SH20: Is it necessary for patients to use home-based skin cleansers prior to surgery? If so, what is the best?

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Response: There is limited evidence to recommend the use of at home skin preparation prior to surgery in terms of reduced bacterial load.

Strength of Recommendation: Limited

Delegate Vote: 43 (88%) agree; 1 (2%) disagrees; 5 (10%) abstain

Rationale: A PubMed/Medline search was used from database inception to September 2024. The following MeSH terms with appropriate Boolean operators were used to search for the listed question: "shoulder", "arthroplasty", "replacement", "benzoyl", "chlorhexidine", "self-cleanse", and "wash". A manual search was then performed forward and backward on relevant citations and related articles to those that were found in the search. After completing the search there were 1,803 articles to review with 625 unique articles after removing duplicates. These articles were screened for relevance based on titles and abstracts which left 59 articles. The full texts of these articles were then reviewed to leave 17 articles.

Most of the studies reviewed focus on the use of benzoyl peroxide (BPO) preoperatively in varying number of days. Some studies focus on BPO on its own, while other compare the efficacy of BPO versus other agents such as chlorhexidine, clindamycin, metronidazole, and blue light therapy. There were four studies that evaluated the efficacy of chlorhexidine on its own.

Of the 5 studies which evaluated BPO, two of them examined the ability of BPO to decrease positive skin cultures with treatment preoperatively. Duvall et al. treated 34 patients with BPO daily for 3 days before surgery and evaluated swabs after treatment then one week after stopping treatment and found significant log decrease after BPO treatment with a log rebound 1 week later[1]. Sabetta et al. evaluated the length of BPO treatment between 1-10 days preoperatively in 65 patients and found an overall reduction of *C. acnes* skin culture of 74%, a 79% reduction if treated >1 day, and a 66.7% reduction rate if treated for one day.[2] Two studies performed case-control trials with a total of 130 patients with regular soap and water as the control and BPO as the treatment. One study treated twice per day for two days prior to surgery and the other for five days prior surgery and both studies demonstrated a significant reduction in *C. acnes* in the treatment group, however all patients had a significant reduction in *C. acnes* after the surgical prep was applied. No significant adverse side effects were reported.[3,4] Similarly, Polce et al. evaluated 183 patients who were treated preoperatively with BPO and found that 83.5% of patients reported no adverse events and 16.5% reported redness, bleaching or dryness. Application was found to be "easy" for about two-thirds and 22% missed at least one treatment, demonstrated the unreliability of preoperative treatment.[5]

Three studies with a total of 170 patients compared 5% BPO treatment with 4% chlorhexidine (CHG) wipes prior to surgery for a range of 1-2 days preoperatively.[6-8] Two studies with 120 patients found that there were significant reductions in *C. acnes* load on the skin in the BPO groups.[7,8] The third study with 50 patients found that all patients still had positive skin cultures after treatment with no difference in *C. acnes* load. While BPO had a lower percentage of positive *C. acnes* culture in the cut skin edges (46%), it was not significantly different that CHG wipes (61%).[6]

Chlorhexidine wipes in isolation were evaluated by four studies. In three studies 157 patients compared CHG wipes with soap and water preoperatively and found there was significant reductions in *C. acnes*, but there was no difference in deep infection or long term infection.[9-11] Matsen et al. evaluated 51 patients who prepped with 4% CHG wipes the night before surgery and found an overall decrease in bacterial load of the skin, but not a significant reduction in *C. acnes*.[12]

Three studies with 140 patients examined the effectiveness of BPO with Clindamycin. There was a significant reduction in *C. acnes*, however the addition of clindamycin does not make a significant difference based on BPO on its own. Additionally, these studies found a decrease in *C. acnes* skin swabs, but no positive deep cultures were found.[13-15] A study by Unterfrauner et al. completed a case-control study with BPO with metronidazole and found that treatment for 7 days preoperatively did decrease skin culture loads, but there was no significant difference in deep cultures.[16] Cotter et al. evaluated BPO with the addition of blue light therapy and found the addition of the light therapy did not make a significant difference in reduction of *C. acnes* skin cultures. Similar to other studies, BPO treatment decreased the culture load of the skin, however the most significant reduction was seen after pre-operative prep with chlorhexidine.[17]

References:

1) Duvall G; Kaveeshwar S; Sood A; Klein A; Williams K; Kolakowski L; Lai J; Enobun B; Hasan SA; Henn RF 3rd; Gilotra MN. Benzoyl peroxide use transiently decreases Cutibacterium acnes load on the shoulder. J Shoulder Elbow Surg. Apr 2020. 29(4). 794-798. 31676186.
2) Sabetta JR; Rana VP; Vadasdi KB; Greene RT; Cunningham JG; Miller SR; Sethi PM. Benzoyl peroxide and clindamycin topical skin preparation decreases Propionibacterium acnes colonization in shoulder arthroscopy. J Shoulder Elbow Surg. Jul 2017. 26(7). 1190-1195. 28479255.
3) Scheer VM; Jungestr√∂m MB; Serrander L; Kal√©n A; Scheer JH. Benzoyl peroxide treatment decreases Cutibacterium acnes in shoulder surgery, from skin incision until wound closure. J Shoulder Elbow Surg. June 2021. 30(6). 1316-1323. 33545336
4) van Diek FM; Pruijn N; Spijkers KM; Mulder B; Kosse NM; Dorrestijn O. The presence of Cutibacterium acnes on the skin of the shoulder after the use of benzoyl peroxide: a placebo-controlled, double-blinded, randomized trial. J Shoulder Elbow Surg. Apr 2020. 29(4). 768-774. 32197765
5) Polce EM; Cotter EJ; Polania-Gonzalez E; Grogan BF. Patient compliance and satisfaction with topical benzoyl peroxide gel prior to shoulder surgery. JSES Int. Jul 2022. 6(4). 686-689. 35813137.

6) Hsu JE; Whitson AJ; Woodhead BM; Napierala MA; Gong D; Matsen FA 3rd. Randomized controlled trial of chlorhexidine wash versus benzoyl peroxide soap for home surgical preparation: neither is effective in removing Cutibacterium from the skin of shoulder arthroplasty patients. Int Orthop. Jul 2020. 44(7). 1325-1329. 32385554.
7) Kolakowski L; Lai JK; Duvall GT; Jauregui JJ; Dubina AG; Jones DL; Williams KM; Hasan SA; Henn RF 3rd; Gilotra MN. Neer Award 2018: Benzoyl peroxide effectively decreases preoperative Cutibacterium acnes shoulder burden: a prospective randomized controlled trial. J Shoulder Elbow Surg. Sep 2018. 27(9). 1539-1544. 30054245.
8) Scheer VM; Bergman Jungeström M; Lerm M; Serrander L; Kalén A. Topical benzoyl peroxide application on the shoulder reduces Propionibacterium acnes: a randomized study. J Shoulder Elbow Surg. Jun 2018. 27(6). 957-961. 29609999.
9) Murray MR; Saltzman MD; Gryzlo SM; Terry MA; Woodward CC; Nuber GW. Efficacy of preoperative home use of 2% chlorhexidine gluconate cloth before shoulder surgery. J Shoulder Elbow Surg. Sep 2011. 20(6). 928-33. 21612945.
10) Makhni MC; Jegede K; Lombardi J; Whittier S; Gorroochurn P; Lehman RA; Riew KD. No Clear Benefit of Chlorhexidine Use at Home Before Surgical Preparation. J Am Acad Orthop Surg. Jan 2018. 26(2). E39-e47. 29227322
11) Hong CK; Hsu KL; Kuan FC; Lee YT; Tsai PF; Chen PL; Su WR. Extended skin cleaning on the shoulder with chlorhexidine reduces the cutaneous bacterial load but fails to decrease suture contamination in patients undergoing arthroscopy rotator cuff repair. J Shoulder Elbow Surg. Apr 2023. 32(4). 744-750. 36464206.
12) Matsen FA; Whitson AJ; Hsu JE. While home chlorhexidine washes prior to shoulder surgery lower skin loads of most bacteria, they are not effective against Cutibacterium (Propionibacterium). Int Orthop. Mar 2020. 44(3). 531-534. 31938858
13) Heckmann N; Heidari KS; Jalali O; Weber AE; She R; Omid R; Vangsness CT; Rick Hatch GF 3rd. Cutibacterium acnes persists despite topical clindamycin and benzoyl peroxide. J Shoulder Elbow Surg. Dec 2019. 28(12). 2279-2283. 31471244.
14) Dizay HH; Lau DG; Nottage WM. Benzoyl peroxide and clindamycin topical skin preparation decreases Propionibacterium acnes colonization in shoulder arthroscopy. J Shoulder Elbow Surg. Jul 2017. 26(7). 1190-1195. 28479255.
15) Symonds T; Grant A; Doma K; Hinton D; Wilkinson M; Morse L. The efficacy of topical preparations in reducing the incidence of Cutibacterium acnes at the start and conclusion of total shoulder arthroplasty: a randomized controlled trial. *J Shoulder Elbow Surg*. Jun 2022. 31(6). 1115-1121. 35183744
16) Unterfrauner I; Wieser K; Catanzaro S; U√ßkay I; Bouaicha S. Acne cream reduces the deep Cutibacterium acnes tissue load before elective open shoulder surgery: a randomized controlled pilot trial. J Shoulder Elbow Surg. May 2022. 31(5). 897-905. 35158064.
17) Cotter EJ; Cotter LM; Franczek EB; Godfrey JJ; Hetzel SJ; Safdar N; Dai T; Arkin L; Grogan BF. Efficacy of combinational therapy using blue light and benzoyl peroxide in reducing Cutibacterium acnes bioburden at the deltopectoral interval: a randomized controlled trial. J Shoulder Elbow Surg. Dec 2021. 30(12). 2671-2681. 34478863