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Journal of Education and Teaching in Emergency Medicine

Title

Emergency Medicine Dermatology

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Journal

Journal of Education and Teaching in Emergency Medicine, 2(2)

Author

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Publication Date

2017

DOI

10.5070/M522034555

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Emergency Medicine Dermatology

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Submitted: March 8, 2017; Accepted: March 30, 2017; Electronically Published: April 15, 2017; <https://doi.org/10.21980/J8DW21>

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ABSTRACT:

Audience: This modified team-based learning (mTBL) exercise is appropriate for junior and senior emergency medicine learners.

Introduction: Rashes and dermatologic complaints are common in the emergency department. It is essential that emergency physicians understand various types of lesions and rashes as well as be able to distinguish between benign and life-threatening dermatologic complaints. The Modified Lynch Algorithm provides a systematic approach to the diagnosis of rashes by providing a number of questions and branching points to narrow down the differential diagnosis of important and life-threatening rashes for the emergency physician.¹ While there are a number of other methods to narrow down the differential diagnosis for rash, the Modified Lynch Algorithm is primarily based on the type of rash and is well suited for this exercise because it provides an excellent opportunity for learners to think about the differential diagnosis for those rashes.

Objectives: By the end of this educational session, the learner will: 1) list the six primary types of rash (maculopapular, petechial/purpura, diffuse erythematous, non-erythematous, vesiculo-bullous, and pustular). 2) be able to accurately describe various types of lesions and rashes with appropriate terminology; 3) understand the use of the Modified Lynch Algorithm and how it can be used to narrow down the differential diagnosis in patients presenting with rash.

Method: This is an mTBL session.

Topics: Dermatology, emergency rashes, life-threatening rashes, maculopapular, petechial, purpura, erythematous, vesiculo-bullous, pustular.



USER GUIDE

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Learner Audience:

Medical Students, Interns, Junior Residents, Senior Residents

Time Required for Implementation:

Instructor Preparation: 1-2 hours
In Class Time: 60-90 minutes

Recommended Number of Learners per Instructor:

Up to 100 learners per instructor.

Topics:

Dermatology, emergency rashes, life-threatening rashes, maculopapular, petechial, purpura, erythematous, vesiculo-bullous, pustular.

Objectives:

By the end of this educational session:

1. List the six primary types of rash (maculopapular, petechial/purpura, diffuse erythematous, non-erythematous, vesiculo-bullous, and pustular)
2. Be able to accurately describe various types of lesions and rashes with appropriate terminology
3. Understand the use of the Modified Lynch Algorithm and how it can be used to narrow down the differential diagnosis in patients presenting with a possible life-threatening rash.

Linked objectives and methods:

In the individual readiness assessment test, the learners are asked to match each lesion or rash with the appropriate terminology. This test ensures they know the appropriate terminology to describe various rashes. Learners then participate in the group readiness assessment test by completing the Kahoot (or PowerPoint) which goes through more examples of rashes and allows the entire group to practice their rash identification. For the group application exercise, learners will implement their understanding of rash

types and brainstorm in small groups on the differential for the primary rash types by filling out their blank Modified Lynch Algorithm.

Recommended pre-reading for instructor:

1. Lynch PJ, Edminster SC. Dermatology for the nondermatologist: a problem-oriented system. *Ann Emerg Med.* 1984;13(8):603-606.
2. Murphy-Lavoie H, LeGros TL. Emergent diagnosis of the unknown rash: an algorithmic approach. *Emergency Medicine Magazine.* <http://www.mdedge.com/emed-journal/article/71662/dermatology/emergent-diagnosis-unknown-rash-algorithmic-approach>. March 2010. Accessed April 5, 2017.
3. Diagnosing rashes in the ED using the Modified Lynch Algorithm. *ConnollyEM.* <http://connollyem.com/2016/08/16/diagnosing-rashes-in-ed/>. August 16, 2016. Accessed April 5, 2017.
4. Nguyen T, Freedman J. Dermatologic emergencies: diagnosing and managing life-threatening rashes. *Emergency Medicine Practice.* https://www.ebmedicine.net/topics.php?paction=showTopic&topic_id=54. September 2002, Volume 4, Number 9. Accessed April 5, 2017.
5. Edmonds M. A Rash diagnosis: dermatology in ED. *Adelaide Emergency Physicians. Education Resources.* <http://adelaideemergencyphysicians.com/2014/10/a-rash-diagnosis-dermatology-in-ed/>. October 26, 2014. Accessed April 5, 2017.

Results and tips for successful implementation:

This mTBL was first implemented during a residency conference with approximately 30 learners (medical students to senior residents). It was very well-received by learners.

Prepare:

1. Read instructor pre-reading
2. You will need a computer with Keynote or PowerPoint and projector/screen to present the Derm TBL Keynote or PowerPoint.
3. The gRAT can either be run through the Kahoot! link (<https://play.kahoot.it/#/?quizId=c0ef5945-7694-4483-accb-9de3c5ced71f>) or through the provided separate gRAT Keynote/PowerPoint. If using Kahoot! each learner will need a device (smart phone, tablet or laptop) with internet access.

For the in-classroom didactic session, you will also need to prepare the following:

1. One copy of iRAT chart for each learner



USER GUIDE

2. One copy of GAE for each learner or each group, depending on if you want learners to each have their own copy.
3. One copy of the gRAT explanations form (also provided in the Keynote and PowerPoint presenter notes)
4. One copy of the GAE key

- iRAT Key
- gRAT Key
- GAE Key

References/suggestions for further reading:

1. Nguyen T, Freedman J. Dermatologic emergencies: diagnosing and managing life-threatening rashes. *Emergency Medicine Practice*. https://www.ebmedicine.net/topics.php?paction=showTopic&topic_id=54. September 2002, Volume 4, Number 9. Accessed April 5, 2017.
2. Edmonds M. A Rash diagnosis: dermatology in ED. *Adelaide Emergency Physicians*. Education Resources. <http://adelaideemergencyphysicians.com/2014/10/a-rash-diagnosis-dermatology-in-ed/>. October 26, 2014. Accessed April 5, 2017.
3. Murphy-Lavoie H, LeGros TL. Emergent diagnosis of the unknown rash: an algorithmic approach. *Emergency Medicine Magazine*. <http://www.mdedge.com/emed-journal/article/71662/dermatology/emergent-diagnosis-unknown-rash-algorithmic-approach>. March 2010. Accessed April 5, 2017.
4. Diagnosing rashes in the ED using the Modified Lynch Algorithm. *ConnollyEM*. <http://connollyem.com/2016/08/16/diagnosing-rashes-in-ed/>. August 16, 2016. Accessed April 5, 2017.

In class implementation:

1. Learners take the iRAT (third slide of the EM Dermatology presentation). They will need to view the slides with the pictures of 10 different rashes in order to complete the iRAT. Give your learners 5 minutes to complete the iRAT. They should not be allowed to use articles or other materials during the iRAT.
2. Review the answers to the iRAT (see provided iRAT Key). Answer any questions from learners.
3. Go through the gRAT via Kahoot! or the gRAT Keynote/PowerPoint. The competition of the Kahoot! often encourages residents to either argue about answers or work together. If using the gRAT Keynote/PowerPoint you can have learners shout out answers, write down answers, or call on them in turn. After learners answer each rash, provide the correct answer and a brief explanation (see gRAT explanation form or presenter notes). Many images have multiple findings, and the Kahoot! provides only certain answers to minimize confusion, but it is important to point out these findings to learners.
4. Now break up learners into groups of four. The instructor should assign the groups and we recommend evenly distributing junior and senior residents in each group. Provide each group or learner with a copy of the GAE, give them 15-20 minutes to brainstorm and complete the GAE. After groups have completed their forms, review answers from the Derm TBL presentation. Please note, if you want to help get your learners started or have less advanced learners, you could fill in part of the GAE before providing it to learners.
5. We recommend emailing the GAE Key to learners after completion of the session for their review.

Content:

- EM Derm TBL Presentation
 - Keynote
 - Powerpoint
- iRAT
- Derm gRAT
 - Kahoot
 - Keynote
 - Powerpoint
- GAE



EM Dermatology: individual Readiness Assessment Test (iRAT)

Answer choices (use each term once)

Macule
Papule
Nodule
Plaque
Pustule
Rash

Vesicle
Bulla
Petechiae
Purpura
Scales
Lesion

Condition	Definition	Picture
	Circumscribed elevation of skin 1cm or larger in diameter; a confluence of papules	
	Excess dead epidermal cells produced by abnormal keratinization; sometimes with desquamation	
	Circumscribed, fluid-filled lesion less than 1cm in diameter	
	Solid, raised lesion 1cm or larger in diameter	
	Small red or brown macules less than 1cm in diameter that do not blanch	
	Solid, raised lesion less than 1cm in diameter	
	Circumscribed red or brown macules 1cm or larger in diameter	
	Circumscribed area of skin containing pus	
	Circumscribed area of change in skin color without elevation	
	Circumscribed, fluid-filled lesion 1cm or larger in diameter	
	An eruption of the skin involving more than one lesion	n/a
	Single diseased area of skin	n/a



LEARNER MATERIALS

EM Dermatology: group Readiness Assessment Test (gRAT)

The gRAT for this TBL can either be completed through the following Kahoot!

<https://play.kahoot.it/#/?quizId=c0ef5945-7694-4483-accb-9de3c5ced71f>

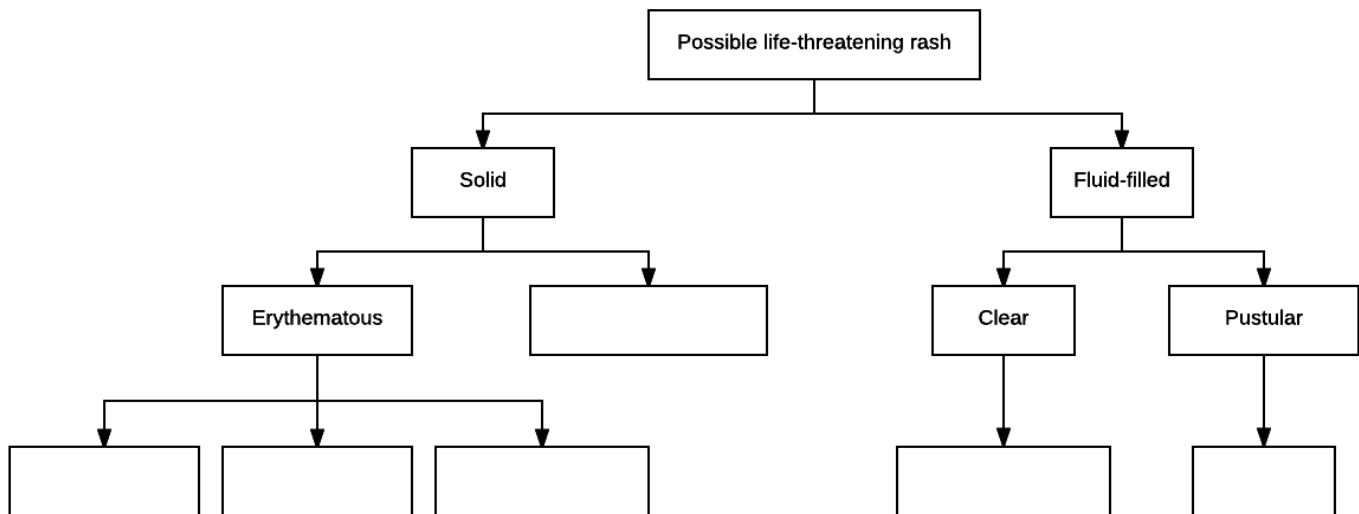
or through the associated Derm gRAT Keynote/PowerPoint.



EM Dermatology: Group Application Exercise (GAE)

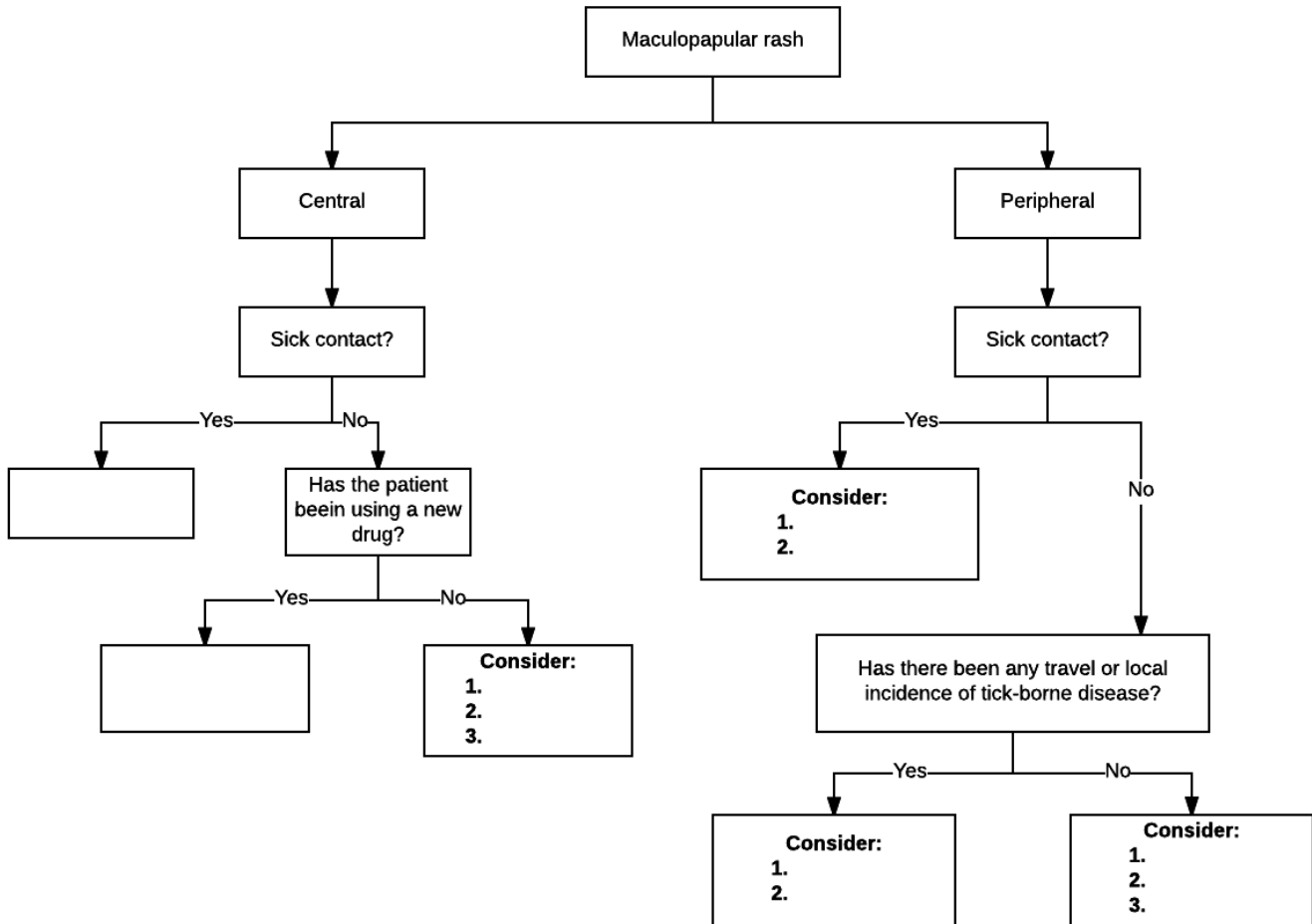
Modified Lynch Algorithm

Possible life-threatening rash



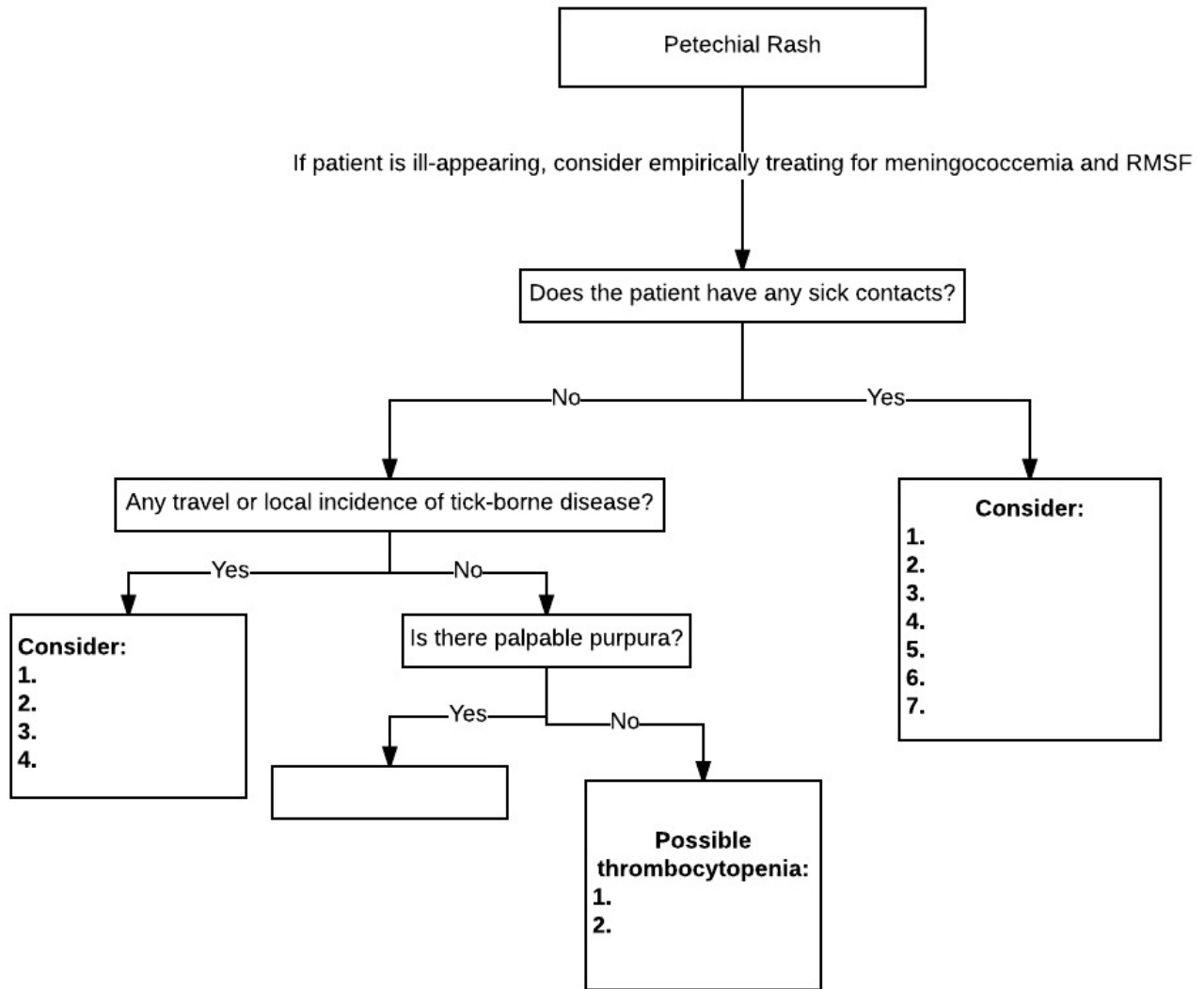


EM Dermatology: Group Application Exercise (GAE) Modified Lynch Algorithm Maculopapular Rash



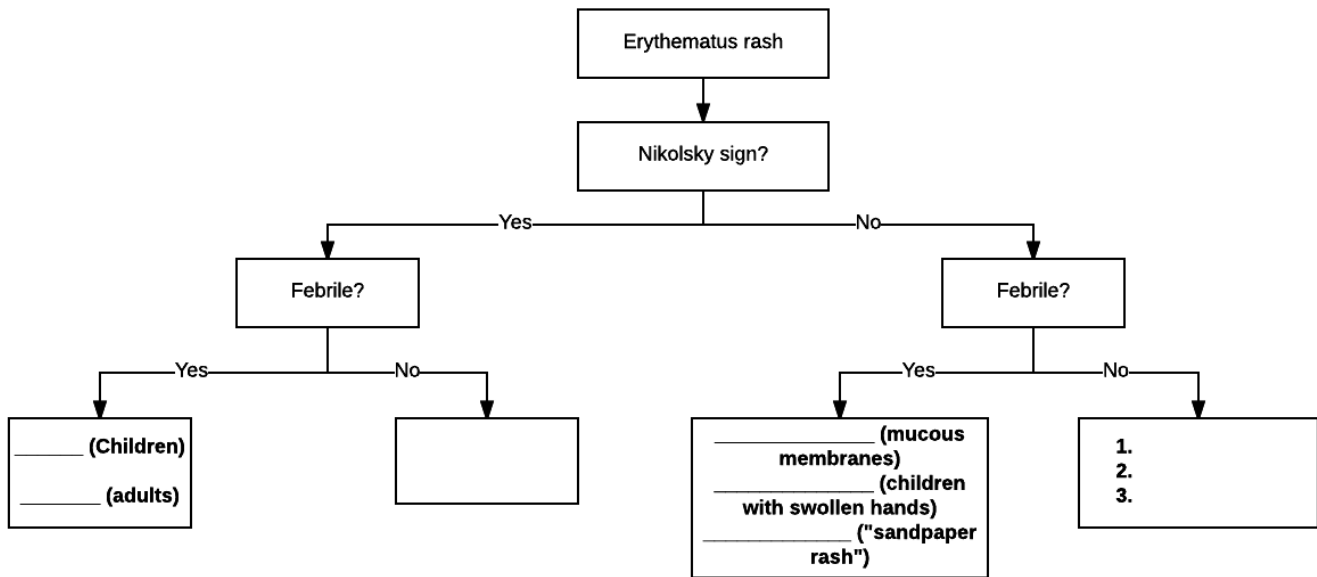


EM Dermatology: Group Application Exercise (GAE) Modified Lynch Algorithm Petechial Rash



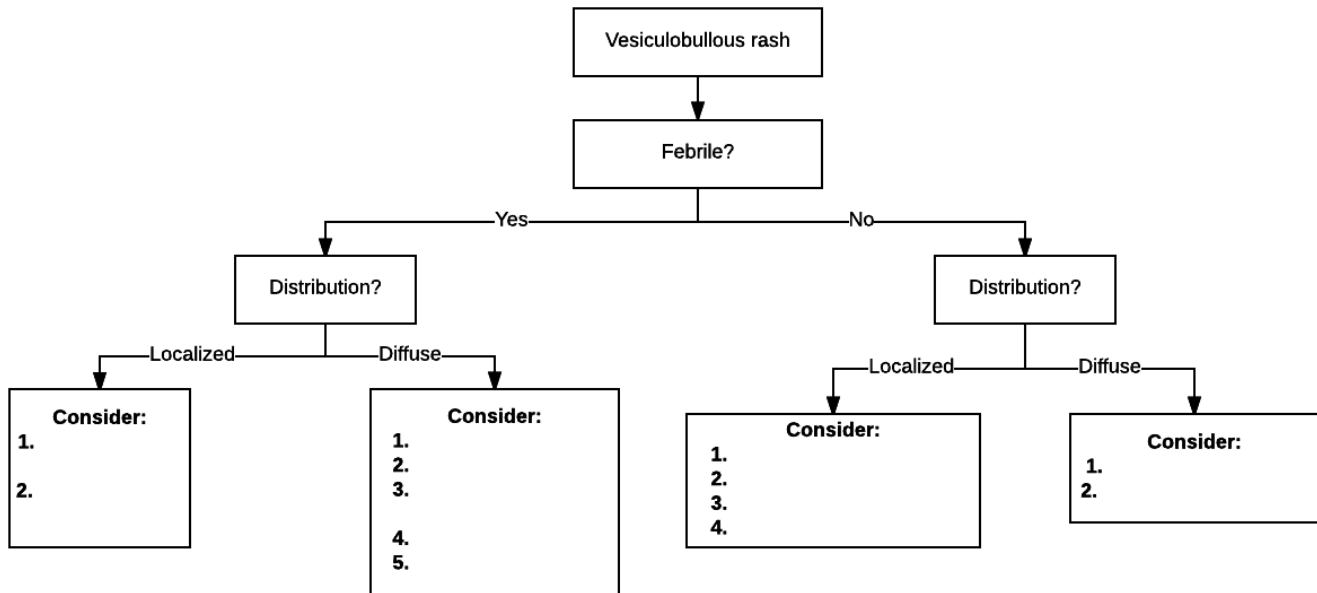


EM Dermatology: Group Application Exercise (GAE) Modified Lynch Algorithm Erythematous Rash





EM Dermatology: Group Application Exercise (GAE) Modified Lynch Algorithm Vesiculobullous Rash



Non-erythematous rash:

1. _____
2. _____
3. _____

Pustular:

1. _____
2. _____
3. _____
4. _____



INSTRUCTOR MATERIALS

Answer keys to all exercises with explanations, are on the following pages.

Learners: please do not proceed.



INSTRUCTOR MATERIALS

EM Dermatology: individual Readiness Assessment Test Key (iRAT Key)

Answer choices (use each term once)

Macule
Papule
Nodule
Plaque
Pustule
Vesicle

Bulla
Petechiae
Purpura
Scales
Lesion
Rash

Condition	Definition	Picture
Plaque	Circumscribed elevation of skin 1cm or larger in diameter; a confluence of papules	B
Scales	Excess dead epidermal cells produced by abnormal keratinization; sometimes with desquamation	E
Vesicle	Circumscribed, fluid-filled lesion less than 1cm in diameter	D
Nodule	Solid, raised lesion 1cm or larger in diameter	A
Petechiae	Small red or brown macules less than 1cm in diameter that do not blanch	H
Papule	Solid, raised lesion less than 1cm in diameter	F
Purpura	Circumscribed red or brown macules 1cm or larger in diameter	I
Pustule	Circumscribed area of skin containing pus	C
Macule	Circumscribed area of change in skin color without elevation	G
Bullae	Circumscribed, fluid-filled lesion 1cm or larger in diameter	J
Rash	An eruption of the skin involving more than one lesion	n/a
Lesion	Single diseased area of skin	n/a



INSTRUCTOR MATERIALS

EM Dermatology: group Readiness Assessment Test Key (gRAT Key)

gRAT answers are available on the Kahoot!

Answers and instructor notes can also be found on the Derm gRAT Keynote/PowerPoint presenter notes.

Notes for instructors are also available below.

1. Macule. Circumscribed area of change in skin color without elevation.
2. Pustules from Impetigo. Starting to coalesce into what could be called a plaque.
3. Pustule. Circumscribed area of skin containing pus.
4. Maculopapular rash. Combination of circumscribed areas of change in skin color without elevation and solid, raised lesion less than 1cm in diameter.
5. Macule.
6. Papular. Solid, raised lesion less than 1cm in diameter. Likely viral exanthem.
7. Plaques. This is a maculopapular rash that has coalesced into plaques which is common with urticaria.
8. Papules. Solid, raised lesion less than 1cm in diameter.
9. This picture has a combination of macules, papule and pustules. Consistent with acne.
10. Nodule. Solid, raised lesion 1cm or larger in diameter.
11. Macule.
12. Maculopapular rash, coalescing into plaques.
13. Maculopapular rash.
14. Plaque with scales. Circumscribed elevation of skin 1cm or larger in diameter and excess dead epidermal cells produced by abnormal keratinization.
15. Nodule. Solid, raised lesion 1cm or larger in diameter.
16. Vesicles. Circumscribed, fluid-filled lesion less than 1cm in diameter.



INSTRUCTOR MATERIALS

17. Vesicles. A little difficult to tell the size but these are <1cm so vesicles not bullae.
18. Maculopapular rash. This was a drug rash.
19. Pustules overlying macular skin changes.
20. Macule.
21. Umbilicated flesh-colored papules. This is molluscum contagiosum.
22. Plaques. Circumscribed elevation of skin 1cm or larger in diameter; a confluence of papules.
23. Purpura. Circumscribed red or brown macules 1cm or larger in diameter.
24. Bullae. Circumscribed, fluid-filled lesion 1cm or larger in diameter.
25. Maculopapular rash with pustules.
26. Pustular lesions now coalesced into plaques. Impetigo.
27. Target shaped maculopapular lesions with multiple bullae.
28. Pustular lesions.
29. Petichiae. Small red or brown macules less than 1cm in diameter that do not blanch.
30. Vesicles with an erythematous base.
31. Macules with pustules.
32. Bullae.
33. Scales. Excess dead epidermal cells produced by abnormal keratinization; sometimes with desquamation.
34. Vesicles. This is herpes zoster on an elbow.
35. Vesicles. Likely herpes zoster.
36. Bullae. This is bullous pemphigoid.



INSTRUCTOR MATERIALS

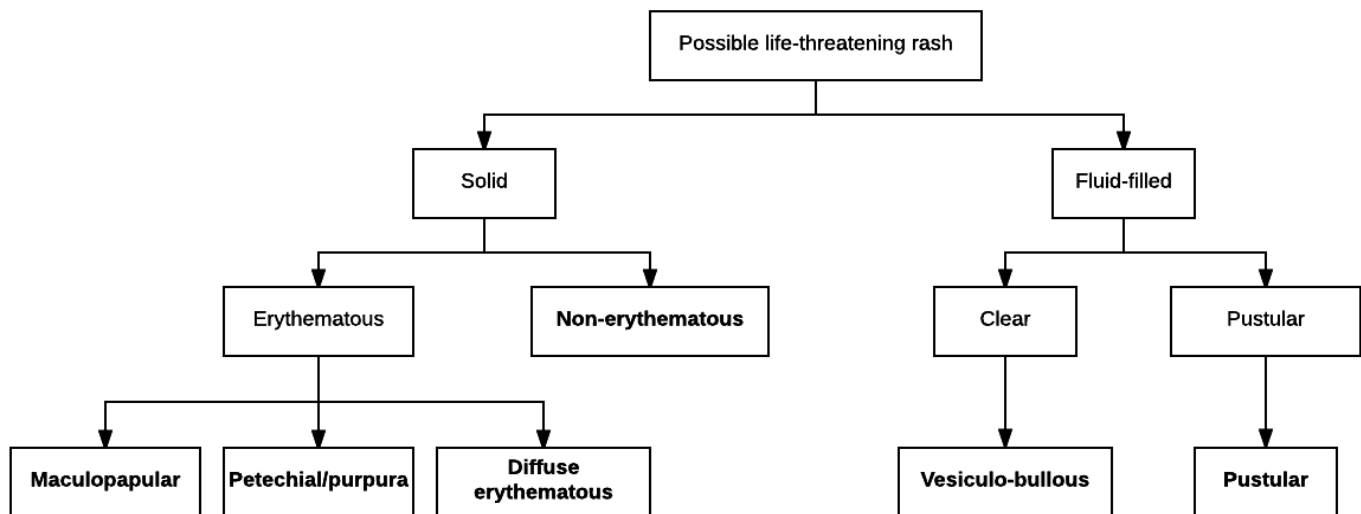
37. Plaques with scales. Circumscribed elevation of skin 1cm or larger in diameter; excess dead epidermal cells produced by abnormal keratinization.
38. Macules and bullae.
39. Petechiae. Small red or brown macules less than 1cm in diameter that do not blanch. This is in a child with Henoch-Schonlein purpura.
40. Bullae.
41. Purpura. Circumscribed red or brown macules 1cm or larger in diameter.
42. Maculopapular.



EM Dermatology: Group Application Exercise Key (GAE Key)

To wrap up, the instructor can review the answers for the Modified Lynch Algorithm with learners and have teams share their differentials with the larger group. Answers to the GAE are provided below.

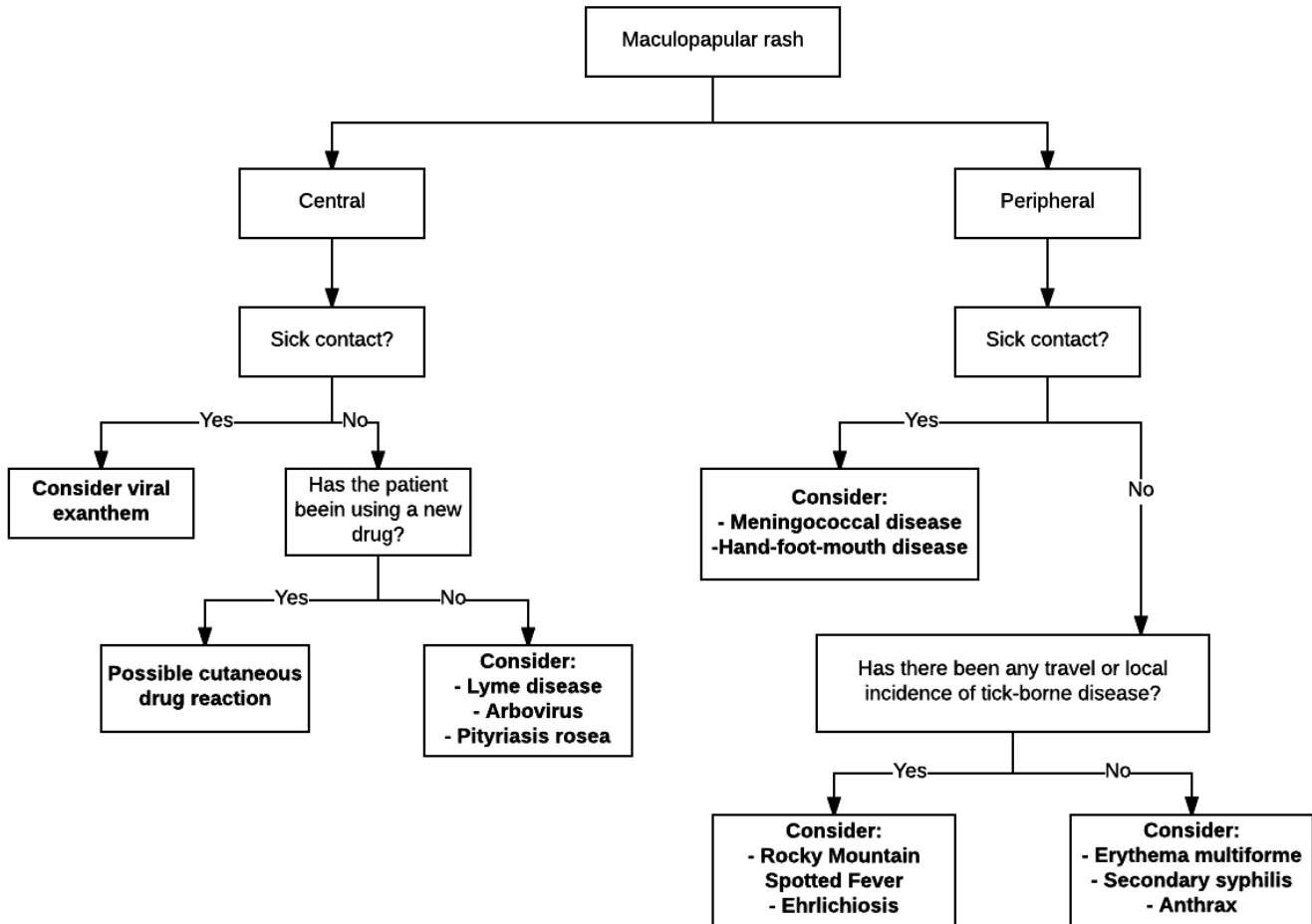
Modified Lynch Algorithm Possible life-threatening rash





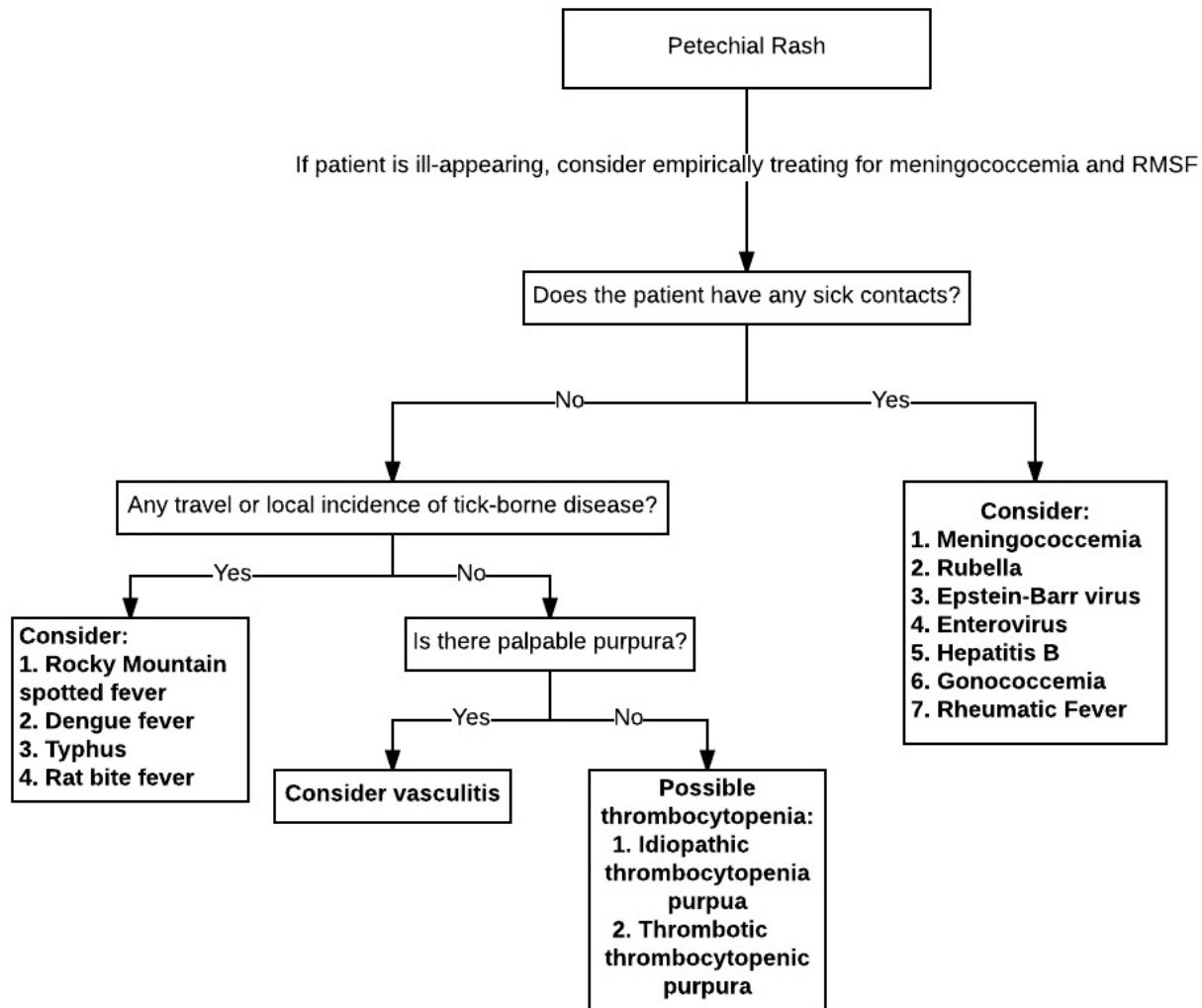
INSTRUCTOR MATERIALS

EM Dermatology: Group Application Exercise Key (GAE Key) Modified Lynch Algorithm Maculopapular Rash





EM Dermatology: Group Application Exercise Key (GAE Key) Modified Lynch Algorithm Petechial Rash

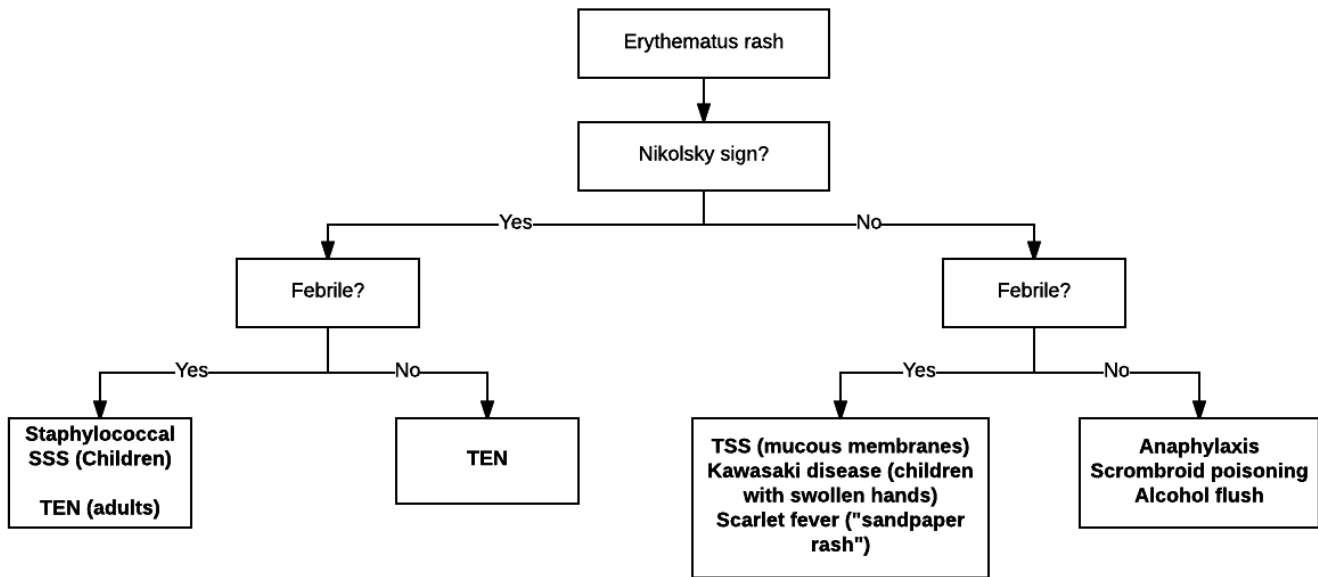




EM Dermatology: Group Application Exercise Key (GAE Key)

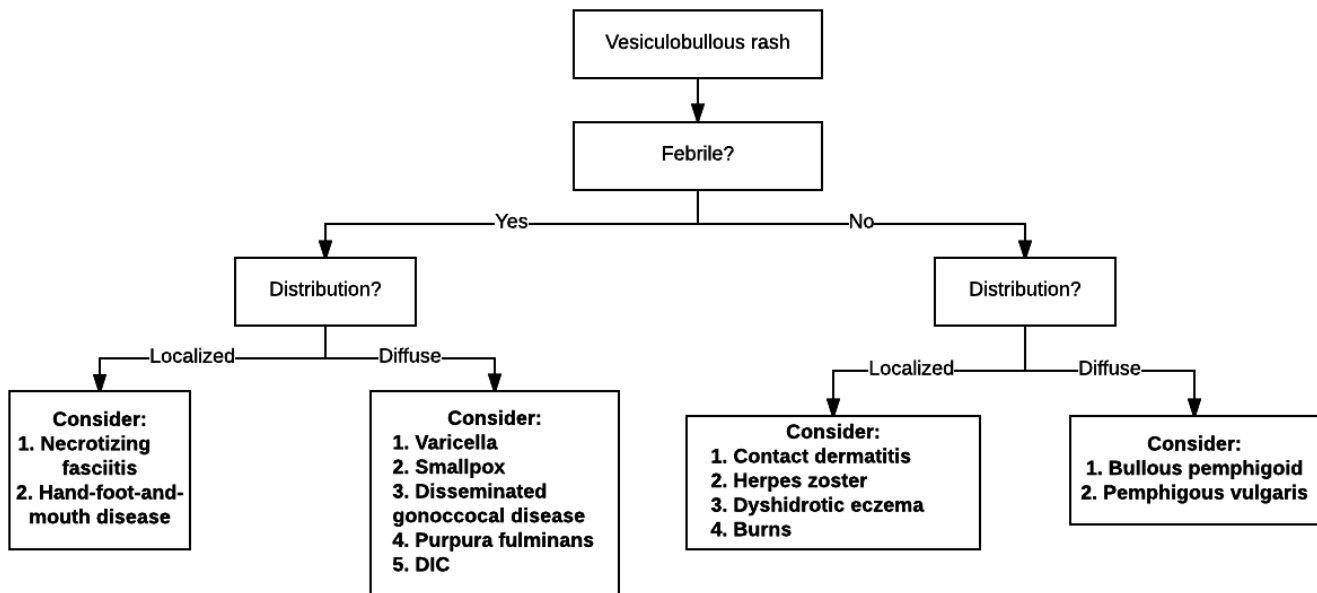
Modified Lynch Algorithm

Erythematous Rash





EM Dermatology: Group Application Exercise Key (GAE Key) Modified Lynch Algorithm Vesiculobullous Rash



Non-erythematous rash:

1. Syphilis
2. Anthrax
3. Vitiligo

Pustular:

1. Impetigo
2. Gonorrhea
3. Bacterial folliculitis
4. Pustular psoriasis