PROCEDURE: WOUND PROTOCOL

I. PRINCIPLE

A. A wide variety of microorganisms that reside on the skin and mucous membranes of the body, as well as those found in the environment can cause skin and soft tissue infections. Superficial wound and abscess specimens usually grow primary pathogens that can cause infections. However, interpretation of these cultures taken from open skin or abscesses may be compromised due to the fact that these lesions are often colonized with a large number of indigenous microbiota. The presence of inflammatory cells and the resultant pus is a hallmark of local infection. Evidence of this process can be documented by the presence of PMNs in the gram stain. The presence of epithelial cells indicates contamination of the specimen with skin or mucous membrane microbiota and may compromise the significance of the culture results. Therefore, the quality of the wound specimen should be determined by the gram stain results.

II. AVAILABILITY

A. 7 days a week; all shifts

III. TEST CODE

A. **CXWND** – WOUND CULTURE

IV. SPECIMEN

A. Refer to Specimen Management procedure for complete acceptance/rejection criteria.
B. Refer to Planting Procedure for complete specimen processing information and media selection guidelines.

V. PROCEDURE

A. Examine plates at 24- and 48-hours incubation.
B. No or poor growth after initial 24-hr. incubation should be re-incubated for evaluation at 48-hrs.

VI. INTERPRETATION

A. Evaluate gram stain and correlate with culture.
    1. Good quality specimen indicated by presence of PMNs
    2. Moderate to many squamous epithelial cells seen and/or no PMNs indicate poor quality specimen
B. Any growth of the following organisms is always worked up fully:
    1. *Staphylococcus aureus*
    2. *Pseudomonas aeruginosa*
    3. Beta-hemolytic *Streptococcus* Group A or B
C. Agents of Bioterrorism should always be ruled out.
D. Organisms growing on CHOC only should be fully identified to rule out agents of Bioterrorism and other potentially significant organisms such as *H. influenzae* and *N. gonorrhoeae*.

E. Staphylococcus:
   1. All *Staphylococcus* isolates morphologically consistent with *S. aureus* must have a Staphaurex performed and documented.
      a. Refer to *Procedure: Organism ID/AST* for notes on colony morphology.
   2. Only isolates of Coagulase-negative *Staphyloccocus species* reported as a potential pathogen need a Staphaurex performed and documented.
   3. Coagulase-negative *Staphylococcus* are fully worked-up if any of the following criteria are met:
      a. Pure culture isolated from invasively collected or good quality specimen
      b. Associated with PMNs in direct smear
      c. Organism isolated from multiple cultures
   4. Rule out *S. lugdenensis* initially using PYR if reporting a Coagulase-negative *Staphylococcus.*

F. Yeast:
   1. Yeast should be considered commensal flora unless it is isolated in pure culture.
   2. If pure and “feet” present, report as probable *C. albicans*.
   3. If pure and no “feet” present, set up Maldi and report ID. Refer unusual/uncommon identifications to the Mycology lab.
   4. Any isolate identified as *Cryptococcus* species should be reported.
   5. All molds that are not obvious contaminants (growing off the streaked area) should be forwarded to Mycology for evaluation. **Do not report** - The Mycology lab will decide if clinically significant and whether to report.

G. Commensal Flora: *Refer to Appendix AP19: Wound Culture - Commensal flora*
   1. Organisms considered commensal flora are dependent on source/site.
   2. Organisms isolated from sources other than those included in the list of commensal flora should be brought up on Rounds.
   3. Organisms reported as commensal flora are to be listed generically in the worksheet.

H. Pathogen Workup: *Refer to Appendix AP18: Wound Culture Work-up Flowchart*
   1. Determine if a single morphology or multiple morphologies are isolated.
   2. Single morphology isolated:
      a. Perform ID/AST if potential pathogen isolated
      b. Commensal Flora:
         i. Perform ID/AST on isolates from invasively collected specimens
         ii. Isolates from non-invasively collected specimens or poor-quality specimens should be brought up on Rounds to determine significance and extent of workup
   3. Multiple morphologies isolated:
      a. Determine the number of potential pathogens:
         i. ≤2 potential pathogens
            a) Perform ID/AST on predominant potential pathogens
            b) Non-predominant potential pathogens are either listed generically or grouped as commensal flora based on quantitation, gram stain and culture correlation
            c) Potential pathogens isolated from poor quality specimens are grouped as commensal flora
         ii. ≥2 potential pathogens
            a) Potential pathogens isolated from good quality specimens are listed generically or grouped as commensal flora based on quantitation, gram stain and culture correlation
            b) Potential pathogens isolated from poor quality specimens are grouped as commensal flora

VII. REPORTING RESULTS

A. All gram stain and biochemical testing necessary to rule-out suspected pathogens should be performed and documented in the worksheet.
   1. Examples of required testing:
      Note: This is not a complete list of testing that may be needed to rule out potential pathogens
      a. Strep grouping for Beta-hemolytic *Streptococcus sp.*
      b. Oxidase for NLF Gram-negative rods
      c. Staphaurex (or Maldi if latex negative) for atypical morphologies of *S. aureus*
B. Quantitate all significant isolates and report with appropriate susceptibility results.
C. Organisms reported as commensal flora should be listed generically in the worksheet (gram stain and biochemical testing is not required unless performed to rule-out suspected pathogen).
D. Use the appropriate organism code based on site when reporting commensal flora:

mixcut	Mixed Cutaneous Flora
mixres	Mixed Respiratory Flora
mixora	Mixed Oral Flora
mixent	Mixed Enteric Flora
mixgu	Mixed Genito-urinary Flora
mixvag	Mixed Vaginal Flora
mixaer	Mixed Aerobic Flora

E. If commensal flora is reported, a designated isolate comment must be included.

   1. *S. aureus*, *P. aeruginosa*, or Beta-hemolytic *Streptococcus* Group A or B **ISOLATED:**
      a. Add isolate comment: **&NFW – *No further workup***

Example:

* **Wound Cult and GS** FINAL 01/31/19 10:39

1+ Staphylococcus aureus

Oxacillin-susceptible staphylococci are susceptible to nafcillin, oxacillin, cephalosporins, carbapenems (meropenem) and B-lactam/B-lactamase inhibitor combinations.

2+ Mixed Aerobic Flora

No further workup

   2. *S. aureus, P. aeruginosa,* or Beta-hemolytic *Streptococcus* Group A or B **NOT ISOLATED:**
      a. Add isolate comment: ***&NSPS – No Staphylococcus aureus, Pseudomonas aeruginosa or Beta-hemolytic Streptococcus Group A and B isolated.***

Example:

* **Wound Cult and GS** FINAL 01/31/19 10:37

2+ Mixed Aerobic Flora

No Staphylococcus aureus, Pseudomonas aeruginosa or Beta-hemolytic Streptococcus Group A and B isolated.

Example:

* **Wound Cult and GS** FINAL 01/31/19 10:35

2+ Serratia marcescens
2+ Mixed Cutaneous Flora

No Staphylococcus aureus, Pseudomonas aeruginosa or Beta-hemolytic Streptococcus Group A and B isolated.

VIII. PROCEDURE NOTES

A. Technologist discretion and professional judgement should be used to ensure all necessary testing (ie. Gram stain, Staphaurex, oxidase, Strep Grouping) has been performed and documented to either rule out or identify any potential pathogens present.
B. Hold plates without full ID/AST performed in the 7-day hold racks, not including mixed commensal flora.
C. *Appendix AP18 - Wound Culture Work-up Flowchart* is to be utilized to guide decisions regarding extent of workup for potential pathogens in conjunction with specimen source, site, gram stain, and patient history. It is not all-inclusive and technologist discretion is expected in evaluating potential clinical significance of organisms isolated.
D. Any workup not consistent with stated guidelines should be brought up on Rounds for further discussion.

IX. LIMITATIONS

A. The significance of culture results is dependent on appropriate specimen collection and processing.
B. In immunocompromised patients, PMNs may not be present in the specimen to guide extent of culture workup.
C. Vaginal wounds requested for GC should be tested by Aptima for optimum detection.

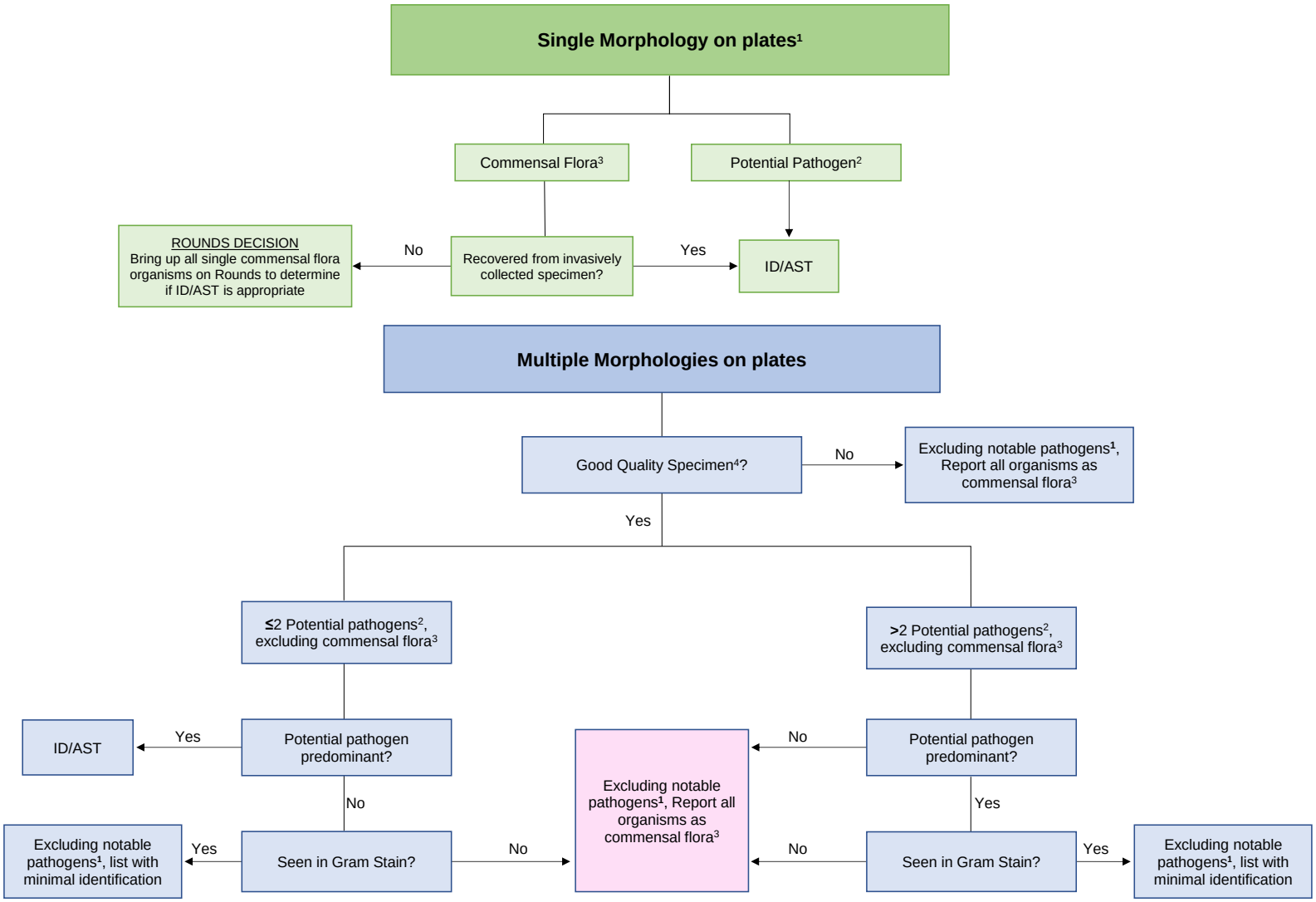
X. REFERENCES

A. A.L. Leber. 2016. Wound/Abscess and Soft Tissue Cultures p.3.13.1.1-3.13.120. Clinical Microbiology Procedures Handbook, 4th Edition, Vol 1 ASM Press, Washington, D.C.
B. Mount Sinai Hospital, Department of Microbiology Wounds/Tissues/Aspirates Culture Manual, Version 17.

XI. REVISIONS

A. 8/30/2023 – Procedure updated to clarify required testing and documentation of commensal flora vs potential pathogens present

Wound Culture Work-up Flowchart



[1] *S. aureus*, *P. aeruginosa*, and BHS A or B are always fully worked-up pathogens regardless of quantitation or other organisms present.

[2] Potential pathogens are site dependent and may include: *H. influenzae*, *N. gonorrhoeae*, Non-fermenting GNRs, Enteric pathogens, Agents of Bioterrorism, *B. cereus*, *Listeria*, *Actinomyces*, *Erysipelothrix*, and *Nocardia*.

[3] Commensal flora: Varies depending on source of the specimen. Refer to Appendix AP19 for additional guidance.

[4] Good quality specimens: Presence of PMNs in direct smear
Poor quality specimens: Presence of moderate or many squamous epithelial cells on direct smear or no PMNs

Algorithm adapted from Clinical Microbiology Procedures Handbook 4th Edition, 2016. Figure 3.13.1-5

Appendix AP19

Wound Cultures - Commensal Flora

Reported as:	**Respiratory Flora (mixres)** **Oral Flora (mixora)**	**Cutaneous Flora (mixcut)**	**Enteric Flora (mixent)**	**Genito -urinary Flora (mixgu)** **Vaginal Flora (mixvag)**
Sites:	Conjunctiva, Nose, Mouth, Oropharynx	Skin, Outer Ear	Stomach, large intestine, small intestine, bowel contents	Urethral, Vaginal
Organisms:	CoNS Alpha strep Non-path Neisseria Hemophilus Diphtheroids BHS not A or B Yeast Actinomyces Eikenella N. meningitidis	CoNS Diphtheroids Bacillus Alpha Strep BHS not A or B Yeast	Alpha Strep Enterobacteriaceae CoNS Lactobacillus BHS not A or B Enterococci Yeast Diphtheroids Actinomyces	CoNS Diphtheroids Alpha Strep BHS not A or B Yeast Enterococci Enterobacteriaceae Gardnerella vaginalis Lactobacillus Non-pathogenic Neisseria Actinomyces

***This is not an exhaustive list of site/commensal flora combinations. If organism(s) isolated cannot be fit into one of these categories using professional judgement, bring up on Rounds, or use Mixed Aerobic Flora (mixaer), if appropriate.