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CONCISE COMMUNICATION

Principles for developing and adapting clinical practice guidelines and guidance for pandemics, wars, shortages, and other crises and emergencies: the PAGE criteria

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In recent years, the development of clinical practice guidelines has become a more formalized and ubiquitous process. The AGREE II [1, 2] and RIGHT [3] paradigms provide instruction for reporting guidelines development; GRADE [4] and other systems have been refined for assessing the level of evidence and qualifying the strength of recommendations. Nationally recognized authorities such as the NCCN [5], professional medical societies with guidelines committees [6, 7], interdisciplinary working groups, the National Guidelines Clearinghouse [8] and successor organizations are all playing key roles in developing and disseminating guidelines.

The reasons for guideline development are many. Given the increased interest in quality of care, guidelines can be helpful for educating providers about best practices and decreasing variation in care delivery. Guidelines can also help introduce new therapies or diagnostic interventions, and clarify their role in patient management. Guidelines for rare conditions or diseases can spark interest in them and illuminate areas where knowledge is lacking, thereby stimulating further research. When high-level evidence is lacking but providers need direction, guidelines based largely on expert opinion can fill the gap. Payers and regulators can also look to guidelines to better understand the standard of care, even though guidelines documents typically include a disclaimer specifically disavowing any intent to create or reinforce such a standard. Even patients can benefit from guidelines, which may help them learn about their condition and its common management options.

Clinical practice guidelines are general documents designed to apply to most affected patients in commonly encountered clinical situations. While certain special circumstances may be envisioned, guidelines are not usually intended for situations in which normal care delivery is interrupted. Thus, at present, there is a need for a template for the adaptation of clinical practice guidelines to widespread emergency situations not specifically related to the disease or condition addressed by the guidelines. Relevant emergencies may be local, regional, national, or international. The precise nature of an emergency may vary, with possibilities including epidemics or pandemics, wars, shortages of medical services or products, natural disasters (e.g., earthquakes, fires, floods, droughts), and others. The common feature of such emergencies is an inability to provide routine care to patients because of effects on patients, effects on the health care system, or both.

The following is a template for the creation of adapted emergency guidance associated with existing clinical practice guidelines. This template (PAGE, Principles for Adapting Guidelines in Emergencies) is the product of the CISTERN (Committee on Invasive Tumor Evidence-Based Recommendations) [9, 10] group, a multidisciplinary, multispecialty collaboration formed for the purpose of cancer guidelines development. The template was developed during consensus meetings during March and April 2020.

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General rules for emergency guidance

Adapted guidance can be helpful during emergencies and times of uncertainty when the normal conditions of care delivery are disrupted. Common criteria may facilitate the development of any emergency guidance:

(1) **Plan a short timeline to completion.** Since an emergency implies problematic circumstances that are unexpected, patients and providers will not have planned for the scenario and will need prompt guidance on how to proceed. Whether a draft guideline is needed in hours, days, or weeks, will depend on the nature of the specific emergency. Consider contacting other experts to develop the appropriate timeline before proceeding. To increase the likelihood that this timeline will be observed, it may be prudent to obtain, at the inception of the process, written commitments from participants to hew to it, and devote appropriate time; those that are unwilling or unable may need to be substituted with experts having comparable knowledge. Upon invitation, each participant may be furnished with a calendar listing dates and times for all subsequent meetings, virtual or otherwise, either of the entire group or its various subgroups. This will help participants prepare, and also facilitate on-time completion of the guidelines.

(2) **Consider limited guidance rather than full guidelines.** The specific emergency likely impacts only part of the care delivery process for a particular disease or condition, and so the emergency direction should be limited in scope. There will not be the time, resources, or necessity for rigorous guidelines development. Instead, emergency guidance can be framed as a quick, best-guess, partial solution for a pressing problem. Though the best available evidence should drive any recommendations, emergency guidance may rely heavily on expert opinion. It is unlikely new high-quality studies will be available. Guidance should be qualified to make clear to the reader that the standard processes for guidelines development were either abbreviated or not followed, and as a result, the guidance provided is inherently less robust and more provisional.

(3) **Define the conditions during which the guidance will be in effect.** By definition, emergency guidance is predicated on the existence of an emergency. While the nature of the emergency may be self-evident to those preparing the guidance, it is important that the relevant conditions prompting the new rules to be clearly and precisely delineated in writing to avoid any ambiguity. This will preclude any misunderstanding that the emergency guidance is in fact new blanket guidance that is always operative. Moreover, characterizing the specific conditions of the emergency, and the rationale for the emergency guidance, will also make it clear when the emergency comes to an end, and the emergency guidance ceases to apply. If the end date of an emergency is known at the time the emergency guidance is prepared, this date should be included in the emergency document as the date of expiration.

(4) **Explain how the group developing the guidelines was assembled, and use an existing guidelines group, if possible.** Many professional medical societies have standing guidelines committees that can be mobilized expeditiously. Other national guidelines groups may also be well-poised to respond to emergencies. In general, it will be more effective to ask members of an existing group to work together to develop emergency guidelines than to try to convene a new group, as the latter will take time to assemble and train. If the expertise within an existing guidelines group is insufficient, ad hoc members may be added as necessary.

(5) **Use a guidelines group of sufficient size.** Since emergency guidance will likely be heavily supported by expert opinion rather than high-level published evidence, it is important that the group be of sufficient size and diversity to ensure that its recommendations are viewed as credible. A small or homogeneously constituted group may be viewed as excessively swayed by the opinions of individual members, even if such bias is inadvertent or unconscious.

(6) **Avoid duplication of the work of other guidelines groups.** Several different guidelines groups may be poised to develop emergency guidance on the same topic. Coordination between these groups, if known to each other, is best while the others tacitly endorse its work product. Multiple, competing sets of dissimilar guidances may exacerbate confusion among patients and providers.

(7) **Only adopt recommendations supported by consensus or at least a supermajority.** When providing guidance resting almost solely on expert opinion, it is particularly important that this opinion be perceived as widely shared. If an existing group is being mobilized to develop emergency guidelines, reasonable efforts should be undertaken to include all members of this group, as well as other ad hoc invitees with relevant expertise. Group consensus is best, but if it is unachievable, any recommendations should be supported by at least a 60% (3/5th) supermajority of all group members. Anonymity may be preserved, but a

complete vote count (i.e., total number of group members, votes in favor, votes against, and abstentions) should be posted next to each recommendation. A brief rationale shared by those in favor of the recommendation should also be included.

(8) **Convey the tenor and degree of support of dissenting views.** While views supported by a single group member or a very small subgroup need not be divulged, dissenting recommendations supported by a sizable minority (20% or more) of the group should be summarized in the guidance after the majority recommendation. This is not to detract from the majority recommendations but to concede that a degree of uncertainty exists.

(9) **Areas of uncertainty should be acknowledged, and issues regarding which no recommendations can be provided should be noted.** There may be important concerns pertaining to the emergency for which no clear guidance can be provided due to a very high level of associated uncertainty. If this occurs, the relevant concerns should be discussed in the guidance document and the lack of agreement regarding their management should be explicitly stated. If one or more sizable minorities of the group have views regarding the management of these concerns, these minority opinions and the proportion of the group supporting each may be briefly conveyed.

(10) **Do not promulgate recommendations outside the specific scope of the guidelines group.** Emergencies may arise due to natural or man-made disasters, pandemics or pestilence, market forces and market failures (e.g., shortages), and civil disobedience or armed conflict between nations. Doctors are not experts in natural disasters, terrorism, economics, or warfare. Indeed, members of a guidelines group will lack expertise even in unrelated medical specialties or subspecialties. For these reasons, guidance prepared by physicians to manage specific diseases and conditions in the context of emergencies should not venture into speculating about the nature, causes, duration, or course of the underlying emergencies. If it is important to discuss safety measures recommended by other authorities to cope with the underlying emergency, the relevant authorities should be referenced or outside consultation sought. Citing appropriate references or linking to a webpage may be preferable to attempting to reproduce general third-party guidance in a disease-specific guidance document. By referencing other authorities, the guidelines group will avoid inadvertently providing wrong or outdated recommendations.

(11) **Ensure that the final document is brief and easy to read.** Since emergency guidance is an adaptation of existing guidelines, it does not need to be long or complex. Apart from the elements that must be included (e.g., recommendations, rationale for recommendations, dissenting views, areas of uncertainty), the details of the deliberations leading to specific recommendations should be omitted or relegated to footnotes.

(12) **Widely disseminate the emergency guidance document.** Patients and physicians may be distracted in an emergency situation. Since they may be inundated with information excess related to the emergency, they may not be aware of the existence of recently produced emergency guidance. The emergency guidance document should thus be proactively disseminated by the guidelines group to relevant physicians and caregivers through as many communications channels as possible. For instance, the emergency guidance may be: emailed to caregivers; physically mailed to caregivers, if appropriate; presented from the podium at live meetings or teleconferences attended by medical professionals; sent to professional medical societies for posting on their web-pages and for inclusion in their news feeds; submitted for expedited publication to peer-reviewed journals; and abstracted in non-peer reviewed trade publications. Emergency guidance is only useful to the extent that it is implemented by physicians providing relevant care, and physicians can only implement guidance that is readily available, or easy to find or download.

(13) **Update the guidance as often as necessary.** Emergencies emerge unexpectedly, and they also evolve. If conditions associated with an emergency change materially, existing emergency guidance may need to be updated. Updates should be marked with the time and date when they were adopted. Updates should also be available in the same repository as all preceding guidance and updates, so it is clear to readers which is the most recent guidance. If email or other contact information is available for users of the original guidance or previous updates, future updates should automatically be sent to those to ensure they are not unwittingly relying on outdated guidance. After the crisis has ended, revisit key guidelines to update the relevant disaster planning sections to include the lessons learned from the event.

Special considerations based on the type of emergency

As noted care-disrupting emergencies can occur when there is: damage to physical locations where care is provided; a shortage of drugs or devices; a shortage of qualified personnel; an excessive number of patients needing care; a situation

in which patients are under physical threat or cannot safely present to receive care; or a situation in which providers are under physical threat or cannot safely deliver care.

Next, we consider specific rules that may help with developing emergency guidance in particular types of emergencies. For each of these types of emergencies, only recommendations specific to the disease or condition being considered need be provided in the guidance document. Defer to local, state, or national emergency management authorities for general guidance on healthcare delivery in the context of the emergency.

(1) **Damage to physical location, like hospital buildings:** If appropriate, the emergency guidance document may explain how appropriate care for the disease or condition may need to be delivered in non-medical buildings, temporary shelters, or at home.
(2) **Shortage of drugs or devices:** If appropriate, provide suggestions for substituting other drugs or devices for managing the disease or condition. For devices, if the relevant technical expertise exists among the guidelines group, consider designing new, minimally resource-intensive, and easy-to-fabricate substitutes that may be rapidly manufactured.
(3) **Shortage of qualified personnel:** If appropriate, provide methods for efficiently training other medical personnel to perform the necessary functions for the disease or condition. Specify what types of personnel and which types of pre-existing job functions may be most suitable for retraining.
(4) **An excessive number of patients needing care:** If appropriate, triage patients to minimize overall morbidity and mortality based on a risk assessment of the condition or disease and its relevant subcategories. Also, identify means that can be used to speed treatment for the disease or condition or to make treatment less resource-intensive. Avoid discussion about rationing care or withholding care from more vulnerable subpopulations as this is an ethically problematic topic for physicians.
(5) **A situation in which patients are under physical threat or cannot safely present to receive care:** If appropriate, describe alternative strategies for treating the disease or condition, including telemedicine, home visits, or public health initiatives.
(6) **A situation in which providers are under physical threat or cannot safely deliver care:** If appropriate, describe alternative strategies for treating the disease or condition, including telemedicine or public health initiatives. Referral to a provider in another location may be preferable. If traveling by providers is infeasible, consider developing methods for training local caregivers or family members.

Emergency provisions of general (non-emergency) clinical practice guidelines

While emergency guidance may be necessary, preparing this is likely to be resource-intensive and associated with delay. Development of even the most efficiently produced emergency guidance will be preceded by the recognition of the need for such, assembly of the guidelines group, a consensus estimate of how the emergency should alter care delivery, and writing and dissemination of the guidance document. To mitigate the need for a separate emergency guidance document, creators of general (non-emergency) clinical guidelines may include a section describing how the main guidelines may be adapted in an emergency situation. Since the particular type of emergency will not be known at the time, this section may stratify potential emergency strategies based on the risk level associated with the emergency. In other words, in a dire emergency in which it is extremely difficult to deliver care safely, only the care most crucial for patients may be provided. In a less extreme emergency, other types of care may be feasible.

In summary, emergency guidelines for clinical care of particular diseases or conditions may become necessary. When possible, advanced planning and anticipatory strategies can be developed to allow for a rapid response. If this occurs, abbreviated guidance may be promptly developed that is focused specifically on the exigencies of treating this disease or condition given the emergency-associated limitations. Such guidance may be most efficiently prepared by an existing guidelines group, assuming the group is large enough to be viewed as sufficiently diverse and unbiased. Vote tallies in favor of individual recommendations should be noted in the guidance document, with the views of sizable minorities also conveyed. Areas of uncertainty should be acknowledged. Specific types of emergencies may warrant additional types of specific medical guidance. In all circumstances, emergency guidance provided by physicians with expertise in a narrow field should avoid advising patients on managing the greater emergency.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Simera I, Moher D, Hirst A, Hoey J, Schulz KF, Altman DG (2010) Transparent and accurate reporting increases reliability,

utility, and impact of your research: reporting guidelines and the EQUATOR Network. BMC Med 26(8):24
2. Brouwers MC, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna SE, Littlejohns P, Makarski J, Zitzelsberger L, AGREE Next Steps Consortium (2010) AGREE II: advancing guideline development, reporting, and evaluation in health care. Prev Med 51(5):421–424
3. Chen Y, Yang K, Marušic A, Qaseem A, Meerpohl JJ, Flottorp S, Akl EA, Schünemann HJ, Chan ES, Falck-Ytter Y, Ahmed F, Barber S, Chen C, Zhang M, Xu B, Tian J, Song F, Shang H, Tang K, Wang Q, Norris SL, RIGHT (Reporting Items for Practice Guidelines in Healthcare) Working Group (2017) A reporting tool for practice guidelines in health care: the RIGHT statement. Ann Intern Med 166(2):128–132
4. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P et al (2008) GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ (Clin Res Ed) 336(7650):924–926
5. Chu MB, Slutsky JB, Dhandha MM, Beal BT, Armbrecht ES, Walker RJ, Varvares MA, Fosko SW (2014) Evaluation of the definitions of "high-risk" cutaneous squamous cell carcinoma using the American Joint Committee on Cancer Staging criteria and National Comprehensive Cancer Network guidelines. J Skin Cancer 2014:154340
6. Kouba DJ, LoPiccolo MC, Alam M, Bordeaux JS, Cohen B, Hanke CW, Jellinek N, Maibach HI, Tanner JW, Vashi N, Gross KG, Adamson T, Begolka WS, Moyano JV (2016) Guidelines for the use of local anesthesia in office-based dermatologic surgery. J Am Acad Dermatol 74(6):1201–1219
7. Alam M, Gladstone H, Kramer EM, Murphy JP Jr, Nouri K, Neuhaus IM, Spencer JM, Spenceri E, Van Dyke S, Ceilley RI, Lee KK, Menaker G, Monheit GD, Orentreich DS, Raab B, Smith KC, Solish NJ, American Society for Dermatologic Surgery (2008) ASDS guidelines of care: injectable fillers. Dermatol Surg 34(1):S115–S148
8. Munn Z, Qaseem A, American College of Physicians and the Joanna Briggs Institute (2018) Disappearance of the National Guideline Clearinghouse: a huge loss for evidence-based health care. Ann Intern Med 169(9):648–649
9. Owen JL, Kibbi N, Worley B, Kelm RC, Wang JV, Barker CA, Behshad R, Bichakjian CK, Bolotin D, Bordeaux JS, Bradshaw SH, Cartee TV, Chandra S, Cho NL, Choi JN, Council ML, Demirci H, Eisen DB, Esmaeli B, Golda N, Huang CC, Ibrahim SF, Jiang SB, Kim J, Kuzel TM, Lai SY, Lawrence N, Lee EH, Leitenberger JJ, Maher IA, Mann MW, Minkis K, Mittal BB, Nehal KS, Neuhaus IM, Ozog DM, Petersen B, Rotemberg V, Samant S, Samie FH, Servaes S, Shields CL, Shin TM, Sobanko JF, Somani AK, Stebbins WG, Thomas JR, Thomas VD, Tse DT, Waldman AH, Wong MK, Xu YG, Yu SS, Zeitouni NC, Ramsay T, Reynolds KA, Poon E, Alam M (2019) Sebaceous carcinoma: evidence-based clinical practice guidelines. Lancet Oncol 20(12):e699–e714
10. Worley B, Owen JL, Barker CA, Behshad R, Bichakjian CK, Bolotin D, Bordeaux JS, Bradshaw S, Cartee TV, Chandra S, Cho N, Choi J, Council ML, Eisen DB, Golda N, Huang CC, Ibrahim SF, Jiang SIB, Kim J, Lacutoure M, Lawrence N, Lee EH, Leitenberger JJ, Maher IA, Mann M, Minkis K, Mittal B, Nehal KS, Neuhaus I, Ozog DM, Petersen B, Samie F, Shin TM, Sobanko JF, Somani AK, Stebbins WG, Thomas JR, Thomas V, Tse D, Waldman A, Xu YG, Yu SS, Zeitouni NC, Ramsay T, Poon E, Alam M (2019) Evidence-based clinical practice guidelines for microcystic adnexal carcinoma: informed by a systematic review. JAMA Dermatol 155(9):1059–1068

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