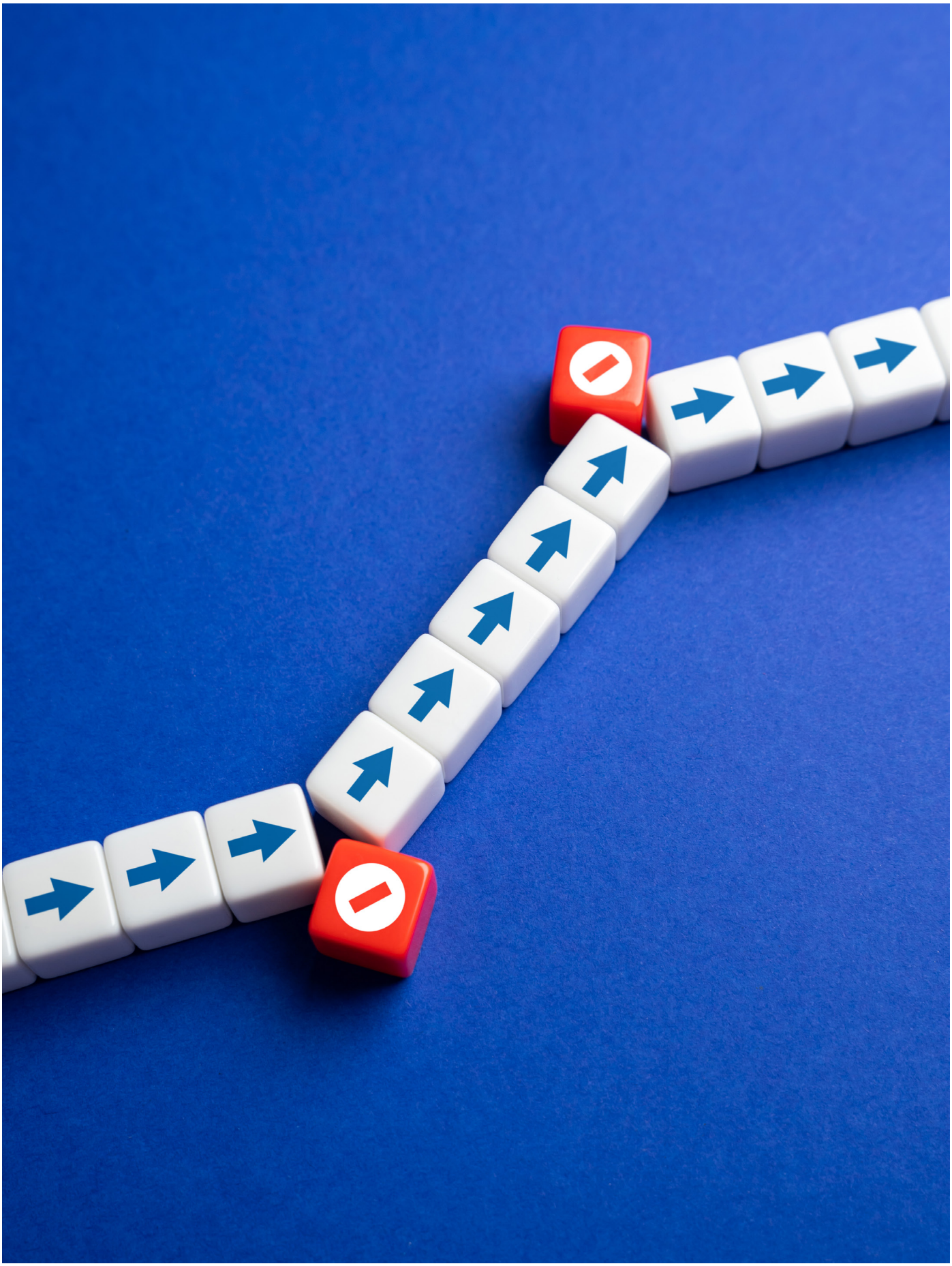

Steam Sterilization for Immediate Use: Achieving Best Practices

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LEARNING OBJECTIVES

1. Describe concepts applied to immediate-use steam sterilization in its historical and current contexts
2. Understand how immediate-use steam sterilization can be practiced appropriately
3. Propose strategies to prevent routine utilization of immediate-use steam sterilization

When performed correctly, immediate-use steam sterilization (IUSS) is an effective sterilization method.[1,2] The Association for the Advancement of Medical Instrumentation (AAMI) defines IUSS as the shortest possible time between a sterilized item's removal from the sterilizer and its aseptic transfer to the sterile field, as described in ANSI/AAMI ST79:2017 *Comprehensive guide to steam sterilization and sterility assurance in health care facilities*.[3] IUSS is performed with the expectation that the sterilized item will be used immediately, not stored, and that it will be handled in a manner that minimizes the risk of environmental contamination. Essentially, IUSS can be understood as a modification of conventional steam sterilization, in which the instrument is placed in an open tray or in a specially designed, covered, rigid container that allows rapid steam penetration.[4]

Indiscriminate use of IUSS may create an unsafe environment. Historical evidence documents cases of omitted or inadequate instrument cleaning, patient burns, and the use of IUSS for convenience; therefore, it is important to understand the evolution of IUSS to the present day.

Objective 1: Describe concepts applied to immediate-use steam sterilization in its historical and current contexts

In real-world settings, several situations may justify the use of IUSS:[5]

- An emergency surgical procedure that requires a specific instrument
- An instrument that cannot be replaced during the surgical procedure has become contaminated, and is necessary for the continuation of the surgery
- An instrument that dropped on the floor but is still needed to continue the surgical procedure

Recommendations	Comments
Perform IUSS only when all of the following conditions are met:[3] • The device and sterilizer IFU include instructions for IUSS; • The device manufacturer's written IFU for cleaning, cycle type, exposure times, temperature settings, and drying times (if recommended) is readily available and followed; • Items are placed in a containment device that has been validated for IUSS and cleared by the U.S. Food and Drug Administration (FDA) for this purpose and in a manner that allows steam to contact all instrument surfaces; • The rigid sterilization container manufacturer's written IFU are followed; and • Measures are taken to prevent contamination during removal from the sterilizer and transfer to the sterile field.	It is not possible to establish a general rule for IUSS without considering the manufacturer's instructions for use regarding cleaning, cycle parameters (e.g., exposure time, type of equipment—gravity or dynamic air removal), load composition, and packaging.[7]
Clean items to be steam sterilized for immediate use according to institutional protocols and evidence-based guidelines.	It is important to remember that cleaning removes organic and inorganic debris from the surfaces of medical devices and is a prerequisite for effective sterilization. If soil remains on the instrument, it may dry or bake onto the surface, making removal more difficult and reducing the penetration of the sterilizing agent, which may result in the survival of microorganisms.[4] Cleaning quality cannot be assessed based on satisfactory results from CIs and BIs, as these monitors evaluate only the sterilization process.
Contain devices processed using IUSS in a rigid sterilization container and transport them to the point of use in a manner that minimizes the risk of contamination of the item and thermal injury to patients or personnel.[3]	Instrument processing and care also include the risk of contamination during transport and transfer to the sterile field, since the devices are unwrapped. For this reason, the use of containers specifically designed for IUSS is recommended. One study found that the safe temperature range for instrument use is between 21°C and 36.9 °C.[10]
Use items processed by IUSS immediately and do not store them for future use or hold them from one procedure to the next.[3,9]	Considering that instruments subjected to IUSS are required for unforeseen and emergency situations, they must be returned immediately to the surgeon to continue the procedure. For this reason, there is no intention to store these instruments for later use. In most cases, containers or trays dedicated to IUSS are intended to prevent contamination during transport, enable aseptic transfer of the devices, and avoid burns to healthcare professionals. If storage of the devices is necessary, terminal sterilization should be used instead of IUSS.
When IUSS of an implant is unavoidable, determine cycle selection according to the device manufacturer's written IFU, and run a BI and a type 5 CI with the load. For dynamic air-removal cycles, a preassembled process challenge device can be used. When an implant is used before the BI results are known and the BI is later determined to have a positive result, notify the surgeon and infection preventionist(s) according to facility policy as soon as the results are known.[9]	The service should not rely on IUSS to support the surgical schedule. Instrument inventory and the time required for processing must be estimated to fully meet the surgical schedule. Consequently, IUSS should not be used as a substitute for insufficient instrument inventory or inadequate time for processing loaned surgical instruments, including implants.[3]

Table 1: Summary of recommendations for the safe use of IUSS, based on 2025 AORN guidelines

Adapted from: Association of periOperative Registered Nurses. Guidelines for Perioperative Practice.[9,11]
BI= biological indicator; CI= chemical indicator; FDA= US Food and Drug Administration; IFU= instructions for use

IUSS was originally called "flash sterilization"—in other words, an accelerated sterilization method that was often carried out in a noncompliant or unsafe manner. In routine practice, this understanding led to the omission of important reprocessing steps, such as proper cleaning, thereby compromising the safety of the sterilization process. Additionally, IUSS became a very frequent practice in healthcare services for reasons such as convenience and to compensate for an insufficient number of surgical instruments.[5,6,7]

The history of "flash sterilization" is also marked by adverse events. In 1999, two cases were reported in which patients suffered significant burns due to the use of instruments sterilized using the "flash" cycle.[8] Due to the high sterilization temperature, the instruments require cooling before use; otherwise, they may cause burns to both healthcare professionals and patients. *(Editor note: The opening keynote address "The $20.6 Million Shortcut: Dissecting the Jake Gleeson IUSS Failure" at HSPA's 2026 Conference highlighted the infection risks of inappropriate IUSS. As a professional soccer player, Gleeson underwent what should have been a routine surgery but suffered a career-ending infection caused by inappropriate IUSS and miscommunication.)*

In the past, IUSS was considered merely a "cycle for unwrapped instruments,"

Interventions	Comments
Providing education for all team members, including surgeons	The authors carried out a collaborative effort involving professionals from the OR, SPD, surgeons, and scheduling staff. The sessions addressed the consequences of IUSS and the responsibilities related to instrument availability. They also updated surgeon preferences to ensure that additional instruments would be available and sterilized in time to meet the surgical schedule.
Improving scheduling practices by personnel from surgeons' offices	The main problems identified were incomplete information and incorrect procedures. Staff involved in scheduling were encouraged to develop a dictionary to help clarify doubts about procedures. Surgeons and administrative personnel collaborated to identify scheduling conflicts and reorganize schedules when necessary.
Improving vendor compliance regarding loaned sets	One of the problems identified was the unavailability of instruments and implants in time. Therefore, all contracts required the delivery of these devices 48 hours before surgery; otherwise, a 5% reduction in charges would be applied as a penalty.
Purchasing additional instrument sets	In many cases, the same instrument set was used for successive procedures, necessitating IUSS. The authors' findings justified the purchase of additional instruments, thereby eliminating the need for IUSS.
Transitioning from paper wrap to metal containers for instrument sets	Metal containers reduce the need for re-sterilization resulting from perforations in flexible packaging.
Instituting a policy whereby nursing leaders were required to approve IUSS before it could be used	The nursing leader serves as a liaison between the OR and SPD. To grant approval, it is necessary to verify whether another set of instruments is available. When another set is not available, the nursing leader works with SPD staff to help ensure processing and, if necessary, IUSS.
Developing guidelines for immediate and rapid processing in the SPD;	Policies and procedures provide instructions for cleaning and decontamination based on applicable standards and recommended practices. This helps make work processes clear, maintaining consistency and effectiveness of outcomes.3
Monitoring compliance daily and regularly communicating results to all team members	Managers review IUSS records and incorrect scheduling daily and report indicators monthly. This allows teams to assess whether adjustments are needed to meet the surgical schedule.

Table 2: Interventions in work processes to reduce IUSS reliance

Adapted from: Hutzler et al 2013.[12]
OR= operating room; SPD= sterile processing department

without considering the complexity of instruments, evidence-based guidelines, manufacturers' instructions for use (IFU), specific sterilization cycle requirements, or aseptic transfer to the point of use.[7] These cycles were originally designed for a single instrument; however, over time, they came to be used for full sets of instruments, multiple trays, complex medical devices, and loaned instrumentation.[6]

Objective 2: Understand how immediate-use steam sterilization can be practiced appropriately

In 2013, the scientific article "Immediate use steam sterilization: Moving beyond current policy" addressed the controversies surrounding the term "flash sterilization." It also reported that, in April 2010, AAMI hosted a meeting with several professional organizations to review their guidelines and develop a multi-society position statement regarding IUSS. As a result, the term "flash sterilization," considered outdated, evolved into IUSS, reflecting the complexities of medical devices and the variety of sterilization cycles required to address them.

It is important to note that there are no indications for the routine use of IUSS. In simpler terms, its use should be limited to unforeseen circumstances. In daily routines, higher usage of IUSS may result from ineffective planning for scheduled procedures or from frequently occurring but unscheduled surgical procedures.[1] Table 1 summarizes the main recommendations from the Association of periOperative Registered Nurses in 2025 for the safe use of IUSS.[9]

Objective 3: Propose strategies to prevent routine utilization of immediate-use steam sterilization

Hutzler et al conducted a 2013 study to determine the reasons behind IUSS in a specialized orthopedic hospital with 226 beds and approximately 16,000 surgeries per year.[12] The results showed that IUSS was performed in 79% of procedures. The main reasons included incorrectly scheduled procedures, trays used in successive procedures, and an insufficient number of instruments within the tray. Following the investigation, the authors implemented work process changes to reduce the practice of IUSS. These interventions serve as an example for healthcare facilities seeking to improve their practices (see **Table 2**).

Physical parameter monitoring must be performed for every load and is an essential component of the load release criteria. Type 1 indicators should be placed on the outside of every package unless the internal chemical indicator (CI) is visible. CIs, ideally Type 5 or Type 6, should also be placed inside every package, whereas biological indicator (BI) monitoring may be performed in an empty chamber. For sterilizers with chamber volumes larger than 2 cubic feet, commercially available disposable process challenge devices (PCDs) containing CIs and/or BIs are recommended.[3] **Table 1** summarizes specific recommendations for implant loads.

Records of IUSS cycles shall be maintained to ensure traceability to individual patients for the time period specified by the healthcare organization and in compliance with regulatory and accreditation requirements. In addition to patient identification data, it is recommended that records include information on the contents of each load, load identification, exposure parameters, operator identification, the results of physical monitors, and the results of CIs and BIs.[9]

Conclusion

IUSS is a valid sterilization method; however, it requires knowledge of evidence-based guidelines for safe use in clinical practice. It is essential that IUSS is reserved only for emergency situations and not used inappropriately or routinely out of convenience or due to insufficient instruments to meet procedural volume.

REFERENCES

1. Shenoy ES, Weber DJ, McMullen K, Rubin Z, Sampathkumar P, Schaffzin JK, Sickbert-Bennett E, Washer L, Yokoe DS, Calderwood AH, Chinn R, Day M, Garcia-Houchins S, Javaid W, Klacik S, Kyle E, Murthy RK, Wood A, Rutala WA. "Multisociety guidance for sterilization and high-level disinfection." *Infect Control Hosp Epidemiol*. April 28, 202:1-23. doi: 10.1017/ice.2025.41.
2. Rutala WA, Weber DJ. Healthcare Infection Control Practices Advisory Committee. Guideline for disinfection and sterilization in healthcare facilities [Internet]. Atlanta: Center for Disease Control and Prevention; 2008. Available from: https://www.cdc.gov/infection-control/hcp/disinfection-and-sterilization/index.html
3. Association for the Advancement of Medical Instrumentation (AAMI). ANSI/AAMI ST79:2017(R)2022 *Comprehensive guide to steam sterilization and sterility assurance in health care facilities*.
4. Rutala, W.A., Weber, D.L., and the Healthcare Infection Control Practices Advisory Committee. June 2024. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. https://www.cdc.gov/infection-control/media/pdfs/Guideline-Disinfection-H.pdf
5. The Joint Commission. What are important considerations associated with Immediate-Use Steam Sterilization? Last Updated: Oct 19, 2021. Available from: www.jointcommission.org/en/knowledge-library/support-center/standards-interpretation/standards-faqs/000002122
6. Seavey R. "Immediate use steam sterilization: moving beyond current policy." *Am J Infect Control*. May 2013;41(5 Suppl): S46-8. doi: 10.1016/j.ajic.2012.10.029.
7. Seavey R. "The new consensus surrounding sterilization understanding the shift from 'flash' sterilization to 'immediate-use sterilization.'" *Prevention Strategist*. 2011; 28-30. Available from: https://apic.org/Resource_/TinyMceFileManager/Academy/ASC_101_resources/Sterilization/The_New_Consensus_Surrounding_Sterilization_by_Rose_Seavey.pdf
8. Rutala WA, Weber DJ, Chappell KJ. "Patient injury from flash-sterilized instruments." *Infect Control Hosp Epidemiol*. 1999 Jul;20(7):458. doi: 10.1086/503136.
9. Association of periOperative Registered Nurses. Guidelines for Perioperative Practice 2025: 1049-83.
10. Roper D, McClean A, Hand CJ. "Too hot to handle: how quickly do surgical instruments cool sufficiently to use safely following sterilisation using the medical device decontamination capability (forward)?" *Journal of The Royal Naval Medical Service* 2018; 104:87-92. doi: https://doi.org/10.1136/jrnms-104-87
11. AORN. Immediate-Use Steam Sterilization. 2011. Available from: https://www.aorn.org/guidelines-resources/clinicalresources/position-statements
12. Hutzler L, Kraemer K, Iaboni L, Berger N, Bosco JA. "A hospital-wide initiative to eliminate preventable causes of immediate use steam sterilization."*AORN J*. Dec. 2013;98(6):597-607. doi: 10.1016/j.aorn.2013.10.006.

CRCST Self-Study Lesson Plan Quiz: Steam Sterilization for Immediate Use: Achieving Best Practices

Lesson No. CRCST 210 (Technical Continuing Education – TCE) • Lesson expires October 2029

1. Which scenario may justify the use of immediate-use steam sterilization (IUSS)?
   a. An emergency surgical procedure that requires a specific instrument
   b. An instrument that cannot be replaced during the procedure has become contaminated and is needed to continue the surgery
   c. An instrument drops on the floor but is still needed to continue the procedure
   d. All the above

2. IUSS was previously called:
   a. Fast sterilization
   b. Flash sterilization
   c. Forced sterilization
   d. Rapid-use steam sterilization

3. It is acceptable to practice IUSS if instrument inventory is insufficient to meet high procedural volume.
   a. True
   b. False

4. According to historical evidence, IUSS:
   a. Has not contributed to significant adverse events
   b. Has proven an effective way to cut costs
   c. Has contributed to adverse events, including burns
   d. Has not been used inappropriately

5. A cycle for unwrapped instruments:
   a. Is a definition that adequately describes IUSS
   b. Is a description of IUSS that did not consider device complexity
   c. Refers to sterilizing several devices in a rigid container
   d. Requires extended dry times

6. Currently, there is no indication for the routine use of IUSS.
   a. True
   b. False

7. According to AORN's 2025 guidelines:
   a. IUSS should always be avoided
   b. Instructions for use (IFU) should be considered before deciding to perform IUSS
   c. IUSS is generally safe for most medical devices
   d. Surgeons determine whether IUSS is appropriate

8. When IUSS of an implant is unavoidable:
   a. Run a biological indicator (BI) and Type 3 chemical indicator (CI) with the load
   b. Only a BI is needed with the load
   c. Run a BI and Type 5 CI with the load
   d. Only a Type 5 CI is needed with the load

9. Items processed by IUSS:
   a. Should not be stored for future use
   b. Can be safely stored for up to 24 hours
   c. Can be held in sterile storage for up to a week
   d. Require sign-off by Infection Prevention & Control

10. Device cleaning:
   a. Is a prerequisite for effective sterilization
   b. Is not necessary for IUSS
   c. Can be assessed with BI and CI results
   d. Should be performed twice before IUSS

11. If an implant is used before BI results are known, and the BI later reads positive:
   a. Notify Risk Management and the patient
   b. Notify the surgeon and OR manager
   c. Notify the surgeon and infection preventionist
   d. Implants should not be used until results are known

12. In the 2013 Hutzler study, insufficient instruments were not a main reason IUSS was performed.
   a. True
   b. False

13. Type 1 indicators should be placed:
   a. On the outside of each package unless the CI is visible
   b. Inside each package if the CI is visible
   c. Inside and outside the package
   d. Inside the package with a Type 3 indicator

14. IUSS records should include:
   a. Patient and operator identification details
   b. Exposure parameters
   c. Monitor results
   d. All the above

15. Physical parameter monitoring must be performed:
   a. At least daily
   b. At least weekly
   c. For every load
   d. By the lead technician

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