocation of Responsibility in Remote Surgery Discuss the complexities of apportioning liability between local and remote institutions. Consider the roles of the remote surgeon as an instructor versus a collaborative operator and how the "D to P with D" classification in Japan attempts to bridge this gap.

2. Technical Fail-Safes and Emergency Protocols Analyze the requirements for "Emergency Response Manuals" and the necessity for local surgeons to be able to convert to open or laparoscopic surgery. Why is the "switch of operating authority" feature on the surgeon's console a critical safety specification?

3. Cybersecurity as a Clinical Necessity Evaluate the argument that cybersecurity in telesurgery is as vital as sterile technique in traditional surgery. Discuss the risks of IP address spoofing, malware from USB drives, and the necessity of isolating surgical networks from Electronic Medical Record (EMR) systems.

4. Regional Disparities and Economic Sustainability The guidelines mention that telesurgery is often driven by humanitarian perspectives, such as treating elderly patients in remote areas. Explore the economic challenges mentioned, such as the high cost of guaranteed bandwidth lines and the potential role of public subsidies in ensuring long-term sustainability.

IV. Glossary of Important Terms

- **BYOD (Bring Your Own Device):** The use of personally owned information equipment (like tablets or PCs) by medical staff to access remote guidance systems or cloud services.
- **Closed Communication Network:** A network (like an L3/L2 VPN) that is physically or logically separated from the public Internet to ensure security and bandwidth.
- **D to D (Doctor-to-Doctor):** A category of online clinical practice involving information exchange and educational activities between physicians, applied here to telementoring.
- **D to P with D (Doctor-to-Patient with Doctor):** A category where a remote doctor interacts with a patient while a local doctor is also present, applied here to telesurgical support.
- **Information Processing Delay:** The time required to compress and decompress information signals for transmission between remote locations.
- **ISMAP (Information System Security Management and Assessment Program):** A Japanese government system for assessing the security of cloud services, required for risk assessment in telesurgery.
- **Jitter:** Fluctuations in the delay of received communication packets, which can negatively affect the real-time control of a surgical robot.
- **Local Hospital/Institution:** The actual facility where the patient is physically located during the surgery.

- **Remote Mentor:** A physician who provides guidance via images and audio but does not directly operate the surgical robot.
- **Remote Surgeon:** A supervisory physician who operates a surgical robot from a distant facility to provide technical support to a local surgeon.
- **Surgical Robot:** A robotic unit approved as a surgical support system by an accredited agency (classified as a Class III highly controlled medical device in Japan).