Reconstruction after Skin Cancer Resection Clinical Practice Guideline

Introduction and Background

According to the American Cancer Society, skin cancer is the most common type of human cancer with one in five Americans diagnosed by 70 years old (American Cancer Society, 2018). Between 1994 and 2014, the diagnosis and treatment of nonmelanoma skin cancers in the United States increased 77% (Mohan, 2014). Surgical resection and reconstruction is frequently recommended as part of the therapeutic approach for the treatment for skin cancer depending on the interpretation of clinical information including appearance and morphology, anatomic location, genetic risk factors, and patient history (AAD, 2018). In smaller and more straightforward cases of skin cancer, excision may be performed along with direct closure, and is often done without the need for more advanced reconstructive techniques. In more extensive cases of skin cancer or in cosmetically sensitive areas, resection may be performed with Mohs surgery or utilizing frozen section analysis of margins. Resultant defects after skin cancer resection may need to be closed by reconstructive methods such as tissue rearrangement, grafts, or flaps. In some situations, the reconstruction may be performed by the same individual doing the resection, while in other cases the reconstructing surgeon may be a different person.

The aim of this guideline was to focus on the process of surgical reconstruction after skin cancer resection.

Scope and Intended Users

In order to avoid confusion and arrive at a consensus direction, the scope of the guideline begins with the process of reconstruction, assuming that the skin cancer is resected and the margins are clear of tumor. As the guideline is intended to inform the practice of reconstruction, issues relating to the resection (i.e. methods, margins, etc) are outside the scope of this effort, and may be addressed by other publications about skin cancer treatment.

This guideline provides evidence-based recommendations for surgical reconstruction post resection of skin cancer once clear margins have been achieved. The work group did not specify who should perform the reconstruction surgery but assumes that the surgeon planning this procedure will be capable and qualified.

This evidence-based guideline is supported by a systematic review of evidence and specifically addresses the surgical timing, use of antibiotics, pain control, and management of anticoagulants for patients undergoing reconstruction after a diagnosis of skin cancer. This guideline is intended to be used by the multidisciplinary team that provides care for patients with skin cancer that require reconstruction. Health care practitioners should evaluate each case individually, considering these evidenced-based recommendations and patient values and preferences, to determine the optimal treatment plan for each patient. This guideline is intended to serve as a resource for health care practitioners and developers of clinical practice guidelines and recommendations.

Disclaimer

Evidence-based guidelines are strategies for patient management, developed to assist physicians in clinical decision-making. This guideline was developed through a comprehensive review of the scientific
literature and consideration of relevant clinical experience, and describes a range of generally acceptable approaches to diagnosis, management, or prevention of specific diseases or conditions. This guideline attempts to define principles of practice that should generally meet the needs of most patients in most circumstances.

However, this guideline should not be construed as a rule, nor should it be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the appropriate results. It is anticipated that it will be necessary to approach some patients’ needs in different ways. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of all the circumstances presented by the patient, the available diagnostic and treatment options, and available resources.

This guideline is not intended to define or serve as the standard of medical care. Standards of medical care are determined on the basis of all the facts or circumstances involved in an individual case and are subject to change as scientific knowledge and technology advance and as practice patterns evolve. This guideline reflects the state of current knowledge at the time of publication. Given the inevitable changes in the state of scientific information and technology, this guideline will be considered relevant for a period of 5 years after publication, in accordance with the inclusion criteria of the ECRI Guidelines Trust.

Definitions

Reconstruction is defined as cutaneous closure that requires a flap or graft. Second intention healing, simple, and complex closures (where no flaps or grafts are needed or where muscle or bone are involved) are outside the scope of this guideline.

METHODS

Work Group Selection Process

The guideline is a joint effort of the American Society of Plastic Surgeons (ASPS) and the American Society for Dermatologic Surgery (ASDS). ASPS members were invited to apply to the Work Group via society email. All applicants were required to submit an online conflict of interest disclosure form for membership consideration. Per ASPS policy, co-chairs must be free of any conflicts of interest for the duration of the project. Members of the ASPS Quality and Performance Measurement Committee reviewed and selected ASPS Work Group members to ensure a diverse representation of United States regions, practice type (large multispecialty group practice, small group practice, solo practice, and academic practice), and clinical, research, and evidence-based medicine experiences and expertise. Six stakeholder organizations, including the American Academy of Dermatology, American Academy of Facial Plastic and Reconstructive Surgery, American Academy of Otolaryngology-Head and Neck Surgery, American College of Mohs Surgery, American Society for Mohs Surgery, and the American Society of Ophthalmic Plastic and Reconstructive Surgery were also invited to participate in the guideline development process by nominating 1-2 members from their respective organizations to serve on the Work Group. Four patient representatives were included on the panel to provide insight related to patient values and preferences, and an ASPS quality department staff member was assigned to manage the project and provide expertise in clinical practice guideline development methodology.

Clinical Question Development
Work Group members used a consensus-based approach to select the clinical questions to be addressed in this evidence-based guideline. Work Group members used a blinded process to submit clinical questions via individual email to the ASPS project manager, who compiled and dispersed the clinical questions for consideration and discussion at the introductory meeting. The clinical question topics were discussed in detail at the introductory meeting with diverse representation from plastic surgery, dermatology, patients, and other specialties.

A total of 67 clinical questions were reviewed by the Work Group. Clinical questions were developed and selected based on the scope and patient-important outcomes determined by the Work Group. The patient population for the guideline is adult patients who are being seen at the time of reconstruction, under the assumption that margins are clear. Patient-related outcomes of interest include infection rate, other surgical complications (e.g., hematoma, etc.), adverse events, risk of stroke or pulmonary embolism (specific to anticoagulation), pain, healing, and patient satisfaction. Final voting was completed by the Work Group via email following the meeting, which resulted in the following 7 clinical questions:

1) In adult patients undergoing reconstruction after skin cancer resection, does remaining on anticoagulants during surgery compared to stopping or bridging anticoagulants prior to surgery differ in the risks of stroke or pulmonary embolism, or surgical complications?

2) In adult patients undergoing reconstruction after skin cancer resection, does same day reconstruction compared to delayed reconstruction differ in infection rates, other complications, and patient satisfaction?

3) In adult patients undergoing reconstruction after skin cancer resection, does an administered perioperative systemic antibiotic regimen compared to none differ in infection rates, other complications, and patient satisfaction?

4) In adult patients undergoing reconstruction after skin cancer resection, does narcotics versus OTC medication use differ in measurement of pain and/or satisfaction with pain management?

5) In adult patients undergoing reconstruction after skin cancer resection, are there circumstances (anatomic location, defect size and/or depth, patient factors) when reconstruction should be performed the same day or delayed to affect aesthetic or functional outcomes, surgical complications, and patient satisfaction?

6) In adult patients undergoing delayed reconstruction after skin cancer resection, does a systemic antibiotic regimen administered during the interim between resection and reconstruction compared to none differ in infection rates, other complications, and patient satisfaction?

7) In adult patients undergoing reconstruction after skin cancer resection, does betadine versus chlorhexidine versus chloroxylenol versus ivory soap differ in infection rates or adverse events?

Literature Search

Multiple literature searches were performed between 2017 and 2018 aimed to identify relevant studies published from 1990 to the date each search was conducted. The initial search dates were January 1,
1990 through March 12, 2018, with a subsequent update search on May 8, 2018. Electronic searches of PubMed, Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) were performed. Literature searches were performed by using appropriate combinations of the following MEDLINE Medical Subject Headings (MeSH) terms and keywords, as permitted by the search functionalities of each database/journal:

- **MeSH terms (used in PubMed only):** "Skin Neoplasms"[Mesh], "Carcinoma, Basal Cell"[Mesh], "Carcinoma, Squamous Cell"[Mesh], "Nevi and Melanomas"[Mesh], “Carcinoma, Merkel Cell”[Mesh], “Facial Neoplasms”[Mesh], "Lip Neoplasms"[Mesh], “Ear Neoplasms”[Mesh], “Nose Neoplasms”[Mesh], “Skull Base Neoplasms”[Mesh], “Dermatologic Surgical Procedures”[Mesh], “Mohs Surgery”[Mesh], "Surgery, Plastic”[Mesh], “Skin Transplantation”[Mesh], “Surgical Flaps”[Mesh]

- **Keywords:** Skin cancer, reconstruction, skin graft, excision, resection, anticoagulants, fibrinolytic agents, antithrombetics, antiplatelets, platelet aggregation inhibitors, heparin, enoxaparin, lovenox, plavix, coumadin, warfarin, fragmin, dalteparin, innohep, tinzaparin, arixtra, fondaparinux, factor Xa inhibitor, angiogax, bivalirudin, refrudan, aspirin, lepirudin, iprivask, desirudin, pradaxa, dabigatran etexilate, xarelto, rivaroxaban, apixaban, time-to-treatment, same-day, delayed, surgery, procedure, timing of surgery, anti-bacterial agents, antibiotic prophylaxis, narcotics, opioid, anti-inflammatory agents, non-steroidal, NSAID, naproxen, acetaminophen, analgesics, non-narcotic, pain management, postoperative pain, anti-infective agents, povidone-iodine, betadine, wokadine, pyodine, iodopovidone, chlorhexidine, chloroxylenol, PCMX, dettol, soaps, disinfectants, thromboocyte aggregation inhibition, blood clotting factor 10a inhibitor, thromboprophylaxis, clopidogrel, antibiotic therapy, anti-infective agent, opiate, opium, paracetamol, codeine, ibuprofen, skin decontamination, paroex, chloraprep, antimicrobial, skull base tumor, head and neck tumor, skin tumor

Initial study selection for each clinical question was performed by 2 reviewers with a multi-level screening process. Level I screening involved a review of the title and abstracts of the articles captured by the search strategies, to identify potentially relevant studies for inclusion in level II screening. Level II screening involved a review of the full-text of articles to confirm relevance and compare study details with the inclusion and exclusion criteria below:

**Inclusion Criteria:**

- Published since 1990 (01/01/1990 – 05/08/2018)
- Published in English language
- Reported a meta-analysis/systematic review, RCT, prospective or retrospective cohort/comparative, case-control, or case series
- Reported outcomes of interest for clinical questions
- Included at least 20 patients per study and/or per arm of study
- Human subjects

**Exclusion Criteria:**
• Published outside of inclusion date range
• Published in language other than English
• Animal or cadaver subjects
• Patient age < 18 years old
• Reported a case report, economic analysis, review, study protocol, editorial, consensus statement, position statement, meeting abstract, letter, news, commentary
• Reported no outcomes of interest
• Included fewer than 20 patients per study and/or per arm of study

Relevant clinical practice guidelines and systematic reviews underwent a separate bibliographic screen, as a cross-reference to ensure no relevant literature was excluded during the search process. These articles were screened as described above. Duplicate articles were eliminated. Studies meeting inclusion criteria were assessed for methodologic quality, as described below. Excluded studies and their reasons for exclusion were documented for review by the Work Group to confirm the final rejection or reconsider the study for inclusion.

Additional references were included in this review if considered necessary for background or discussion; however, these references were not critically appraised or used in the development of recommendation statements.

Critical Appraisal of Evidence

The ASPS utilizes the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) process to evaluate the methodologic quality of clinical studies and the strength of clinical evidence for the purposes of developing clinical practice guidelines and performance measures. GRADE determines the quality of evidence across outcomes rather than assessing each study individually. The quality of evidence for each outcome is initially determined by study design. The evidence from randomized controlled trials (RCTs) is assigned as high-quality evidence, while evidence from observational studies begin as low quality. From there, high quality evidence can be downgraded and low-quality evidence can be graded up or down based on the following: risk of bias; publication bias; imprecision related to the estimate of effect; inconsistency across studies; and indirectness related to the clinical questions. Studies on melanoma were considered but downgraded for being indirect evidence.

Grading of Recommendations

Clinical practice recommendations were developed using BRIDGE-wiz (Building Recommendations in a Developers’ Guideline Editor) software (Shiffman et al 2012), with consideration to the following 3 factors: 1) level of evidence (study quality); 2) assessment of benefits versus harms; and 3) patient preferences; 4) feasibility. Work Group members jointly drafted statements for each recommendation during an in-person meeting in the Spring of 2018 as well as subsequent conference calls and online discussions. After each meeting, members had an opportunity to individually comment and revise the draft recommendations via email discussion. Work Group members participated in several rounds of revisions until unanimous consensus was achieved for each recommendation statement. Each recommendation in this guideline is accompanied by a grade indicating the strength of the
recommendation, which was determined by considering the overall level of evidence supporting the recommendation and the judgment of the guideline developers.

Peer Review and Public Comment Process

The draft guideline was invited for peer reviewed by the American College of Physicians, American Society for Clinical Pathology, American College of Cardiology, American Society of Hematology, and the American Society of Anesthesiologists. ASPS members of the Quality and Performance Measurement and Healthcare Delivery Committees were also invited to participate in the peer review process. Peer Reviewers were invited to review and provide feedback on the validity, generalizability, and clarity of the draft guideline using the Appraisal of Guidelines for Research & Evaluation Global Rating Scale (AGREE GRS) instrument, as well as asked to support the individual recommendations. The draft guideline was also posted on the ASPS website for a public comment period.

Guideline Approval Process

After the peer review and public comment process, the guideline draft was reviewed and modified by the Work Group in consideration of peer review and public comments. The final guideline was approved by the ASPS and ASDS Executive Committees during their Month 20XX and Month 20XX meetings.

Plan for Updating Guideline

In accordance with the inclusion criteria of the ECRI Guidelines Trust, this guideline will be updated within 5 years or in the event when newly published evidence may result in a change to current recommendations. ASPS uses a digital platform (P.E.E.R.) to store literature and data, thereby facilitating an efficient updating process.

RESULTS

A total of 8,344 references were identified from databases; with 8,138 screened after excluding duplicate records. After screening and critical appraisal were performed, 20 studies were selected for final review for this guideline (Appendix/Figure ATTRITION DIAGRAM). The recommendations listed below were based on low and moderate quality evidence.

A summary of recommendation statements is shown in Table X.
## RECOMMENDATIONS

**Recommendation 1:**

The Work Group finds that it is acceptable that clinicians perform delayed reconstructive surgery for adult patients after skin cancer resection.

**Evidence Quality:** Low  
**Recommendation Strength:** Option

<table>
<thead>
<tr>
<th>Benefits</th>
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| • Patients with anxiety can be managed and sent for general anesthesia  
• Time for patients to process reconstruction options  
• Surgical reconstruction requiring general anesthesia will require the patient to fast before surgery, while this is not required at the time of a typical Moh’s micrographic resection  
• Delayed grafts for cartilage resection  
• Minimize local anesthetic dose  
• Ability to bring in surgeon with more reconstructive expertise in complicated cases  
• Lower risk of physician and patient fatigue |

<table>
<thead>
<tr>
<th>Risks, Harms, and Costs</th>
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| • Patients may have some anxiety at leaving open wound  
• Patient inconvenience  
• Possible patient need to manage dressing  
• Cost of multiple surgeons involved  
• Possible greater risk of bleeding complications at home  
• Risk of contracture and aesthetic challenges if delay too long |

<table>
<thead>
<tr>
<th>Benefit/Harms Assessment</th>
<th>Balance of Benefits and Harms</th>
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<tr>
<th>Value Judgments</th>
<th>None</th>
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<table>
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<tr>
<th>Intentional Vagueness</th>
<th>Delay is purposely not defined</th>
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<tr>
<th>Role of Patient Preference</th>
<th>Strong- patient preference should play a large role in this decision</th>
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<tr>
<th>Exclusions</th>
<th>None</th>
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<tr>
<th>Differences of Opinion</th>
<th>None</th>
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### Rationale

Reconstruction can be performed immediately following excision of a skin cancer, or reconstruction can be delayed until days, weeks, or even months later (Goto H. 2017; Robinson JK, 2002; Thibault MJ, 1995; Koolen P, 2017; Oliver-Allen H, 2017; Topin-Ruiz S, 2017; Escobar V, 1999; Mordick TG, 1990; Patel SA, 2016). At least 3 studies of low to moderate quality have compared immediate to delayed reconstruction for relative functional and aesthetic outcomes (Goto H. 2017; Robinson JK, 2002; Thibault MJ, 1995). A low quality study found that a 1 month delay improved survival of grafts of the foot (Goto H. 2017), but a moderate quality study of grafts at various anatomic locations detected no reduction in partial graft necrosis when reconstruction was delayed 1-8 days (Thibault MJ, 1995). A comparative
study of delayed versus immediate nasal reconstruction that stratified graft repairs in terms of degree of graft loss reported a higher rate of loss in some but not all categories of grafts placed immediately versus 12-14 days later (Robinson JK, 2002). The same study found that delay reduced nasal valve impairment, wound contractures and depressions at the graft site. A number of non-comparative studies have separately assessed the outcomes of either immediate reconstructions, or delayed reconstructions (Topin-Ruiz S, 2017; Escobar V, 1999; Mordick TG, 1990; Patel SA, 2016). In general, rates of surgical complications have not been found to be different. Minor infections were seen in 4-8% of patients delayed and immediate repair cohorts (Oliver-Allen H, 2017; Topin-Ruiz S, 2017; Mordick TG, 1990). Wound dehiscence, significant bleeding requiring hospitalization, rates of deep vein thrombosis and pulmonary embolus, myocardial infarction were not reported after immediate reconstruction (Oliver-Allen H, 2017; Topin-Ruiz S, 2017). Flap and graft necrosis were reported in a minority of cases after both immediate and delayed repairs, but differences in methodology and types of repairs included preclude direct comparisons (Oliver-Allen H, 2017; Mordick TG, 1990). Surgical complications were seen in up to 9% of patients with delayed reconstructions (Mordick TG, 1990; Patel SA). Regarding patient satisfaction, in one study of immediate reconstruction, 98% reported absence of aesthetic discomfort and absence of, or mild effect on, quality of life. Overall patient satisfaction was 92% (Topin-Ruiz S, 2017).

Studies of delayed reconstruction, and comparative studies of immediate versus delayed reconstruction, appear to disproportionately include larger post-cancer excision defects, such as those that require flap or graft repairs, or those at anatomically sensitive areas, like the nose, hand, and foot. Smaller defects as well as those at less aesthetically and functionally sensitive areas are generally repaired immediately. Hence comparative data for these is not available.

Reconstruction after skin cancer resection can be performed on the same day, or after a delay of days to weeks. For certain types of repairs, such as skin or composite grafts on anatomically sensitive areas or those with cartilage resection, delay may in some cases improve graft survival and contour. Logistical benefits of delayed reconstruction may include additional time to discuss reconstructive options with patients, and time to prepare for general anesthesia when this is needed for the repair or preferred to manage patient anxiety. Physician and patient fatigue may be reduced by delayed repair, with patients undergoing general anesthesia for the repair only having to restrict eating and drinking for a briefer period. For larger repairs, delay may allow the total local anesthetic dose to be minimized, and kept in a safe window. When a surgeon with specialized expertise is required for reconstruction, delay may facilitate scheduling and handover. On the other hand, risks, harms, and costs of delaying reconstruction include patient inconvenience, as patients may need to manage a potentially unstable open wound at home. Patients may need to change or reinforce wound dressings. Bleeding complications at home may necessitate additional office or hospital visits. While risk of infection is not increased with delay, patients may be anxious about this and about other perceived risks of delayed reconstruction. Excessively long delay prior to reconstruction may potentially lead to elevated risk of contractures and aesthetic impairment. Additional direct and indirect costs of delayed reconstruction include the patient and their caregivers needing to take additional time off work, as well as the additional costs associated with the involvement of multiple surgeons.
Overall, there is an equilibrium between the benefits and harms of delayed as versus immediate reconstruction. Aesthetic and functional outcomes, infection rates, other surgical complications, and patient satisfaction do not appear to systematically differ based on the timing of repairs. Delayed reconstruction is not more risky than immediate reconstruction. Immediate or delayed reconstruction might each be appropriate in particular circumstances. Patient characteristics and logistical feasibility may impact decision-making regarding the appropriateness of delay. Patient preference should also be taken into consideration. When delay is selected, the duration of delay may also vary.
Recommendation 2:

The Work Group suggests that clinicians not routinely prescribe systemic antibiotic therapy in the interim between resection and reconstruction for adult patients undergoing reconstruction after skin cancer resection.

Evidence Quality: Low  
Recommendation Strength: Weak

| Benefits | • Reduce antibiotic resistance  
| • Reduce side effects  
| • Reduce cost  
| • Reduce possible drug/drug interactions |

| Risks, Harms, and Costs | • Possible low risk of infection if patient not compliant with instructions or patient engages in activity that increases risk of infection  
| • Need for education of physicians that wound healing is not improved with antibiotics  
| • Possible patient anxiety about risk of infection |

Benefit/Harms Assessment | Preponderance of Benefit over Harm

Value Judgments | None

Intentional Vagueness | Interim is any period between resection and reconstruction

Role of Patient Preference | Moderate- patients need to be educated to understand antibiotic resistance

Exclusions | None

Differences of Opinion | None

Rationale

There are occasions when immediate reconstruction following skin cancer resection may not be feasible, and a delay occurs between the point when the cancer is fully removed, and the patient is reconstructed. When such delay occurs, the surgeon may choose to provide antibiotic prophylaxis in the interim between resection and reconstruction. No studies have compared the use and non-use of antibiotic prophylaxis during a standardized period of postponement between resection and reconstruction. One randomized controlled trial that compared the utility of 2 g of cephalexin to placebo delivered one hour prior to flap or graft reconstructions of the nose or ear found that antibiotic prophylaxis reduced the risk of surgical site infections, but not of tissue necrosis nor wound dehiscence (Rosengren, Heal, Buttner 2018). A randomized study of 203 S. aureus nasal carriers found that decolonization with intranasal mupirocin and chlorhexidine body wash prior to skin cancer excision did not reduce the rate of surgical site infections after reconstruction (Tai, Borchard, Gunson et al 2013). Neither study measured or otherwise characterized the duration of delay between resection and reconstruction, if any.

In the absence of data showing convincing benefits, systemic antibiotic therapy does not appear necessary or desirable in most cases when there is delay between cancer resection and reconstruction. Benefits of avoiding antibiotics include reduced risk of antibiotic resistance, avoidance of drug-related side effects, cost savings, and minimization of possible drug interactions. Potential risks, harms, and
costs include the possible low risk of infection if the patient is not compliant with instructions or engages in activities that increase the risk of infection; possible patient anxiety regarding the risk of infection; and the time and effort required to educate physicians that antibiotics are not needed in this context.

Notably, there are cases in which antibiotic use may be appropriate when reconstruction is coordinated to be completed at a separate setting. Diabetics, immunocompromised patients, drug addicts, and other patients at high risk of infection may benefit from systemic antibiotics while they are awaiting reconstruction. If patients have been told that they need antibiotics before any surgery, it may be prudent for the surgeon to consult with the patients’ other physicians. This may help the surgeon better understand whether the relevant risk factors suggest a need for longer-term prophylaxis during the interim between cancer removal and repair. Finally, the general recommendation that antibiotics not be used when reconstruction is delayed is not meant to exclude or discourage the use of peri-operative antibiotics, which are routinely appropriate, particularly in the facility setting.
Recommendation 3:

3a. The Work Group suggests that clinicians may administer peri-operative (i.e., no more than 24 hours) systemic antibiotics for adult patients undergoing reconstruction after skin cancer resection in a facility (non-office based) setting.

Evidence Quality: Low
Recommendation Strength: Weak

| Benefits | Compliance with hospital and regulatory protocols
<table>
<thead>
<tr>
<th></th>
<th>Possible reduction of infection rates</th>
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</table>
| Risks, Harms, and Costs | Side effects
|          | Cost
|          | Drug/drug interaction
|          | Allergic reaction
|          | Contribute to antibiotic resistance |

Benefit/Harms Assessment: Small Preponderance of Benefit over Harm

Value Judgments: None
Intentional Vagueness: None
Role of Patient Preference: None
Exclusions: None
Differences of Opinion: None

3b. The Work Group recommends that clinicians should not routinely administer perioperative systemic antibiotics for adult patients undergoing reconstruction after skin cancer resection in the office-based setting.

Evidence Quality: Moderate
Recommendation Strength: Moderate

| Benefits | No cost
|          | No side effects
|          | No drug/drug interactions
|          | Less time for delay to reconstruction
|          | Avoid complications of IVs or PO
|          | No contribution to antibiotic resistance |
| Risks, Harms, and Costs | Small risk of medicolegal vulnerability |

Benefit/Harms Assessment: Preponderance of Benefit over Harm

Value Judgments: None
Intentional Vagueness: None
Role of Patient Preference: None
Exclusions: None
Differences of Opinion: None
Rationale

Among the measures proposed to reduce the risk of infection associated with reconstruction following skin cancer removal is administration of systemic antibiotics. Perioperative systemic antibiotics may be administered orally or intravenously. The duration of treatment with perioperative antibiotics is typically brief (Rosengren H 2018; Alam M 2013). Definitions of surgical site infections (SSI) vary. A formulation commonly used by researchers is that promulgated by the U.S Centers for Disease Control and Prevention, which requires at least one of the following within 30 days of surgery: purulent discharge; localized swelling, pain or heat; erythema more than 1 cm from wound edge; or patient report of increasing tenderness. Infection may also be assessed by clinical impression, culture positivity, or the incidence of adverse infection-associated outcomes such as necrosis or dehiscence (Alam M, 2013).

There is conflicting outcomes in studies evaluating the effectiveness of perioperative antibiotics in preventing SSI as defined above. One randomized controlled trial of flap and graft reconstructions on the nose and ear in the office-based setting detected a significantly higher rate of SSI in the group pretreated with 2g of oral cephalaxin one hour before surgery as versus the group that did not receive pre-treatment (1.4 versus 11.6%) (Rosengren H 2018). However, this study included a somewhat unusual treatment paradigm. The skin cancer removal preceding reconstruction was completed with a staged excision with 2-day intervals and temporary dressing applications between stages, which may have contributed to the introduction of contaminants and the high rate of infection detected. In the same study, no difference was noted across groups in the rate of wound dehiscence or flap necrosis, with a single case (1.4%) of the former in the antibiotic prophylaxis group and a single case of the latter in the control group (Rosengren H 2018). A multicenter cohort study of consecutive reconstructions after skin cancer resection found no difference in the rate of infection, as assessed by clinical impression and culture positivity, between the group treated with perioperative oral antibiotics and the untreated group (Alam M, 2013). There was also no difference in the incidence of total adverse events between the antibiotic and no antibiotic groups, and the group receiving antibiotics was not less likely to experience delayed healing, such as partial or full necrosis. In this study, the overall risk of SSI was less than 0.40% (Alam M, 2013).

Other observational studies have similarly detected SSI rates of less than 1% associated with clean office-based reconstructions of skin cancer excision wounds in the absence of perioperative antibiotic prophylaxis (Cook JL 2003; Rogers HD 2010). A meta-analysis of randomized controlled trial of clean and clean-contaminated operations in plastic surgery found that antibiotic prophylaxis was associated with a 47% reduction in risk of SSI, but longer-term antibiotic use was not superior to shorter-term use (Zhang Y 2014).

For infection risk after reconstruction following skin cancer resection, there is more evidence available for reconstructions in the office-based setting than the facility setting. In general, reconstruction in the office-based setting appears to be associated with an exceedingly low risk of infection, which is not mitigated further by use of perioperative antibiotics. In the facility setting, risk of infection during complex reconstructions and clean-contaminated operations, as well as in special high-risk populations,
may in some cases be greater. Hence use of perioperative antibiotic prophylaxis may be appropriate in the facility setting. There is no evidence in either setting that long-term antibiotic prophylaxis provides infection risk reduction compared to short-term prophylaxis.

Consequently, in the *facility setting*, it is recommended that peri-operative systemic antibiotics be administered, albeit for no longer than 24 hours, for reconstruction following skin cancer removal. Potential benefits of this approach include compliance with hospital and regulatory protocols, as well as possible reduction of surgical-site infection rates. Potential risks, harms, and costs appear to be collectively less significant, and include antibiotic-related side effects, the cost of medication, possible drug-drug interactions, risk of allergic reaction, and contributing to system-wide antibiotic resistance. Notably, ambulatory surgery centers should comply with state laws and regulations pertaining to antibiotic prophylaxis.

Based on the preponderance of evidence, in the *office setting*, it is recommended that clinicians *not* administer routine peri-operative systemic antibiotics. Benefits of avoiding antibiotic prophylaxis include cost savings, absence of antibiotic side effects, prevention of drug-drug interactions, reduced time delay prior to reconstruction, avoidance of complications associated with oral or intravenous administration, and lack of contribution to antibiotic resistance. Potential risks and harms include medicolegal vulnerability if an infection occurs. Exclusions to this recommendation are appropriate for reconstructions in special high-risk populations, such as those requiring large or complex reconstructions, those with clean-contaminated wounds, or those with medical histories or co-morbidities associated with immunosuppression or elevated risk of infection. Patient education on the need for antibiotic stewardship may help convey to patients that antibiotic prophylaxis is not without risk, and avoidance of such may be in their best interest.
Recommendation 4:

4a. The Work Group recommends that clinicians should continue anticoagulant, antithrombotic, and antiplatelet medications for adult patients undergoing reconstruction after skin cancer resection in the office based setting.

Evidence Quality: Moderate
Recommendation Strength: Moderate

| Benefits | • Reduce risk of any thromboembolic event  
|          | • Increase patient compliance/decrease patient confusion regarding medication  
|          | • Reduce mortality  

| Risks, Harms, and Costs | • Slight increased risk of bleeding (from 1-2%, which might require a bandage change or additional stitch)  
|                          | • Minor risk of graft or flap (tissue) loss  
|                          | • Possible delayed wound healing  
|                          | • Inconvenience to patient to having to return to physician for a complication  
|                          | • Cost of medication  
|                          | • Possible increased duration of procedure or multiple procedures  
|                          | • Cost of multiple visits or procedures  
|                          | • Might choose a less delicate procedure or perform less delicately that might not be as aesthetically pleasing  

| Benefit/Harms Assessment | Preponderance of Benefit over Harm  
|                         | 
| Value Judgments | None  
| Intentional Vagueness | None  
| Role of Patient Preference | None  
| Exclusions | None  
| Differences of Opinion | None  

4b. The Work Group recommends that clinicians should coordinate with the physician managing the anticoagulation medication before modifying the medication prior to reconstruction procedures in a facility (non-office based) setting.

Evidence Quality: N/A (this is a good practice recommendation)
Recommendation Strength: N/A

| Benefits | • Ensure appropriate process for bridging or stopping  
| Risks, Harms, and Costs | • Physician time  
|                          | • Possible delay in surgery to arrange call  

| Benefit/Harms Assessment | Preponderance of Benefit over Harm  
| Value Judgments | None  
| Intentional Vagueness | None  
| Role of Patient Preference | None  
| Exclusions | None  
| Differences of Opinion | None  


**Rationale**

Perioperative bleeding can occur in the context of oral anticoagulants, antithrombotics, and antiplatelet medications that may be concurrently dosed at therapeutic levels to manage patient co-morbidities, such as risk of stroke, myocardial infarction, or pulmonary embolus. The combined evidence from 6 studies (Engheta A. 2016; Eichorn W 2015; Harbottle M 2014; Shipkov H, 2015, Dhiwakar M, 2006, Eilers Jr. R 2018) derived predominantly from hospital-based settings revealed no difference in the rate of occurrence of perioperative bleeding or hematoma in patients who had been administered a relevant pharmacologic agent prior to the onset of surgery, as versus those who had not. Most selected studies compared aspirin, warfarin, or clopidogrel to placebo or no medication (Engheta A. 2016; Eichorn W 2015; Harbottle M 2014; Dhiwakar M 2006), and one also assessed the effect of newer anticoagulant agents (Eilers Jr. R 2017). Studies were generally of low quality (Harbottle M 2014; Shipkov H, 2015, Dhiwakar M, 2006, Eilers Jr. R 2017), with the reported duration of bleeding assessment post-surgery ranging from immediately after completion of surgery to 4 weeks. All but one of the selected studies assessed the bleeding risk on both flap and graft repairs (Engheta A. 2016; Eichorn W 2015; Harbottle M 2014; Shipkov H, 2015, Eilers Jr. R 2017), with one including flaps only (Dhiwakar M, 2006). One high quality randomized controlled trial (Engheta A. 2016), which assessed the impact of aspirin, provided the drug to the treatment group for 3 months before surgery, and detected no difference in the volume of bleeding within 24 hours post-operatively.

Pragmatic case series and cohort studies that have detected a higher rate of bleeding in reconstructions associated with anticoagulant use recommend continuing such medications perioperatively as the same studies have noted that cases of increased bleeding did not result in serious consequences for patients (Bordeaux JS 2011; Cook-Norris RH 2011; Otley CC 1996; Billingsley EM 1997). On the other hand, there are numerous case reports of medication cessation being associated with death as well as serious adverse events (Khalifeh MR 2006; Alam M 2002; Schanbacher CF 2000; Kovich O 2003) including strokes, cerebral emboli, myocardial infarctions, transient ischemic attacks, deep venous thromboses, pulmonary emboli, and retinal artery occlusion leading to blindness.

Potential benefits of continuing anticoagulant, antithrombotic, and antiplatelet medications include, most importantly, reduced risk of any thromboembolic event, and reduction in mortality. From a patient standpoint, not stopping medications may improve compliance, decrease patient confusion, and reduce the risk that medications will inadvertently be managed improperly. Potential risks of continuing medications perioperatively are milder, including slightly increased risk of bleeding, which may require bandage change, or further measures to secure the reconstruction with additional sutures or pressure dressings. Concurrent concerns may be a minor elevation in the risk of graft or flap loss, possible delay in wound healing, increased duration of the procedure, patient inconvenience relating to returning to the physician for a bleeding-associated complication, and the direct and indirect medical costs of additional medications, office visits, or procedures that may be required. Conceivably, surgeons concerned about a bleeding-associated complication may choose a less aesthetically or functionally optimal repair to minimize the risk. Importantly, the risks, harms, and costs of continuing oral anticoagulant, antithrombotic and antiplatelet medications can be collectively characterized as minor
inconveniences and costs, while the potential benefits are reduction in the incidence of severe adverse events and death.

As noted above, there are numerous factors to consider in management of anticoagulant therapy perioperatively, predominantly weighing the risks associated with cessation against those of continuation: frequent but minor increased risk of bleeding and associated complications versus rare but serious risk of stroke and thromboembolism. The risks involved in cessation of anticoagulants may differ significantly according to the indications for which they are prescribed. In some cases continuation is essential (i.e. recent placement of drug eluting cardiac stent), and cessation can have serious fatal consequences (reference). For other indications, a brief interruption during the perioperative period may not have any negative effects. In the large cohort study by Douketis et. al. (2015) in NEJM patients with atrial fibrillation treated with warfarin were separated into two groups: one had bridging with low molecular weight heparin and the other stopped anticoagulation perioperatively. There was no increase in thromboembolism in the group undergoing surgery without anticoagulation.

Similarly, the risk of bleeding and resulting complications may differ significantly according to the extent and method of reconstruction. While in the office based setting, the harms of continuation may be low, in certain facility based cases where the surgeon anticipates a higher risk of bleeding and/or significant negative consequences from bleeding sequelae, consideration may need to be given to bridging or stopping the anticoagulant.

Anticoagulation management perioperatively requires decision making that should involve the prescribing clinician, surgeon, and patient. When complex reconstructive procedures involving flaps/grafts are planned, bleeding risk potentiates complications and possible failure of the reconstruction. In some situations, anticoagulant management is more critical than in a straightforward excision and repair where it may be continued. Reversible agents used in bridging treatment provide flexibility when bleeding events are encountered and may be a safer alternative. On the other hand, some patients with significant increased risk of thromboembolism (i.e. personal history of thromboembolism or bleeding disorders) may need anticoagulant therapy despite risk to surgical outcomes. Consultation with the primary physician, cardiologist, or other prescribing clinician is helpful in weighing risks and benefits and allows for a coordinated approach to therapeutic management.

Furthermore, the majority of the available evidence on these agents details the usage of aspirin and warfarin, and data is limited with respect to the consequences and effects of multiagent anticlotting treatments, as well as the newer generation of oral anticoagulants. The lack of reversibility of newer agents and associated risks are difficult to evaluate, as there is an absence of available data. It may be difficult to make blanket recommendations for all agents until more evidence is available, and this highlights a need for future investigation.
Recommendation 5:

5a. The Work Group recommends that clinicians should not prescribe narcotic medication as first line treatment for pain in adult patients undergoing reconstruction after skin cancer resection.

Evidence Quality: Moderate
Recommendation Strength: Moderate

| Benefits                                                                 | • Avoid risk of addiction  
|• Avoid side effects (nausea, vomiting)  
|• Reduce number of opioid pills in circulation  
|• Cost of medication  
|• Possibly improve pain control  
|• Reduce risk of morbidity and mortality |
| Risks, Harms, and Costs | • Perception of patient dissatisfaction  
|• Time to educate patient on why narcotics are not needed  
|• Increase anxiety  
|• Inconvenience to patient for getting latent script  
|• Side effects of alternatives (kidney or liver or GI reasons)  
|• Risk of illegal procurement of narcotics |
| Benefit/Harms Assessment | Preponderance of Benefit over Harm |
| Value Judgments | None |
| Intentional Vagueness | None |
| Role of Patient Preference | None |
| Exclusions | None |
| Differences of Opinion | None |

5b. The Work Group recommends that clinicians should prescribe acetaminophen and ibuprofen as first line therapy in adult patients undergoing reconstruction for skin cancer resection.

Evidence Quality: Moderate
Recommendation Strength: Moderate

| Benefits                                                                 | • Possibly improve pain control  
|• Reduce risk of morbidity and mortality  
|• Cost is lower (especially if 600mg ibuprofen is prescribed) |
| Risks, Harms, and Costs | • Side effects (kidney or liver or GI reasons) |
| Benefit/Harms Assessment | Preponderance of Benefit over Harm |
| Value Judgments | None |
| Intentional Vagueness | None |
| Role of Patient Preference | None |
| Exclusions | Patients with renal or liver conditions precluding the use of either OTC option or patients allergic to an alternative |
| Differences of Opinion | None |

Rationale

There is increasing evidence that prescription narcotics, which surgical patients are 4 times as likely to receive upon discharge than non-surgical patients, are associated with increased risk of opioid diversion,
addiction, unintentional injury, and death (Brat GA 2018). Patients who fill narcotic prescriptions after minor surgical procedures are more likely to exhibit persistent opioid use (Harbaugh CM 2018), and the duration of the prescribed use is a predictor of future misuse (Sniezek PJ 2018).

In the realm of reconstruction after skin cancer removal, a randomized clinical trial comparing oral postoperative pain management regimens has not shown narcotics to be more effective (Harris K 2014). Specifically, patients undergoing reconstruction of head and neck wounds were assigned to receive every 4 hours after surgery one of the following: 1000 mg of acetaminophen, 1000 mg of acetaminophen plus 400 mg of ibuprofen, or 325 mg of acetaminophen plus 30 mg of codeine. Pain was assessed by patient self-report using a visual analog scale immediately after surgery, and at 2, 4, 8, and 12 hours postoperatively. Subgroups were compared based on the area of the reconstructed defect. At 2 and at 4 hours the acetaminophen plus codeine group reported more pain than the acetaminophen plus ibuprofen group. At other time points, no difference was seen in mean change in pain scores across the groups. At no time points was the regimen including the narcotic agent found to control pain better than either of the other two non-narcotic regimens. Overall patient satisfaction, measured at the end of the study, did not differ between the codeine group and either of the other two groups (Harris K 2014).

Additional studies on the use of narcotics in cutaneous surgery are consistent with these findings. A survey found that surgeons reconstructing post-skin cancer excisions believe that patients prescribed narcotics typically use fewer than half of the prescribed quantity (Patel S 2018), and this was confirmed in an observational study of plastic surgery of the face (Tinsbloom B 2017). Retrospective and prospective case series (Parsa FD 2017; Kelley BP 2016) that compared narcotic and non-narcotic post-operative pain strategies found no difference in surgical outcomes. Long-lasting field blocks with agents like liposomal bupivacaine (Morales R 2013) have not been well-studied in reconstruction after skin cancer excision.

The preponderance of evidence supports the recommendation that narcotic pain medications should not be the first line treatment for the management of pain during reconstruction. Benefits of not using narcotics include avoiding the risk of addiction, avoiding medication side effects such as nausea and vomiting, reducing the number of opioid pills in circulation as well as the risk of opioid diversion, reducing the risk of opioid-associated morbidity and mortality, and possibly improving pain control. Risks, harms, and costs of narcotic avoidance are collectively less concerning, and include: the time required to educate patients as to why narcotics are not needed, increased patient anxiety associated with the possibility of breakthrough pain, inconvenience for those patients who must return to the physician’s office or otherwise wait for a narcotic prescription when such is later found to be needed, side effects or lack of tolerability of alternative pain medications, and risk of illegal procurement of narcotics. When patient dissatisfaction occurs in the context of narcotics being withheld, this is likely based on patient misperceptions regarding the need for narcotics rather than actual post-operative discomfort or debility associated with a non-narcotic pain control regimen. Patient education, and in some cases physician education, is important to dispel incorrect beliefs about the need for initial narcotics. When in exceptional cases (e.g. extensive reconstructive procedures) narcotic pain management is required, prescriptions should be for brief courses, typically less than 5 days. Additional considerations include adherence to state laws for narcotic prescribing and climbing the ladder of different non-narcotic therapies as necessary. Patient input is important, and shared decision-making
pertaining to non-narcotic pain strategies can be developed in a manner consistent with the CDC Guidelines for Prescribing Opioids.

The evidence suggests that ibuprofen and acetaminophen are effective in reducing postoperative pain after skin cancer reconstruction. Benefits of this approach include those noted above, as well as the lower cost of medication. There are no apparent risks, harms, or costs. Excluded are patients with renal or liver conditions precluding the use of either ibuprofen or acetaminophen, or patients with drug allergies to these agents. To be most effective, ibuprofen and acetaminophen should be started immediately after surgery and dosed on a regular schedule (Sniezek PJ 2018). Patients should not wait for breakthrough pain to take these drugs. Physicians reluctant to prescribe postoperative ibuprofen may also be apprised of the evidence that this does not increase bleeding risk. Future research may assess the utility of liposomal bupivacaine and other field block anesthetic agents after larger reconstructions.
Recommendation 6:

The work group suggests that clinicians discuss management of pain, antibiotics and anticlotting agents with adult patients undergoing reconstruction after skin cancer resection when relevant.

Evidence Quality: Low Quality
Recommendation Strength: Weak Recommendation

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<th>Benefits</th>
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<tr>
<td>• Increase patient satisfaction</td>
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<td>• Increase patient compliance with recommended regimens</td>
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<td>• Improve patient/physician relationship</td>
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<td>• Minimize litigation</td>
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<td>• Minimize complaints</td>
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<tr>
<td>• Improve patient safety</td>
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<tr>
<th>Risks, Harms, and Costs</th>
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<tr>
<td>• Physician burden in reporting and time</td>
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<tr>
<th>Benefit/Harms Assessment</th>
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<td>Preponderance of Benefit over Harm</td>
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<th>Value Judgments</th>
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<tr>
<th>Intentional Vagueness</th>
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<td>Relevant is left to clinician’s judgment</td>
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<th>Differences of Opinion</th>
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There are currently no standardized protocols for how the doctor and patient will manage pain medications, possible oral antibiotics, or anti-coagulation (anti-clotting) medications during the perioperative period for patients undergoing reconstruction after skin cancer resection. Although contextual differences in these procedures and settings should be considered, clear and consistent communication with the patient is imperative. The physician or their designee should share a typical pain management strategy, discussion of antibiotic use (or avoidance), and plan for those patients on anticlotting agents. The benefits of this patient education are numerous and will be highlighted below.

The importance of patient education and the shared decision-making between the physician and patient are highlighted in this statement. Patient education through discussion of their perioperative treatment may help alleviate anxiety, improve communication, increase patient satisfaction and maximize compliance of the patient to the postoperative orders. This process is also a productive method to improve the patient and doctor relationship, which may decrease patient complaints, increase patient safety and decrease potential litigation. The work group considered education on the patient’s management of pain, use of postoperative antibiotics and perioperative use of anticlotting agents as paramount in the patient education process.

Patients are commonly preparing for their reconstruction after skin cancer resection using available internet and social media sources, which may create patient confusion due to the conflicting information. To avoid misunderstanding, the work group considers the preoperative discussion an optimal time to improve the patient education and set expectations for what postoperative pain management protocol should be used. Developing a strategy in the preoperative period also alleviates anxiety, as the patient understands and has prepared for managing the pain with an appropriate guideline. Documentation of this discussion in the medical record is a critical part of the education process. The patient should be encouraged to seek clarification to maximize the patient education experience.

Specific Suggestions
The physician or their designee should summarize a pain management strategy and emphasize that pain will not be prevented entirely. Other topics to review may include the following: anticipated bruising, swelling, discharge of fluids from the surgical sites, and possible activities that would exacerbate pain. The working group strongly advocates for a tiered approach to managing pain. In Tier 1, ice and elevation may reduce swelling and discomfort, while wounds may be bandaged and kept moist. Non-narcotic pain medications are emphasized. These may include acetaminophen, ibuprofen, naproxen, gabapentin or others. Breakthrough pain may, in certain circumstances be treated with narcotic pain medications as Tier 2.

The work group has outlined the use of perioperative systemic antibiotics in recommendation 3 and postoperative antibiotics in recommendation 2 and these will not be reiterated herein. Available evidence does not show a significant benefit in the use of postoperative antibiotics in this patient population (add reference). For this reason, the working group suggests that the physician or their designee communicate to the patient that no routine oral antibiotics will be ordered. The patient may be comforted to know that oral antibiotics will not be discouraged if they happen to show evidence of a wound infection.

A challenge encountered in some patients undergoing reconstruction after skin cancer resection are those patients using antiplatelet medications or anticoagulants due to cardiac arrhythmias or hypercoagulable states (e.g. deep venous thrombosis, pulmonary embolism, or cerebrovascular accidents). Recommendation 4 addresses the working groups recommendations. The working group suggests that patients be counseled on how the risks of continuing the anti-clotting medications (e.g. increased bleeding, possible flap hematoma) need to be balanced with the potential devastating consequences of a systemic thrombotic event. The working group recognizes that the patient should utilize their primary care physician, cardiologist or other specialists to help better understand their risks for undergoing procedures while using their anticoagulant agents.

The working group recognizes that effects of the patient education measures suggested above are difficult to measure. Measuring patient understanding is wrought with contextual confounding variables. Patient reported outcome measures (PROMs) and patient satisfaction surveys may not accurately measure the success of these interventions. We encourage physicians or their designees to deliver a consistent patient education, while directing patients to complementary material in pamphlet or internet-based resources. By creating an opportunity for patients to inquire about pain management, antibiotic use and management of anticoagulant agents, the working group anticipates improved patient satisfaction, patient compliance and potentially improved surgical outcomes.
Sample questions for patients undergoing reconstruction after skin cancer resection.

1. **How should I plan to manage discomfort and pain after the procedure?**
   
   Your physician and you should create a pain management strategy on which you both can agree. The use of over-the-counter pain relievers such as acetaminophen and ibuprofen is encouraged. A few patients may occasionally use a narcotic pain medication, the potential risks should be outweighed with the inability for a non-narcotic pain medication to be adequate.

2. **Will I be taking oral antibiotics after my procedure?**
   
   Typically, oral antibiotics will not be prescribed; however, your doctor may order antibiotics in some unique circumstances to mitigate the risk of infection.

3. **Should I continue to take my blood thinners around the time of the procedure?**
   
   In most cases, the use of anti-clotting agents will not be discontinued (as discussed previously in *key action statement 1.*) However, please consult with your primary care physician, cardiologist, and physician performing your reconstruction.

4. **What type of reconstruction is best for me?**
   
   The surgical options for repair should be discussed with your physician with the risks, benefits and alternatives considered.

5. **When will I return for follow-up?**
   
   Follow-up will vary depending on the use of permanent or absorbable suture materials as well as the protocol as based on your reconstructive team’s standards.

6. **How can I prevent excessive swelling and bruising?**
   
   Postoperative swelling around the surgical site as well as bruising will vary depending on the extent and location of your surgery. The use of ice is a possible option that you should discuss with your physician. Swelling will not resolve for weeks, with a final result from your procedure not being visible for months.

7. **When can I return to my normal daily activities?**
   
   You should discuss your limitations in activity with your physician as your ultimate outcome may be affected in some situations by excessive activity or exercising.

8. **What is the typical timeline for sutures to be removed?**
   
   Sutures are often removed in the postoperative visits ranging between 5-10 days after surgery; however, absorbable sutures may be used which would not require removal. Please consult with your physician regarding the management of the site of your reconstruction after surgery.

9. **When should I plan to return to work?**
   
   It is important to discuss with your physician when you should be expected to return to work and when limitations of heavy lifting would be removed.
Recommendation 7:

The work group suggests that clinicians may offer post-operative follow-up assessment to adult patients undergoing reconstruction after skin cancer resection.

Evidence Quality: Low

Recommendation Strength: Weak Recommendation

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<th>Benefits</th>
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<tr>
<td>• Increases patient physician communication</td>
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<td>• Empowers patient to express satisfaction</td>
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<td>• Allows for collection of patient reported outcome measures (PROM)</td>
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<td>• Identify patients who may benefit from further management or counseling</td>
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<td>• Quality improvement</td>
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<td>• Time of outcome assessment/collection</td>
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<th>Intentional Vagueness</th>
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<td>Follow-up interval or outcome measure not defined</td>
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Rationale

Reconstruction after skin cancer resection may have myriad functional and cosmetic outcomes. The return of the patient for follow-up clinic visits is an excellent opportunity to better understand and measure these outcomes, improve patient-physician communication, and foster quality improvement. Post-operative follow-up can lead to increased communication between the patient and physician, empowering patients to express satisfaction and otherwise important outcome measures. This communication is an opportunity to increase patient and family engagement and offer the patient appropriate patient reported outcome measures (PROMs). Follow-up can recognize areas for technique enhancement, improvement of patient satisfaction, and identify those patients who may benefit from further counseling or management. Quality improvement projects and scientific outcome studies can be constructed through appropriate follow-up.

To contrast the aforementioned benefits of post-operative follow-up, there may be associated costs. These could be in the form of patient travel expense, time, or the cost associated with office visit billing. Additionally, collection and assessment of outcome measures may cost the physician time and administrative resources. In some cases, it may be impractical for patients to return for follow-up to the
reconstructive surgeon (i.e. rural areas where patients have traveled great distances for treatment), and in these cases, postoperative care and coordination may be arranged with a local physician.

There is a paucity of evidence regarding optimal timing for follow-up. Based upon the anatomic site of reconstruction there may be several different functional and cosmetic outcomes to be measured. The work group did not reach consensus on minimal acceptable time for stable outcome assessment. Patient preference does have a role in establishing a timeline for communication and follow-up.

Overall, the Work Group found there was preponderance of potential benefit over harm in offering patients post-operative assessment following reconstruction after skin cancer resection. The interval and method of assessment is at the discretion of the physician. However, use of validated PROMs and patient satisfaction tools specific to the site of reconstruction at an appropriate interval to achieve stable functional and cosmetic assessment is encouraged.
CONCLUSIONS AND FUTURE DIRECTIONS
A variety of new research areas may add to potential improvements of the patient care delivery process for reconstruction after skin cancer resection. Research areas which may contribute to better measuring the outcomes of reconstruction after skin cancer resection may include development of patient reported outcome measures (PROMS). The collection of the patient’s perception of the objective success of the reconstruction as well as the patient satisfaction with the care delivery process can be captured with a forthcoming instrument, which is in the process of content validity testing (University of Virginia- Christophel).

DISCLOSURES
As of this draft, there were no relevant disclosures. Disclosures will be updated prior to publication.
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