Consensus Statement

A Multistep Approach to Improving Biopsy Site Identification in Dermatology

Physician, Staff, and Patient Roles Based on a Delphi Consensus

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IMPORTANCE Excisional skin cancer surgery is a common procedure, with no formal consensus for mitigating the risk of wrong-site cutaneous surgery.

OBJECTIVE To systematically consider the usefulness and feasibility of proposed methods for correct biopsy site identification in dermatology.

EVIDENCE REVIEW Survey study with a formal consensus process. Item development was via a literature review and expert interviews, followed by 2 stages of a Delphi process to develop consensus recommendations.

FINDINGS In total, 2323 articles were reviewed in the literature search, with data extraction from 14. Twenty-five experts underwent 30-minute structured interviews, which were transcribed and coded. The resulting survey was composed of 42 proposed interventions by multiple stakeholders (biopsying physicians, operating physicians, nurses, ancillary staff, patients, caregivers, and family members) at 3 time points (day of biopsy, delay and consultation period, and day of definitive surgery). Two rounds of a Delphi process with 59 experts (25 academic and 34 private practice) scored the survey. Strong consensus was obtained on 14 behaviors, and moderate consensus was obtained on 21 other behaviors. In addition, a 2-state simultaneous algorithm was developed to model surgeon behavior on the day of definitive surgery based on surgeon and patient perceptions.

CONCLUSIONS AND RELEVANCE When definitive surgery is performed after the initial biopsy and by a different surgeon, procedures can be implemented at several time points to increase the likelihood of correct site identification. The specific circumstances of a case suggest which methods may be most appropriate and feasible, and some may be implemented. The risk of wrong-site cutaneous surgery can be reduced but not eliminated.

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Excisional surgery for skin cancer is one of the most frequently performed surgical procedures in the United States. Specifically, nonmelanoma skin cancers are the most common malignancies in the Medicare population.[1] While definitive treatment of these tumors is usually preceded by a diagnostic skin biopsy, when biopsy is performed by one physician and definitive treatment is delivered some time later by another physician, there is a risk that the biopsy site may not be correctly identified. This so-called wrong-site surgery in dermatology is a problem that has recently been extensively described.[2-15]

In one study[12] of 333 consecutive patients receiving Mohs surgery, 9% were unable to identify their biopsy sites. Of 325 dermatologic surgeons questioned in another study,[4] a total of 71% reported that at least 5% of their patients undergoing definitive removal of skin cancer could not identify their prior biopsy site. While patients are often confused about their biopsy site, physicians can also exhibit suboptimal behaviors such as inadequate documentation or imprecise anatomic specification of a biopsy site at a busy clinic.[4] That this lack of clarity can result in wrong-site surgery was confirmed by a survey study[3] of 150 dermatologists who self-reported medical errors: wrong-site surgery accounted for 19% of the "most serious errors," making it the most common error of this type. Associated medicolegal risk has been documented, with wrong-site surgery tied with functional outcome as the most frequent cause of malpractice lawsuits against US Mohs surgeons.[11] Similar data have emerged from insurance company databases: of 107 wrong-site cases among 27 370 adverse events self-reported by physicians to an insurer in Colorado, 1.9% pertained to procedural dermatology and 3.7% to nonprocedural dermatology.[13] As Stahel and colleagues note, this suggests "a persisting high frequency of surgical 'never events.'"[13(p978)] Likewise, in England between 2003 and 2008, multiple cases of successful malpractice litigation against the National Health Service trusts for dermatologic wrong-site surgery occurred.[14]

Overall, wrong-site surgery is more of a risk in dermatology than in some other fields because of anatomic and technical difficulties inherent in identifying skin biopsy sites.[2-15] These may include abundant other benign, cancerous, and precancerous lesions in the biopsy field; other biopsy sites in the immediate vicinity; the proximal presence of old scars; a delay of weeks to months between the biopsy and definitive surgery, with the biopsy site healing during this period; location of the biopsy site in a place not visible to the patient; and lack of standardization in how site information is transmitted from the biopsying physician to the operating surgeon. Finally, because a small proportion of tumors can be cleared during post-biopsy healing even though the biopsy report indicates tumor at the margin, sometimes so-called wrong-site surgery in dermatology is actually performed at the right site, which happens not to contain any residual tumor.[10]

Solutions proposed to facilitate and confirm correct site identification in dermatology have commonly included photography at the time of biopsy,[8,9] with the resulting image recorded in the medical record or the patient's cell phone,[2,5] as well as more esoteric methods such as site marking with UV fluorescent tattoos.[15] Other techniques that have been used include marking of the site on preprinted standardized diagrams, hand-drawn sketches, precise specification using detailed terminology for anatomic subunits, and orientation relative to 2 or more landmarks using ruler measurements.[4,5] It has also been demonstrated that implementation of a rigorous protocol that includes multiple safety measures can reduce the risk of wrong-site surgery.[6]

At present, no formal consensus exists regarding the specific methods that may be most valuable for mitigating the risk of wrong-site surgery in dermatology. While various techniques have been proposed in the literature and implemented by individual surgeons, these have not been examined collectively and assessed by other experts for relative usefulness. The objectives of this study were to systematically consider the usefulness and feasibility of current and proposed methods for correct biopsy site identification in dermatology.

Methods

Study Design

This study was approved by the Northwestern University Institutional Review Board. Oral informed consent was obtained from interview participants, and typed confirmation of consent was obtained from e-mail–based survey respondents. This was a survey study of a stratified sample of experts in dermatologic surgery and surgical patients. Survey development via a literature review and expert interviews was followed by 2 stages of a Delphi process with an additional pool of experts to develop consensus recommendations.

Initial Literature Search

MEDLINE, Embase, CINAHL, and Cochrane Reviews were searched from 2000 to 2012 inclusive with the search algorithm (*surgery* OR *Mohs* OR *excision*) AND (*wrong site* OR *site identification* OR *site misidentification*). Articles were limited to those in the top 10 dermatology journals by 2011 impact factor, as well as dermatology journals with the word *surgery* in their titles (*Dermatologic Surgery* and *Seminars in Cutaneous Medicine and Surgery*). Manual review of abstracts was performed to extract relevant articles. Full-text review of articles was completed by the steering committee (M.A., A.L., and S.Y.) to develop a list of questions for semistructured interviews.

Expert Interviews

Semi-structured, prescheduled telephone interviews of 30 to 45 minutes were conducted with a purposive sample of national experts in cutaneous surgery who were also fellows of the American College of Mohs Surgery, as well as additional experts in medical dermatology or dermatopathology. The interview questions were as follows: (1a) "Have you ever experienced a case of wrong-site surgery when you were the surgeon? If so, please describe the circumstances of the de-identified case(s)." (1b) "How many cases of wrong-site surgery have you experienced with your own patients during the course of your career, and how long have you been in practice?" (2) "In general, what factors do you think can lead to wrong-site surgery in dermatology?" (3) "Are there particular strategies that you have implemented in your practice to mitigate the risk of wrong-site surgery? If so, can you describe these?" (4) "Are there other strategies that you think, theoretically, may be helpful in reducing the risk of wrong-site surgery in dermatology?" Interviews were electronically recorded, with permission, and then transcribed. The responses to question 1a were not recorded because that question was included solely for the purpose of initiating the conversation and helping the interviewee begin to think about the issue in a directed manner.

Patient Interviews

Semi-structured, prescheduled face-to-face and phone interviews of 30 to 45 minutes were conducted with a sample of patients who had previously received care for skin cancer via some excisional modality at the Department of Dermatology, Feinberg School of Medicine, Northwestern University. The interview questions were as follows: (1) "Did you or the doctor have difficulty finding where your biopsy was when you returned for surgery?" (2) "If so, what did you do?" (3) "If not, given that skin biopsies can be hard to find, what do you think can be done to improve this problem?" This was a purposive, nonconsecutive sample of patients designed to provide a demographic and treatment type cross-section. Young (18-35 years), middle-aged (36-65 years), and older (≥66 years) patients were included, and each category contained men and women. Most patients had received standard excision or Mohs surgery for nonmelanoma skin cancers on the head or neck, with 2 having undergone such treatment for tumors of the upper chest or arms. To minimize recall bias and information loss, all interviewed patients had received an excisional procedure of the type specified within the past 6 months.

Survey Development

A survey instrument was developed to assess the relative importance of different potential methods for avoiding wrong-site dermatologic surgery. The survey items included all methods for risk reduction proposed during the expert interviews, regardless of expected relative importance or feasibility. The major categories were as follows: (1) practices by which the biopsying physician can help others identify the biopsy site, (2) practices to identify the biopsy site during the delay period (between biopsy acquisition and the definitive excisional procedure) and the consultation (for the reexcision or Mohs procedure), and (3) practices to identify the biopsy site on the day of definitive surgery. For each of these major categories, possible actions were subdivided by the precise timing and by the class of individual (eg, surgeon, patient, or nurse) undertaking this action. Respondents were asked to identify the steps that could and should be taken (ie, were feasible and would be useful) to improve biopsy site identification at each of the several time points and by each of the classes of personnel involved; there were no predesignated minimum or maximum numbers of item selections per respondent.

A second part of the survey asked respondents to identify the steps that a surgeon should take on the day of the Mohs procedure based on the surgeon's and the patient's level of certainty regarding the biopsy site location. Unlike the other survey items, these items were mutually exclusive (eg, a surgeon can proceed with surgery or send a patient back to the referring dermatologist but not both simultaneously). Before survey use, a convenience sample of 3 Mohs surgeons (not included in the data analysis) was administered the survey for testing of face validity and comprehensibility, as well as technical robustness of the software.

Selection of Survey Respondents

Survey respondents were randomly selected from stratified subgroups of the membership of the American College of Mohs Surgery to ensure that approximately 90% of respondents had more than 5 years of postfellowship training in Mohs surgery and that approximately 60% of respondents were from private practice (numbers are not exact because of rounding and dropouts after consent). Given that primarily descriptive data were elicited, the sample size was arbitrarily set at 5% of the population size.

Survey Delivery

Survey execution was completed with survey software (Qualtrics; qualtrics.com). Before survey delivery, identified potential respondents were sent an e-mail signed by the principal investigator (M.A.) explaining the study and asking them to participate. An affirmative response was construed as informed consent, and a further e-mail was sent to the respondent conveying thanks and including a link to an online survey. Back-end software permitted tracking of who had completed the survey. If respondents did not complete the initial survey within 7 days, they were sent a reminder and then a second reminder, if necessary, 7 days after that. If the survey was not completed within 30 days of the final reminder, the respondent was considered a dropout.

Delphi Process

A Delphi process, originally developed by the US military, is a structured method for arriving at consensus in which a facilitator assembles a group of experts who usually do not meet face-to-face and provides them with questionnaires, surveys, or other materials that require decision making. The facilitator then collates and returns the results of the group's process to each expert, each of whom then uses this to again make decisions, and this process is repeated until consensus is achieved.

In this study, 2 iterations of a Delphi process were performed.[16] After the first round, responses were downloaded and collated into tables. Participant responses were grouped according to level of consensus. Strong consensus was ascribed to any item receiving more than 80% support, moderate consensus included 25% to 80%, and weak consensus was less than 25%. Strong consensus was deemed sufficient to include an item in the final recommendations and weak consensus to omit an item. Items in the moderate consensus category were retested in a second iteration of Delphi with the same sample of respondents. Items receiving more than 50% support in this second round were included in the final recommendations.

In assessing the results of the second part of the survey, which focused on appropriate actions based on surgeon and patient certainty, responses were not grouped according to level of consensus. Instead, a plurality was sufficient for identification as a recommended step. This difference in analysis emanated from the fact that responses in this section were mutually exclusive; therefore, the most selected response per category was usually less than 50%.

Statistical Analysis

Based on survey responses, consensus levels were established in accord with guidelines explained above. Descriptive tables and a decision tree were prepared.

Results

Regarding the initial literature search, the primary search algorithm yielded 2323 articles. Restriction to the journals of interest reduced this to 31, of which 14 were manually selected.

Table 1. Practices by Which the Biopsying Physician Can Help Others Identify the Biopsy Site

Item	Practice	Initial Survey % Consensus	Initial Survey Level of Consensus	Second Survey % Consensus	Final Recommendations
Measures biopsying physicians may take to help other clinicians identify a biopsy site	Take a high-quality photograph with ≥1 visible anatomic landmark	91	Strong	NA	Strong consensus: Take a high-quality photograph with ≥1 visible anatomic landmarks
	Measure distances (in millimeters) from 2 different landmarks using correct terminology	62	Moderate	51	Moderate consensus: Take 2 photographs, one close-up and the other from far away with ≥1 visible anatomic landmarks
	Take 2 photographs, one close-up and the other from far away, with ≥1 visible anatomic landmark	44	Moderate	94	Mark biopsy location on a large pathology diagram with anatomic labels (may include grids)
	Mark biopsy location on a large pathology diagram with anatomic labels (may include grids)	42	Moderate	68	Measure distances (millimeters) from 2 different landmarks using correct terminology
	Leave a stitch in biopsy location to mark the spot	11	Weak	NA	
	Use blade coated with fluorescent beads during biopsy so that the biopsy site will be visible under UV light	9	Weak	NA	
	Do not biopsy very small lesions so that they are easier to see and identify	4	Weak	NA	
Measures biopsying physicians may take to help patients identify their biopsy sites	Use the patient's cell phone to take and store a picture of the biopsy site	69	Moderate	74	Moderate consensus: Use the patient's cell phone to take and store a picture of the biopsy site
	Give the patient a copy of the pathology diagram and relevant measurements	49	Moderate	55	Give the patient a copy of the pathology diagram and relevant measurements
	Talk extensively with patients and family members, letting them know they are responsible for the location of the biopsy	47	Moderate	47	
	Do nothing	4	Weak	NA	

Abbreviation: NA, not applicable.

Of 25 dermatologists invited for telephone interviews, 22 consented and completed such interviews. Among 22 dermatologist interviewees, all but one reported prior cases of wrong-site identification, with these occurring at a mean rate of once per 4 years of clinical practice.

Of 11 patients invited for face-to-face or telephone interviews, 10 consented and completed such interviews. Among these patients, one suggested that he was unsure of the biopsy site, but he knew the general area and "knew it when the doctor found it." The patients had few ideas for better methods of site identification, but one suggested "keeping good records."

Regarding respondent selection for the survey, 78 were invited to participate, and 56 consented. Of these, 2 dropped out (did not complete either iteration of the survey). Among the remainder, 45 completed the first round of the Delphi process, and 47 completed the second round. The resulting survey was composed of 42 proposed interventions by multiple stakeholders (biopsying physicians, operating physicians, nurses, ancillary staff, patients, caregivers, and family members) at 3 time points (day of biopsy, delay and consultation period, and day of definitive surgery).

Fifty-nine physicians (44 male and 15 female) were surveyed. The mean experience of the physicians was 11.2 years, the median was 9 years, the mode was 6 years, and the range was less than 1 year to 34 years. In total, 25 physicians were in academic institutions, and 34 were in private practice. Strong consensus was obtained on 14 behaviors, and moderate consensus was obtained on 21 other behaviors. Furthermore, a 2-state simultaneous algorithm was developed to model surgeon behavior on the day of definitive surgery based on surgeon and patient perceptions.

Additional study results are listed in **Tables 1**, **2**, and **3**. Table 1 includes first-round and second-round Delphi process results for recommended biopsy site identification measures for the day of biopsy, Table 2 for the delay period and consultation, and Table 3 for the day of definitive surgery. The **Figure** shows recommendations based on surgeon and patient surety regarding the biopsy site on the day of definitive surgery.

Discussion

This study extends the results of prior studies[2-15] documenting the high risk of biopsy site misidentification during cutaneous surgery by systematically assessing the importance and feasibility of a wide range of possible preventive interventions associated with various personnel at different time points. The outcomes of this study include that, at the time of the initial biopsy, the best way to document the site is with a photograph, as well as, if possible, multiple photographs in association with landmarks and diagrams. Less consensus exists about having the patient store some of this information, as in a photograph on his or her cell phone or on a paper diagram. There is a high level of consensus that between the time of the biopsy and the definitive surgery the operating surgeon should ensure that his or her office has received all necessary information pertaining to site identification from the referring physicians. There is less consensus regarding the need for a face-to-face consultation with the patient during this period, but if such a consultation occurs, there is consensus that it should include a physical examination, and the patient and surgeon should work

Table 2. Practices to Identify the Biopsy Site During the Delay Period and Consultation

Item	Practice	Initial Survey % Consensus	Initial Survey Level of Consensus	Second Survey % Consensus	Final Recommendations
Measures institutions may take to confirm biopsy site location during the delay period	Confirm with referring dermatologist that the correct documentation has been received and can be used to identify the biopsy site	96	Strong	NA	Strong consensus: Confirm with referring dermatologist that the correct documentation has been received and can be used to identify the biopsy site
	Schedule a consultation within 1-2 wk	47	Moderate	51	Moderate consensus: Schedule a consultation within 1-2 wk
	Call patients a few days before consultation date to check they know where the biopsy site is	29	Moderate	40	
	Get patients in for immediate biopsy if they do not know where the site is	11	Weak	NA	
	Do nothing	4	Weak	NA	
Measures by which surgeons can collaborate with the patient to identify the biopsy site during consultation	Give patient a mirror and ask him or her to point to the site	96	Strong	NA	Strong consensus: Give patient a mirror and ask him or her to point to the site
	Check the available documentation	93	Strong	NA	Check the available documentation
	Ask patient to reconfirm the site that the surgeon has marked after consultation with the patient	91	Strong	NA	Ask patient to reconfirm the site that the surgeon has marked after consultation with the patient
	Ask patient where he or she thinks the biopsy site is	80	Moderate	87	Moderate consensus: Ask patient where he or she thinks the biopsy site is
	Ask patient to confirm whether the site is correct verbally	78	Moderate	89	Ask patient to confirm whether the site is correct verbally
	Ask patient's family members to help identify the biopsy site	71	Moderate	72	Ask patient's family members to help identify the biopsy site
	Ask patient to point to site with cotton tip	61	Moderate	72	Ask patient to point to site with cotton tip
	Ask patient to mark the biopsy site with a surgical marker or inked fingertip	36	Moderate	49	
	Ask patient to confirm whether the site is correct in writing	11	Weak	NA	
	Do nothing	2	Weak	NA	
Procedures the surgeon may perform to identify the biopsy site during consultation	Do a physical examination of the area	96	Strong	NA	Strong consensus: Do a physical examination of the area
	Place ink on the site the physician suspects to be a biopsy site. Ask the patient to touch with a finger where he or she thinks the site is. Check for ink on the finger.	58	Moderate	60	Moderate consensus: Place ink on the site the physician suspects to be a biopsy site. Ask the patient to touch with a finger where he or she thinks the site is. Check for ink on the finger.
	Rub alcohol on the suspected biopsy site	58	Moderate	70	Rub alcohol on the suspected biopsy site
	Perform frozen section biopsies to confirm presence of cancer	40	Moderate	40	
	Rub skin to reveal suspected biopsy site	36	Moderate	53	Rub skin to reveal suspected biopsy site
	Look at site with dermatoscope	20	Weak	NA	
	Inject lidocaine into the suspected biopsy site to see if it puckers in a way that identifies it as the biopsy site	11	Weak	NA	
Practices by which the surgeon may further document and/or identify the biopsy site during consultation	Take a photograph of the marked biopsy site for medical records	93	Strong	NA	Strong consensus: Take a photograph of the marked biopsy site for medical records
	Circle or otherwise mark the biopsy site	82	Strong	NA	Circle or otherwise mark the biopsy site
	Get consensus on biopsy site from patient and nurse	58	Moderate	51	Moderate consensus: Get consensus on biopsy site from patient and nurse
	Have the patient circle or otherwise mark the biopsy site	44	Moderate	72	Have the patient circle or otherwise mark the biopsy site
	Have the nurse circle or otherwise mark the biopsy site	16	Weak	NA	

(continued)

collaboratively to mark, identify, and photograph the site. If there is uncertainty about site identification at the consultation, there is strong consensus that the surgeon should recontact the referring physician for additional information. On the day of definitive surgery, there is strong consensus that an elaborate series of steps should be implemented to confirm the biopsy site, with these including the surgeon identifying the site based on documentation, asking the patient for verbal confirmation, requesting the

Table 2. Practices to Identify the Biopsy Site During the Delay Period and Consultation (continued)

Item	Practice	Initial Survey % Consensus	Initial Survey Level of Consensus	Second Survey % Consensus	Final Recommendations
Steps the surgeon may take when unsure of the biopsy site after consultation	Ask the referring dermatologist for more documentation or clarification	93	Strong	NA	Strong consensus: Ask the referring dermatologist for more documentation or clarification
	Send patient back to the referring dermatologist to get the site marked by the dermatologist	71	Moderate	83	Moderate consensus: Send patient back to the referring dermatologist to get the site marked by the dermatologist
	Wait 3 mo for a repeat visit	33	Moderate	32	
	Wait 7 mo for a repeat visit	11	Weak	NA	

Abbreviation: NA, not applicable.

Table 3. Potential Practices to Identify the Biopsy Site on the Day of Surgery

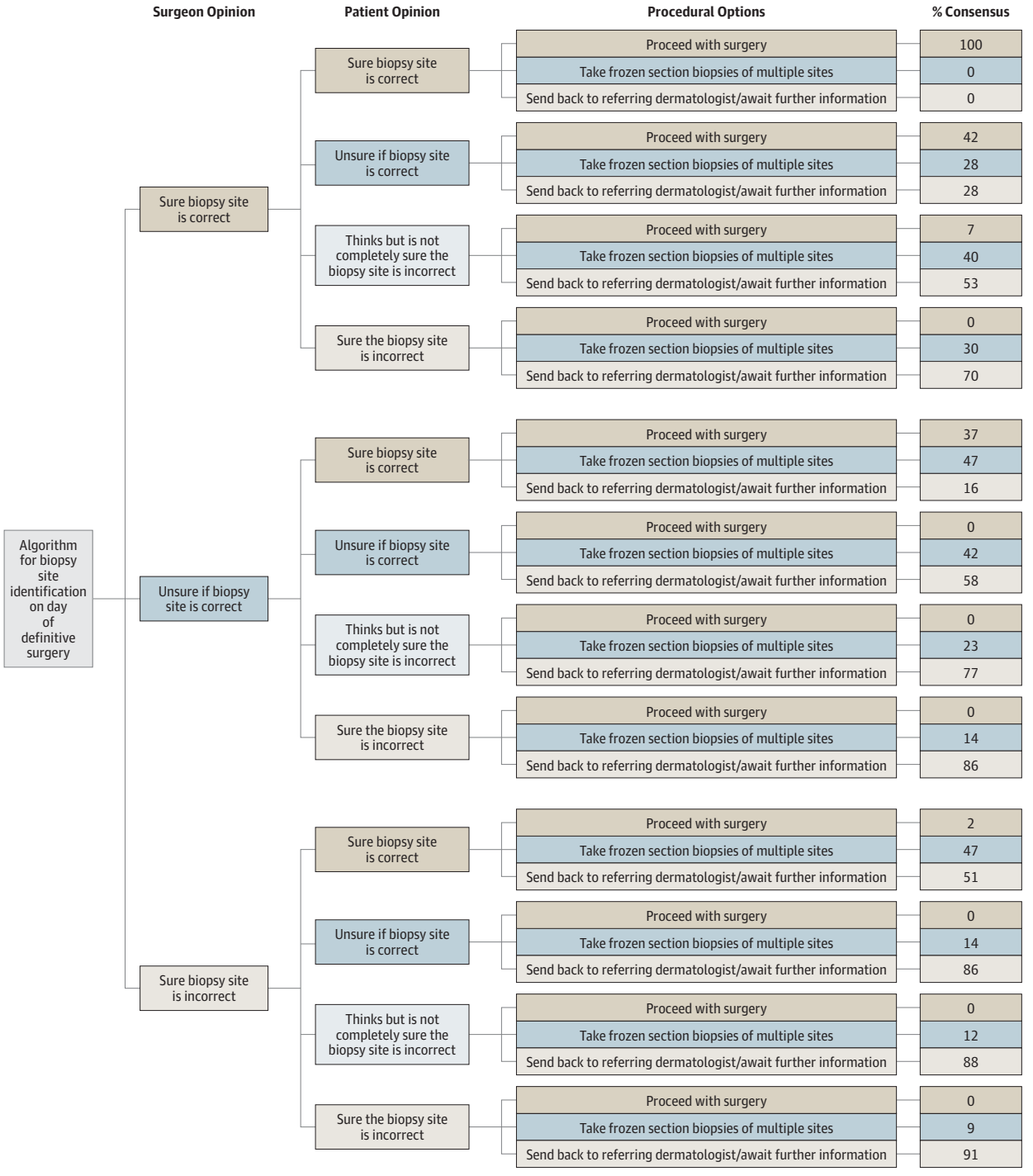
Item	Practice	Initial Survey % Consensus	Initial Survey Level of Consensus	Second Survey % Consensus	Final Recommendations
Practices by which the surgeon can identify the biopsy site on the day of surgery, without consulting other medical personnel	Look for site based on documentation	96	Strong	NA	Strong consensus: Look for site based on documentation
	Ask patient for verbal confirmation of site	93	Strong	NA	Ask patient for verbal confirmation of site
	Ask patient to point to site	82	Strong	NA	Ask patient to point to site
	Recircle or mark the biopsy site	82	Strong	NA	Recircle or mark the biopsy site
	Take another photograph of the site before surgery	73	Moderate	68	Moderate consensus: Take another photograph of the site before surgery
	Get patient to sign consent form and initial agreement of biopsy site location	58	Moderate	64	Get patient to sign consent form and initial agreement of biopsy site location
	Check debulked pathology to confirm whether site is correct	31	Moderate	40	
	Do multiple frozen section biopsies	29	Moderate	38	
	Multiple biopsies: photograph the combination of the number and the biopsy site	24	Weak	NA	
	Multiple biopsies: write a number beside each biopsy site on the skin (1, 2, 3, etc)	16	Weak	NA	
	Look at site with a dermatoscope	16	Weak	NA	
	Multiple biopsies: perform surgery on several sites and take photographs of the others	9	Weak	NA	
Practices by which nurses and other medical providers can identify the biopsy site on the day of surgery	Confirm procedure with patient	87	Strong	NA	Strong consensus: Confirm procedure with patient
	Go over the biopsy site location with the patient without marking it	80	Moderate	72	Moderate consensus: Go over the biopsy site location with the patient without marking it
	Confirm date of birth with patient	80	Moderate	81	Confirm date of birth with patient
	Do the Universal Protocol time-out: check for correct patient name, the correct procedure, and the correct surgical site	76	Moderate	87	Do the Universal Protocol time-out: check for correct patient name, the correct procedure, and the correct surgical site

Abbreviation: NA, not applicable.

patient to point to the site, and then marking the site based on consensus. Significantly, this series of steps is iterative, with the patient and surgeon confirming and then reconfirming the site to avoid miscommunication.

If on the day of definitive surgery the surgeon and patient agree on the biopsy site, all respondents recommend proceeding with surgery. If the surgeon and patient are not sure if the biopsy site is correct or sure that the biopsy site is incorrect, then the most common respondent recommendation is to send the patient back to the referring physician and to await more information about the biopsy site. One exception to this is when the surgeon is unsure that the biopsy site is correct but the patient is sure, in which case the most common recommendation is to perform a frozen section biopsy, if feasible, of the purported site, possibly to avoid offending the patient. Another exception is when the surgeon is sure the site is correct but the patient is unsure, in which case the most common recommendation is to proceed with surgery, presumably because some patients may be elderly, might be cognitively or visually impaired, or have simply never paid attention to or forgotten the location of the biopsy.

Figure. Day of Definitive Surgery Decision Tree for Biopsy Site Identification



This decision tree conveys recommendations based on surgeon and patient surety regarding the biopsy site on the day of definitive surgery.

The results of this study should not be interpreted as prescriptive or exclusionary. A range of recommendations, with strong and moderate consensus, are presented to reduce the risk of wrong-site surgery, but there is no implication that the typical practitioner has to implement all or even most of these. Rather, some of these may be more appropriate or helpful in particular practices, and individual surgeons can also select those that are most appropriate in specific cases. Similarly, the list of interventions assessed in this study is not exhaustive, and there may be other methods that are as helpful. The march of technology may soon create additional novel methods.

It is also important to consider that, given the thousands of procedures performed annually by individual dermatologic surgeons,

and the millions performed nationally overall, the incidence of wrong-site surgery in dermatology likely cannot be reduced to zero. Moreover, wrong-site skin surgery, which may leave a barely perceptible and asymptomatic 1-cm linear scar on the back, for example, is qualitatively different from some other types of wrong-site surgery (eg, removing the wrong lung). The low morbidity and essentially zero mortality associated with wrong-site skin surgery suggests that it is a societal decision as to how much effort and expense should be devoted to confirming and reconfirming site identification. For instance, in a medical environment of limited resources, it may be unreasonable to devote more time and resources to site identification than to the surgery itself. It is beyond the scope of this article to attempt to delineate the bounds of this trade-off.

Although this study specifically examined methods for identification of biopsy sites before definitive surgery, the same recommendations may be applicable when the definitive procedure is not surgical in nature. For instance, if a low-risk tumor is to be treated with electrodessication and curettage or with topical chemotherapy, correct biopsy site identification is still important.

One potential benefit of the recommendations in this study is that they may defuse uncomfortable confrontations between patients and surgeons. Skin sites are visible and seemingly trivial to identify, and it is common for patients and surgeons to disagree on site identification. Informing the patient of the need for adherence to a set identification protocol can help the patient reinterpret an incipient interpersonal conflict as a dispassionate occasion for rule following. This can be especially beneficial with patients who are sure of the biopsy site but are at odds with the objective evidence—so-called adamant but wrong patients.

This study has limitations. First, as noted above, the list of interventions assessed via the Delphi process may have been incomplete or inappropriate. However, this potential problem was addressed by preceding the survey instrument development with a comprehensive literature review, as well as semistructured interviews among a large sample of highly experienced surgeons, to elicit the longest possible list of current and hypothetical interventions. Second, the study surveyed a sample of dermatologic surgeons and not all surgeons. That being said, efforts were made to include a mix of academic and private practice surgeons and to focus on more experienced surgeons, without excluding junior surgeons completely. The overall response rate was high, with more than 65% of invitees completing the first round of the Delphi process, as is desirable in mail-in and e-mail surveys[17]; therefore, selection bias was likely manageable. Third, the recommendations in this study were not tested for effectiveness. A future study may assess whether routine implementation of some of the recommended guidelines may lower the rates of site misidentification. In all likelihood, this is a reasonable expectation because many of the recommendations culled from the expert interviews were practice modifications that the same experts had implemented in response to prior site identification problems.

Conclusions

This study provides recommendations that can be used to minimize the problem of wrong-site surgery in dermatology. Specifically, when definitive surgery is performed some time after the initial biopsy and by a different surgeon, procedures can be implemented by various medical and nonmedical personnel at several time points during the handoff period to increase the likelihood of correct site identification. No method is perfect, and the use of all the proposed methods concurrently is not necessary or appropriate. This study offers a range of options, ie, a menu of choices, from which surgeons may select those most suitable to their circumstances. The specific recommendations were generated and vetted by their peers and so are likely relevant. Future research will assess the extent of the effectiveness of these approaches. While the problem of wrong-site skin surgery can hopefully be reduced, it can never be eliminated entirely even with the most careful implementation of safety measures.

ARTICLE INFORMATION

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Invited Commentary

PRACTICE GAPS

Wrong-Site Surgery in Dermatology

Sherrif F. Ibrahim, MD, PhD

Dermatologic surgeons are faced with a unique challenge that goes beyond the decision of "right" or "left" when identifying the correct anatomical site for surgery. In many instances, we are expected to identify a 3- or 4-mm biopsy site on a background of severely actinically damaged skin, confounded by scale, erythema, or scars from previous procedures, and armed only with a biopsy report that says "nose" or "cheek."

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For reasons detailed in the article by Alam and colleagues[1] in this issue of *JAMA Dermatology*, uncertainty on the part of the surgeon or incongruity between the patient and the surgeon is an inevitable occurrence. The study provides an excellent decision tree to help dermatologic surgeons navigate these situations in an effort to help minimize wrong-site surgery in dermatology.

In my own practice, whether I can see a tumor from across the room or need a dermatoscope to identify it, my first action is to hand a mirror to every patient who is seen

Box. **Procedures to Minimize Wrong-Site Surgery**

At the Time of Biopsy

- Photograph all lesions to be biopsied: mark lesion before photography, ensure image is in focus, include anatomical landmarks.
- Generate a body map: document precise distances to ≥2 distinct landmarks (eg, tragus, lateral canthus, oral commissure).

At the Time of Definitive Surgery

- Invoke a standardized time-out procedure for all patients: hand the patient a mirror and have him or her point to the biopsy site, delineate the area with a surgical marking pen, reconfirm the site with the patient.
- In the event of uncertainty: remove crust and scale, clean the area with alcohol, visually examine and palpate the area under bright illumination, consider a small biopsy or send curettings for frozen section analysis, contact the referring office for additional information, watchful waiting is always an option.