

Quality Improvement Guidelines for Adult Percutaneous Abscess and Fluid Drainage

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PERCUTANEOUS drainage of abscesses and abnormal fluid collections represents a dramatic advance in patient care. Primary and postoperative abscesses and fluid collections in nearly every organ system have been successfully treated by percutaneous means. This procedure has become the treatment of choice for a wide variety of fluid collections. The procedure has resulted in reduced morbidity and mortality and has helped to reduce length of hospital stay and hospital costs (1-7).

These guidelines are written to be used in quality improvement programs to assess percutaneous drainage procedures. The most important processes of care are (a) patient selection, (b) procedure performance, and (c) patient monitoring. The outcome measures or indicators for these processes are indications, success rates, and complication rates. Outcome measures are assigned threshold levels.

DEFINITIONS

Percutaneous *drainage* is defined as the placement of a catheter using imaging guidance to provide continuous drainage of a fluid collection. This in-

cludes localization of the collection, and placement and maintenance of the drainage catheter(s). This may be performed during a single session or as a staged procedure during multiple sessions. Percutaneous *aspiration* is defined as evacuation of a fluid collection using either a catheter or needle, with removal of the catheter or needle immediately after the aspiration.

While practicing physicians should strive to achieve perfect outcomes (eg, 100% success, 0% complications), in practice all physicians will fall short of this ideal to a variable extent. Thus, indicator thresholds may be used to assess the efficacy of ongoing quality improvement programs. For the purposes of these guidelines, a threshold is a specific level of an indicator which should prompt a review. "Procedure thresholds" or "overall thresholds" reference a group of indicators for a procedure, for example, major complications. Individual complications may also be associated with complication-specific thresholds. When measures such as indications or success rates fall below a (minimum) threshold, or when complication rates exceed a (maximum) threshold, a review should be performed to determine causes and to implement changes, if necessary. For example, if the incidence of sepsis is one measure of the quality of abscess drainage, then values in excess of the defined threshold (in this case, 4%) should trigger a review of policies and procedures within the department to determine

the causes and to implement changes to lower the incidence of the complication. Thresholds may vary from those listed here; for example, patient referral patterns and selection factors may dictate a different threshold value for a particular indicator at a particular institution. *Thus, setting universal thresholds is very difficult and each department is urged to alter the thresholds as needed to higher or lower values, to meet its own quality improvement program needs.*

Complications can be stratified on the basis of outcome. *Major* complications result in admission to a hospital for therapy (for outpatient procedures), an unplanned increase in the level of care, prolonged hospitalization, permanent adverse sequelae, or death. *Minor* complications result in no sequelae; they may require nominal therapy or a short hospital stay for observation, generally overnight (see Appendix). The complication rates and thresholds below refer to major complications.

INDICATIONS

Because of variability in the presentation of abscesses and fluid collections, the indications for percutaneous drainage and aspiration must be stated in general terms. The prerequisite for percutaneous drainage is an abnormal fluid collection and one of the following: suspicion that the fluid is infected, need for fluid characterization, or suspicion that the collection is producing symptoms sufficient to

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Specific Major Complications	Rate (%)	Suggested Threshold (%)
Septic shock	1-2	4
Bacteremia requiring significant new intervention	2-5	10
Hemorrhage requiring transfusion	1	2
Superinfection (includes infection of sterile fluid collection)	1	2
Bowel transgression requiring intervention	1	2
Pleural transgression requiring intervention (abdominal procedures)	1	2
Pleural transgression requiring additional intervention (chest procedures)	2-10	20

warrant drainage. The collection may be detected by physical examination, but typically is discovered by an imaging study, such as radiography, ultrasound, or computed tomography. Additional studies may be required to confirm the presence or nature of the fluid collection and to evaluate the feasibility of drainage.

Diagnostic aspiration may be the only means of determining that a fluid collection is infected. For instance, while fever, leukocytosis, malaise, anorexia, or other systemic symptoms point to an infection, these signs and symptoms may be absent in elderly, very ill, or immunocompromised patients. If material that appears infected is obtained or if the operator cannot exclude the presence of infection, a drainage catheter may then be placed.

Percutaneous drainage and aspiration may be performed in essentially every organ system. The contraindications are relative and depend on the suitability of surgical alternatives. Common relative contraindications include coagulopathy and necrotic tissue requiring surgical debridement. There is a spectrum of disease complexity. Examples of more complex situations include multiple abscesses, abscess due to Crohn disease, pancreatic abscesses, drainage route that traverses bowel or pleura, infected clot, and infected tumor (8,9). Articles have documented curative or partially successful percutaneous drainage in patients with these complex situations (10-18). However, one should expect that percutaneous drainage in such cases will have a lower chance of success, be more technically difficult, require longer periods of time for drain-

age, and have a higher rate of complications. In addition, abscesses in such cases may be more likely to recur. Decisions regarding percutaneous versus surgical drainage of complex collections should be made in concert with other physicians involved in the patient's care. Participation by the radiologist in patient follow-up is an integral part of drainage and will increase the success rate of the procedure. Close follow-up, with monitoring and management of the drainage catheter is appropriate for the radiologist.

Indications for diagnostic aspiration and percutaneous drainage

Threshold

Presence of an abnormal fluid collection with suspicion that the fluid is infected, need for fluid characterization, or suspicion that the collection is producing symptoms sufficient to warrant drainage

100%

SUCCESS RATE

Diagnostic aspiration.—Successful diagnostic fluid aspiration is defined as the aspiration of material sufficient for diagnosis.

Threshold

Successful diagnostic fluid aspiration

95%

Drainage of infected collections.—Curative drainage is defined as complete resolution of infection requiring no further operative intervention. Curative drainage has been achieved

in greater than 80% of patients. Partial success is defined as either adequate drainage of the abscess with surgery subsequently performed to repair an underlying problem or as temporizing drainage performed to stabilize the patient prior to surgery. Partial success occurs in 5%-10% of patients. Failure occurs in 5%-10% and recurrence in 5%-10% (1-3). These results are similar for both abdominal and chest drainage procedures (4-7). These success rates will depend on the proportion of collections drained in patients with relative contraindications, on the complexity of the collection, and on the severity of the underlying medical problems.

Threshold

Successful drainage (curative and partial success)

85%

Drainage of uninfected collections.—Due to the variability of the types of uninfected collections, the success rate of drainage will be highly variable and it is not believed that a specific threshold for success can be set.

COMPLICATION

Complications occur in approximately 10% of patients (1-7). Published complication rates and suggested thresholds are given in the Table.

Published rates for individual types of complications are highly dependent on patient selection and are based on series comprising several hundred patients, which is a volume larger than most individual practitioners are likely to treat. Therefore, we recommend that complication-specific rates be set at twice the complication-specific rates listed in the Table. It is also recognized that a single complication can cause a rate to cross above a complication-specific threshold when the complication occurs in a small volume of patients, for example, early in a quality improvement program. In this situation, the overall procedure threshold is more appropriate for use in a quality-improvement program.

The overall procedure threshold for all major complications resulting from adult percutaneous abscess and fluid drainage is 10%.

APPENDIX

Society of Interventional Radiology Standards of Practice Committee Classification of Complications by Outcome

Minor Complications

- A. No therapy, no consequence
- B. Nominal therapy, no consequence; includes overnight admission for observation only

Major Complication

- C. Require major therapy, minor hospitalization (<48 hours)
- D. Require major therapy, unplanned increase in level of care, prolonged hospitalization (>48 hours)
- E. Permanent adverse sequelae
- F. Death

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