Assessment of Referring Providers Use and Perceptions of the Burnett Burn Assessment and Management Tool for Estimating Burn Size

By

Michelle Czerw, RN BSN

University of Kansas School of Nursing

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_____Kelly Bosak, PhD, ANP-BC_____
Faculty Project Committee, Chair

_____JoAnn Peterson, DNP, FNP-BC_____
Faculty Project Committee, Co-Chair

_____Suzanne Mitchell, PhD, FNP-BC, CWS_____
Faculty Project Committee, Co-Chair

_____12 June 2019_____
Date Project Accepted

The DNP Project committee for Michelle Czerw certifies that this is the approved version of the following DNP Project:

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JoAnn Peterson, DNP, FNP-BC

_____

Co-Chair

Suzanne Mitchell, PhD, FNP-BC, CWS

_____

Co-Chair

Date Approved:
12 June 2019

Abstract

Accurate assessment of burn percentage and depth are critical aspects in the initial assessment of the burn patient and guide both the immediate clinical management and subsequent need for follow up. To better assist providers in out-lying facilities, The University of Kansas Health System (TUKHS) Burnett Burn Center developed the Burnett Burn Assessment and Management Tool (BBAMT), which was recently distributed to referring hospitals and clinics. The purpose of this project was to assess the knowledge and perceived needs of outside providers of the burn wound triage and referral process, by evaluating 1) the implementation of the evidence based BBAMT with outlying providers; and, 2) the perceived needs of referring providers for accurate triage of burn wounds to TUKHS inpatient Burnett Burn Center or Outpatient Burn and Wound Care Clinic (OBWCC).

A convenience sample of providers (n=14) were recruited, to evaluate the use of the BBAMT for treatment of a patient. The email addresses of referring providers were recorded and a needs assessment survey was sent by email using open-ended and Likert style questions.

Tool accessibility was moderate (mean of 3.6), provider's understanding and confidence were higher (mean 4.5 and 4.4, respectively). The BBAMTs helpfulness in determining burn %TBSA, burn depth, and referral to inpatient vs. outpatient was also high (mean 4.1). Four common themes were identified from the open-ended question: overwhelming; inpatient vs. outpatient care; fluid calculation; and valuable. This study provided new knowledge of the perspective and competency needs of outside providers of the burn wound triage and referral process. Recommendations for improvements to the BBAMT and the distribution process of the tool to surrounding facilities have been made.

Keywords: Burns, body surface area, burn size estimation, referral, accuracy

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Introduction

The majority of burn injuries are initially assessed and triaged by healthcare facilities with minimal burn expertise, thus, requiring referral or immediate transfer to a verified Burn Center. Accurate assessment of burn percentage and depth are critical aspects in decision making for inter-facility transfer or referral to the outpatient burn clinic. The initial assessment guides both the immediate clinical management and subsequent need for follow up making this an important issue when discussing burn injury referrals (Harish et al., 2015). Burn calculation of percentage total body surface area (%TBSA) and burn depth are primarily visual resulting in variations between providers. Burns can be difficult to evaluate by providers with little burn experience, consequently leading to over or under triage and inappropriate referrals. Decreasing the number of patients who are over or under triaged can be beneficial to the patient and healthcare system by reducing unnecessary costs, resources, and risk of complications.

Referrals to The University of Kansas Health System's (TUKHS) inpatient and outpatient Burnett Burn Center have illustrated that referring facilities who over or under estimate burn size usually result in inappropriate referrals. In order to support outlying providers the Burnett Burn Assessment and Management tool (BBAMT) was developed (See Appendix A) and distributed to outlying facilities to assist in more accurate burn calculations and referrals. The purpose of this study is to assess providers use of the Burnett Burn Assessment and Management Tool and their perceptions of the burn wound triage and referral process. We: (1) evaluated the use of the evidence based Burnett Burn Assessment and Management Tool with outlying providers, and (2)

assessed the perceptions and needs of referring providers for accuarate triage of burn wounds to TUKHS inpatient Burnett Burn Center or Outpatient Burn and Wound Care Clinic (OBWCC).

To assess the current available knowledge a literature review was conducted addressing these issues and summarizes findings that influence the design of this project. The Three-Phase Needs Assessment Model by Witkin and Altschuld supported the design and implementation of the project.

Significance of the Problem

According to the Center for Disease Control (CDC), approximately 1.1 million people suffer from a burn injury requiring medical attention each year in the United States (Center for Disease Control, n.d.). Burn injuries continue to be one of the leading causes of unintentional death and injury in the United States, but 96.7% of those treated in a verified Burn Center will survive (American Burn Association, 2018). Correct estimation of percentage and burn depth are important aspects in obtaining the right treatment plan for the patient. As burn incidence steadily declines it triggers a decrease in the number of active Burn Centers; thus, “access to specialized burn care is becoming more difficult and is being restricted by the decreasing number of specialized Burn Centers” (Atiyeh, Dibo, & Janom, 2014, p.87).

As regional Burn Centers continue to diminish, the expertise needed to care for burn patients declines as well. Because of this, many Burn Center referrals come from non-burn centers. Proper evaluation of acute burn injuries is a clinical competence that relies heavily on training, experience, and feedback to become proficient and often the initial burn assessments are conducted in facilities that do not encompass the resources for burn patient management (Wibbenmeyer et al., 2015). “Acute burn diagnosis is complex, and studies showed that general clinicians are less accurate than burn experts when assessing both burn size and depth” (Boissin

et al., 2015, p.1254). Accurate calculation of burn size and depth is one of the most important aspects when determining the need for immediate inter-facility transfer or referral to an outpatient burn clinic. This project was important to do at TUKHS, because there continues to be inconsistencies in burn size estimation and depth; along with, over and under triage of burn patients between the referring hospital and TUKHS Burnett Burn Center.

Various methods for burn size estimation have been developed over time to improve burn size assessment, but despite these efforts there are still inconsistencies seen in Burn Center referrals (Baartmans et al., 2012). The inexperienced providers often estimate burn size incorrectly leading to the likelihood of under triage or more frequently expensive and wasteful over triage (Saffle, Edelman, Theurer, Morris, & Cochran, 2009). Patients who are over-triaged often have burn wounds that can be managed in an outpatient setting. Over triage precedes unnecessary transfers and inappropriate referrals, thus, incurring needless healthcare costs, misuse of limited resources, and a burden to patients and providers. Burn patients that are under triaged may be affected by increased mortality and morbidity or preventable complications (Wiktor et al., 2018). This makes burn size estimation and depth crucial components when examining the burn referral process and "improving estimation results has always been an issue within the burn community" (Giretzlehner et al., 2013, p.1107). Providing and improving access to valuable resources and education can assist with closing the gap in burn size estimation differences between facilities. Currently there is no evidence on if the Burnett Burn Assessment and Management Tool is being used by outside providers when doing a burn assessment and referral. By evaluating the effectiveness of resources and the perceived needs of providers a foundation for future recommendations of change was built.

Assumptions

The project was designed on two assumptions. One, the perceptions of referring providers regarding accurate triage and referral of burn wounds is based on the current guidelines (i.e., BBAMT) available to them. And second, the burn referral process can be improved based on the findings of the surveys.

Literature Review

For this literature search the databases included: CINAHL, Cochrane Library, PubMed, Library of Medicine at the National Institutes of Health, and MEDLINE. Keywords searched: “burns”, “burn size estimation”, “total body surface area”, “burn referral”, “accuracy of estimation”, “burn assessment” and “burn assessment tools” . The use of Boolean operators were used, for example: burn size estimation AND referral. Inclusion and search limits that were incorporated include: A) *Journals:* include all burn journals, B) *Language*: include only English studies, C) *Date of publication:* include only articles published from 2001 – 2018, D) *Intervention:* include only studies that look at burn size estimation and E) *Content:* include studies that measure burn size estimation between referring institution and the Burn Unit.

One of the strengths of this search criteria is that it yielded specific studies with relevant information pertaining to the purpose of this study. Another asset was the use of a thesaurus to help find information across fields that may have used different terms for the same concept. When conducting the search with the principals listed above, research articles were selected, so the majority of studies presented were primary research articles or systematic reviews. The major weakness that emerged in this literature search was the date of publication. Originally, the date of publication search was from 2001-2018 for included articles, but it did not yield enough primary studies regarding the specific research questions, so the dates were changed to 1985-

2018. The reason many studies date back to the 80's, is because the understanding of the patho-physiology and burn care dramatically improved around that time, and thus, some of the original studies on burn estimation were conducted at that time.

Review and Synthesis of Research Findings

Burn providers value the relationship between burn size and depth with the proper management and interventions needed to reduce complications, healthcare strain, mortality, and morbidity. Unfortunately, there is no single standardized method and even with new and improved estimation techniques numerous studies have highlighted inaccuracies in the assessment of %TBSA and burn depth from referring facilities to a verified Burn Center. " The literature, however, has not reached a consensus as to the exact trend for these %TBSA estimation inaccuracies, with some research pointing toward overestimation of small burns and underestimation of large burns, some research pointing toward patchy burns being overestimated versus singular burns, and other research pointing toward a gross trend of overestimation" (Armstrong, Willand, Gonzalez, Sandhu, & Mosier, 2016, p.31).

The American Burn Association has created specific referral criteria to support decision making for in-patient treatment versus outpatient management. According to the American Burn Association & American College of Surgeons, Committee on Trauma (2007), burn injuries that meet in-patient burn criteria and should be referred to a burn center include: (a) partial thickness burns greater than 10% TBSA, (b) burns involving the face, hands, feet, genitalia, perineum, or major joints, (c) third degree burns of any age, (d) electrical, chemical, or inhalation burns, (e) burn injuries in patients with preexisting medical disorders that could complicate management, (f) any patient with burns and concomitant trauma, (g) burned children in hospitals without

qualification for care of child, and (h) burn injury in patients who require special social, emotional, or rehabilitative intervention.

Historically, the ABA referral criteria has been the standard of care when referring patients to Burn Centers for inpatient treatment, but as medicine and burn care have evolved it may be well suited to receive ambulatory care for some of these minor burns. Outpatient management may be acceptable in the absence of co-morbid complications, adequate pain control, and minor burns under 15% TBSA for adults and 10% in children (Warner, Coffee, & Yowler, 2014). Most patients with minor burns can be treated in the outpatient setting, making primary care providers a key treatment source for the thousands of burns that occur each year (Lloyd, Rodgers, Michener, & Williams, 2012). Outpatient referral criteria is lacking and it is incumbent that guidelines be established to allow growth for outpatient care and aid in reducing the cost of burn treatment, as evidence shows that select minor-to-major burns can be successfully managed in the ambulatory care setting (Warner, Coffee, & Yowler, 2014).

There are several methods for assessment of burn size that are used throughout the healthcare system; these are the "rule of nines," the "Lund-Browder chart," and the "rule of palms." The Wallace "rule of nines" is a useful and rapid tool that assigns a percentage of either nine or a multiple of nine to calculate the body surface area of burn (Papadakis & McPhee, 2017). "It is fairly accurate in adults and small burns, but it is not very accurate in cases of patchy and pediatric burns" (Agarwal & Sahu, 2010, p. 50). The "rule of palms" is another way to estimate burn size; this is when the surface area of the patient's palm is about 1% total body surface area (University of Michigan, 2017). The more accurate method of burn size evaluation is the Lund-Browder chart, which subdivides body areas into segments that are assigned a percentage based on the patients age (Agarwal & Sahu, 2010). The Lund-Browder chart has been

shown to be the most accurate method for assessing proper burn size, but it's very time consuming for referring providers, so the rule of nines and rule of palm are often favored by clinicians for rapid assessment (Thom, 2017).

Berkebile, Goldfarb, & Slater (1986) and Hammond & Ward (1987) were two of the early studies that compared burn size estimation between prehospital reports and that of a Burn Center. In both studies they found that burn patient's prehospital burn size estimations were unreliable in approximately 75% of the cases. Overestimations ranged anywhere from 1% to 100% or more, while underestimations ranged from 1% to 66% TBSA (Berkebile et al., 1986; Hammond & Ward, 1987). Investigators found providers who used the rule of nines increased the tendency to overestimate and those using the Lund-Browder chart provided less variability in burn size assessment. These studies concluded the high frequency of overestimation and underestimations and the magnitude of the problem. Hammond & Ward, (1987) finished the study with the creation of a burn trauma sheet for aiding in burn size estimation for referring facilities. These two initial studies provided a foundation for future studies.

Three studies by Armstrong et al. (2016), Harish et al. (2015), and Collis, Smith, & Fenton (1999) sought to better quantify the differences in burn size assessment from referring hospitals versus calculated %TBSA in the burn unit. The %TBSA estimated by the referring institution was compared with the %TBSA measures at the Burns Unit and inaccuracies where expressed using a percentage. Armstrong et al. (2016) found a significant mean difference of overestimations to be 7.99 ± 7.70% between the referring hospitals and the burn unit, while Collis et al. (1999) study exhibited a standard distribution of 20.5% TBSA error, and Harish et al. (2015) showed overestimations had a statistically significant difference of 6.8%. The results

backed previous studies that trend toward gross overestimation and that the significant inaccuracies may be multifactorial.

In a referral-based system over and under estimating burns can have substantial implications on the health care system. A systematic review by Pham, Collier, & Gillenwater (2018) examined the prevalence and magnitude of %TBSA discrepancies between different level providers, along with determining factors that impact the accuracy of %TBSA estimation. Twenty – six studies were included for a total of 2909 patients (Pham et al., 2018). "The review found that %TBSA estimation discrepancies still remain multifactorial and variation is seen between burn and non-burn specialists" (Pham et al., 2018, p. 7). New interventions must be adopted, because with over 300% TBSA overestimation, 26-77% of admissions would not have met ABA transfer criteria (Pham et al., 2018). This resulted in excess healthcare costs of $250 million. Many experts are advocating for change with the growing technological advances available (Pham et al., 2018).

Three studies examined the differences between referring hospital estimates of burns and the Burns Unit in the pediatric population and found that there were significant differences between %TBSA of the referring institutions and the Burns Unit (Baartmans et al., 2012; Face & Dalton, 2017; McCulloh et al., 2018). The studies also discuss how inaccurate approximations result in treatments and transports that are not indicated based on proper assessments. Burn %TBSA estimates from prehospital, non-burn centers, and ED providers that are significantly higher compared to Burn Center estimations, typically don't meet the ABA-verified transfer requirements. Future research needs to emphasize these issues by proper education and communication between physicians to support more appropriate triage and referrals (Baartmans et al., 2012).

A major finding within these studies was overestimation of burn size and if correctly assessed, would have fallen below the burn size criteria for transfer. These inappropriate transfers have negative implications on resource management, acquiring needless costs and burdening patients and families. Possible contributing factors in over and under estimations are the tools and methods used to measure %TBSA from the referring hospitals. Inaccuracies are a result of many factors, but may be due in part to limited exposure by non-burn specialist. This implicates the need for continuing education and better methods for proper burn size assessment. These studies concluded that significant overestimation continues to persist, and it may be due to counting simple erythema in burn size or inconsistent use of methods from referring facilities.

Burn size estimations between referring institutions and the Burn Center seem to be a continuous problem over the last thirty years even with advances in education and estimation tools. Are these inconsistencies due to %TBSA estimation tool choice or is it possibly a lack of education or advanced resources? These questions are still missing in much of the research. “There is no question that, for the purpose of research, some reliable form of documenting burn size should be commonly accepted among burn care providers” (Wachtel, Berry, Wachtel, & Frank, 1999). Past and current research still display questions and knowledge gaps, and that many non-burn providers still have little experience with burn patients, which is why TUKHS Burnett Burn Center developed a Burn Assessment and Management Tool for surrounding facilities to use when determining burn %TBSA and burn depth. The goal of this tool is to aid in more accurate burn size and depth assessments, which will allow for more appropriate referrals to a verified Burn Center.

The BBAMT was created based on the current American Burn Association (ABA) and American College of Surgeons guidelines. The guidelines were created to assist emergency

personnel in the initial management of a burn patient prior to the transfer to the Burn Center. The BBAMT consists of seven sections the first being how to conduct an initial assessment using the ABCDEF primary survey and secondary survey technique. The second section describes how to calculate the percent TBSA for the burn patient. Estimation using the Lund-Browder chart, which is regarded as the 'gold standard' is provided; the "Rule of Nines" and "Rule of palms" methods are also provided, because they are a useful and rapid tool in case a quick assessment is needed. The third section reviews how to begin fluid resuscitation prior to transfer.

The middle section of the tool reviews how to properly identity burn injury depth. This is a vital section as first degree/superficial burns should not be counted into the percent TBSA; thus, understanding and correctly identifying burn depth can drastically effect the %TBSA calculation. The next section reviews when to refer a patient to the Burn Center according to ABA criteria. Properly identifying burn depth and percentage are important aspects as they often are determining factors for referral to a Certified Burn Center. The last two sections describe information on special types of burn management; such as, chemical, electrical, and scald burns and information on the Burnett Burn Center and the transfer center.

The use of the BBAMT by outside providers during the burn referral process and its usefulness have not been evaluated, and thus, are what influenced the project and ultimately the design. A needs assessment of the tool's use and providers perceptions allowed for more evidence-based outcomes and constructive recommendations of change. A needs assessment can be defined as "a systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvement and allocation of resources. The priorities are based on identified needs" (Witkin & Altschuld, 1995, p.4). There are currently discrepancies and gaps between outlying provider's %TBSA estimations and those of the Burn

Center. Because of this a needs assessment on the use and providers perceptions of the BBAMT was warranted. A needs assessment sought to determine discrepancies and examine the nature and causes in order to set priorities for future action (Witkin & Altschuld, 1995).

Theoretical Content

The project evaluated outlying providers use of the burn tool and their perceptions of the burn wound triage and referral process. It was guided by Witkin and Altschuld's Three-Phase Needs Assessment Model. The concept dates back to 1984, but has been revised to greatly expanded explanations of the three phases and the steps and tools within each (Altschuld & Watkins, 2014). Altschuld & Kumar (2010) and Altschuld & Witkin (2000) continued to expand and analyse what might be done in each of these phases. "The Three-Phase Model is an analysis, assessment and action plan framework embedded within one method and the focus tends to be on process improvement and the achievement of the organization's goals for individuals and small groups" (Watkins, 2008).

Witkin and Altschuld's Model occurs over three phases: preassessment (exploration), assessment (data gathering), and postassessment (utilization). The Three-Phase Model goes beyond the scope of just a needs assessment and is actually a plan for identification of problems and resolutions (Watkins, 2008). The preassessment (exploration) phase looks at what the situation is about and are there needs to be pursued. This phase relies on defining the purpose, gathering existing information, determining what data to collect, the sources and methods, and is this need strong enough to move into phase two (Altschuld & Watkins, 2014). The second step is the assessment phase and consists of gather data on the needs. This phase includes: determining the sampling strategy, conducting in depth surveying, causal analysis and managing the data, and prioritization of needs (Altschuld & Watkins, 2014). The last and final phase of this model is the

postassessment phase where some activites from phase 2 might be done in more detail. This phase is also where implementing action plans, evaluating how well the solutions are working, and creating stragies for evaluating the needs assessment itself are done (Altschuld & Watkins, 2014). Considering alternative solutions and reporting the results are also part of phase 3 (Witkin & Altschuld, 1995).

The Three-Phase Model is a plan for problem identification and resolution and is what guided the project design. Phase 1 (preassessment) consisted of reviewing literature and gathering existing data; the literature identified inconsistencies between referring hospitals and Burn Center's %TBSA estimations and burn depth. Due to this the Burnett Burn Center developed a Burn Assessment and Management Tool to help providers better evaluate burn wounds and it was distrubuted to surrounding facilities. The perceptions and use of this tool by outlying providers had not been assessed; therefore, a need for further data collection was identified. Phase 2 (assessment) consisted of the sampling, in-depth surveying, and deeper analyses. During burn referral calls through TUKHS's call center an email address of the referring provider was recorded. Surveys were administered to providers addressing the use of and their perceptions of the BBAMT. In Phase 3 (postassessment) outcomes were considered and what was learned in Phase 1 and 2 allowed initiation of action plans, ways to evaluate those actions, and included strategies for evaluating further needs. The project results were summarized and reported back to the Burnett Burn Center management team. The feasibility of implementing expanded educational efforts to improve the tool and use of the tool, creating a future implementation plan, and determining continued evaluation efforts were assessed. The project was the foundation for determining future reccommendations in order to improve burn assessments and referrals.

Project Methods

Selected Organization

The inpatient Burnett Burn Center and the Outpatient Burn and Wound Care Clinic (OBWCC) at TUKHS was the organization to investigate the question presented. The OBWCC is associated with the Burnett Burn Center at TUKHS, which is an ABA verified Burn Center. Approximately 20+ patients are referred to TUKHS inpatient and outpatient Burn Center each month and require wound care and burn management. It is a frequent occurrence that patients who are referred to the Burn Center are either over or under triaged due to inconsistencies in burn size estimation from the referring facility. The BBAMT created by TUKHS Burnett Burn Center has been distributed to surrounding facilities as a means to support more accurate burn size and depth estimations and more appropriate referrals. The tool was hand delivered to the reception desks at these surrounding Emergency Departments. Whether this tool was accessible, being utilized, and its usefulness by outlying providers during the burn referral process were still in question.

Currently, when a referral call is made by the outside facility provider (MD, DO, NP, or PA), the referral goes through the transfer center who directs the phone call to the inpatient Burn Center Charge Nurse and the Attending physician on call. Information is shared between providers, which includes burn size estimation and depth. The Charge Nurse is tasked with gathering as much information to complete the Burn Referral Call Record (See appendix B). The Attending physician then decides based on the information provided whether to admit the patient via inter-facility transfer or have the patient follow up in the OBWCC. It is not uncommon that when the burn providers assess the patients, there are variations in burn size and depth from what

the transferring facility communicated. Because of these variations, inappropriate referrals are observed during admissions to inpatient and those following up in the outpatient clinic.

Design and Rationale

The methodology chosen was based on the assumptions that recognizing the provider use of the burn tool and outlying provider's perceptions of the burn wound triage and referral process, future recommendations for change and improvement could be established. The project used a cross-sectional survey design that assessed if outlying providers were using the burn tool and, if so, what were their views of the tool. Data was collected during burn patient referral calls to TUKHS inpatient and OBWCC and was conducted from February 7, 2019 to May 26, 2019. Information was collected from the inpatient and outpatient Burnett Burn Center admission call records and attached algorithm (See Appendix C). Data collection included the referring facility, participation in the attached algorithm, outlying provider's use and access to the BBAMT and their email. A follow up survey and a copy of the poster were sent via REDCap secure server to those who provided an email. The goal was to obtain information regarding provider's use of the tool and their perceptions of the burn wound triage and referral process.

Sample and Selection Process

All burn calls that were referred to TUKHS Burnett Burn Center inpatient and OBWCC through the transfer center during the time of Febuarary 7, 2019 through May 26, 2019 were included. All providers that supplied an email address received an email with the BBAMT, along with, the secrue REDCap survey link.

Data Collection Methods

Data was collected during the burn referral calls to TUKHS Burnett Burn Center. The transfer center connected the referring provider with the burn attending physician on-call and the

inpatient charge nurse. During this time patient information was shared between the referring provider and the burn attending and charge nurse, and it was entered into the Burnett Burn Center Admission Call Record. The referring facility was documented from the Admission Call Record. The alogrithm assessing utilization of the BBAMT was attached to the admision call record. During burn referral calls through TUKHS call center the Burn Unit charge nurse asked the questions to the outlying provider following the algorithm on the admission call record. Initial data collection included outlying provider's use and access to the BBAMT and their email address. For those who provided an email address, a copy of the BBAMT and a follow-up survey were sent via REDCap secure server (See Appendix D) to assess provider's access and perceptions of the tool. The survey collected demographics, which included provider's years of experience, education level, and zip code.

Education and training regarding data collection was provided to the unit manager and all unit charge nurses and relief charge nurses assisting in data collection. This took place during two of our unit monthly staff meetings; along with, study information provided via email. Individual education and training took place with those who could not attend the monthly staff meetings. The referral call sheets stored on the TUKHS secure server were reviewed as data collection occurred weekly. Outlying provider information was compiled into a data repository that resides on the secure KUMC server.

Analyzing Data

The next step was gathering all returned surveys and analyzing the responses provided. Demographic data was examined to determine any identifying features or trends from the survey responses. A simple relative frequency table to examine respondent's perceptions was constructed for the Likert style questions. For the final open-ended question, repeating themes

were identified. The themes and frequency of these themes were examined. All data was collected and entered into a secure database for analysis. Data patterns were analyzed to determine provider's perceptions and needs for assessing burn wound depth and size, and to improve the process for more appropriate burn referrals.

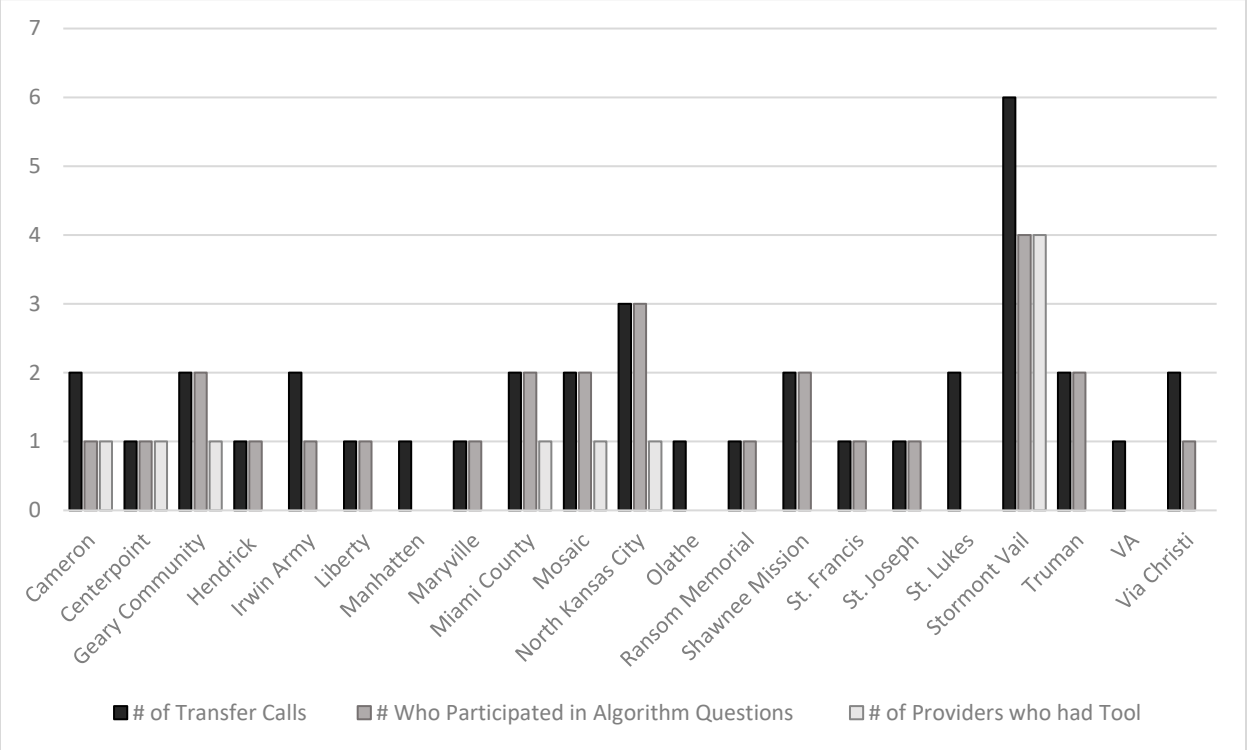
Results

Algorithm Outcomes

There was a total of 83 transfer center calls from February 7, 2019 to May 26, 2019. The charge nurse was able to initiate the first question on the study algorithm with approximately half (38, 45.7%) of the referring providers, with slightly fewer (28, 33.7%) actually completing the remaining algorithm questions (See Figure 1; one algorithm collected was missing the location, so was not included in the figure). Ten providers stated they were too busy to participate. The majority (22, 78.5%) of those providers who completed the algorithm questionnaire shared their email address. Six providers did not want to share their personal email. There were 21 different facilities that had transfer calls to TUKHS Burnett Burn Center during the study period. Seven of these facilities had one or more providers state that they had the BBAMT. The remaining facilities did not have the Burnett Burn Assessment and Management Tool.

Figure 1.

Transfer Calls with Algorithm Initiated



When asked if the BBAMT was utilized, four (14%) providers stated “yes” they used the tool for the care of the burn patient (See Table 1). Twenty-four providers stated they did not use the burn assessment and management tool in the care of their patient. Of the 24 providers who did not use the tool, six (22%) had access to it and 18 (64%) did not have access to it.

Table 1.

Utilization of BBAMT

Utilization and Access to BBAMT	Frequency (%)
Used Tool	4 (14%)
Did not use tool; had access	6 (22%)
Did not use tool; did not have access	18 (64%)

Survey Outcomes

A total of 14 providers completed the questionnaire during the study period. The majority of referring providers identified themselves as Medical Doctors (4, 29%) and Nurse Practitioners Master's prepared (4, 29%), followed by Doctors of Osteopathic Medicine (2, 14%), Doctorates of Nursing Practice (2, 14%); and Physician Assistants (2, 14%). Descriptive statistics were calculated for participants' demographics (See Table 2). The average provider experience was 3 – 9 years. Respondents resided in Johnson County (7, 50%), Shawnee County (3, 21.5%), Douglas County (3, 21.5%), and Jackson County (1, 7%).

Table 2.

Provider's Demographics

Characteristics	No.	(%)
Years of experience		
0 – 2 yrs.	3	21.5%
3 – 5 yrs.	2	14%
6 – 9 yrs.	5	36%
10 – 15 yrs.	3	21.5%
15+ yrs.	1	7%
Provider Professional Degree		
MD	4	29%
DO	2	14%
DNP	2	14%
MSN	4	29%
PA	2	14%
County/Zip Code		
Douglas County		
66006	1	7%
66025	2	14%
Jackson County		
64108	1	7%
Johnson County		
66204	2	14%
66206	1	7%
66211	1	7%
66215	1	7%
66226	1	7%
66227	1	7%
Shawnee County		
66604	1	7%
66606	1	7%
66610	1	7%

A total of six questions of provider perceptions were rated on a Likert scale ranging from strongly disagree (1) to strongly agree (5) (See Table 3). Only two of the 14 surveys had missing answers to some of the questions. According to respondents, most agreed or remained neutral (mean 3.6) when asked if the BBAMT was easily accessible. Participants agreed or strongly agreed (mean 4.5 and 4.4) for provider's understandability and confidence, respectively when using the BBAMT. For the BBAMT helpfulness in determining burn %TBSA, burn depth, and referral to inpatient most participants agreed (mean 4.1) for each question.

Table 3.

Frequency Table of Total Responses w/ Relative Frequency and Mean

	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**	**Total Responses**	**Mean**
The BBAMT is be easily accessible at your hospital?	3 (23%)	0 (0%)	1 (8%)	4 (31%)	5 (38%)	13	3.6
The BBAMT is easy to understand?	0 (0%)	0 (0%)	1 (8%)	4 (31%)	8 (61%)	13	4.5
I do/would feel confident using the BBAMT?	0 (0%)	0 (0%)	1 (8%)	6 (46%)	6 (46%)	13	4.4
The BBAMT is/would be helpful when determining (%TBSA)?	0 (0%)	1 (7%)	1 (7%)	8 (57%)	4 (29%)	14	4.1
The BBAMT is/would be helpful when determining burn depth?	0 (0%)	1 (7%)	1 (7%)	8 (57%)	4 (29%)	14	4.1
The BBAMT is/would be helpful when determining to refer to inpatient or outpatient care?	0 (0%)	0 (0%)	2 (15%)	8 (62%)	3 (23%)	13	4.1
Total	3	2	7	38	30	80	

Five of the fourteen respondents completed the open-ended question regarding further considerations when using the BBAMT. Four themes emerged from the information: the reference material (tool) was overwhelming (1, 20%); need for both inpatient and outpatient

criteria (2, 40%); clarification of fluid resuscitation calculations (1, 20%); and the tool was valuable (1, 20%) (See Table 4).

Table 4.

Emerging Themes from Survey

Emergent Theme	Description	Frequency
Overwhelming	The poster seems very busy and complex for a quick reference.	1, (20%)
Inpatient versus Outpatient Care	Would be helpful to include information or general criteria for outpatient, along with, the inpatient criteria listed.	2, (40%)
Fluid Calculation	Could use better fluid resuscitation calculations for larger %TBSA burn patients.	1, (20%)
Valuable	Poster is user friendly and easy to follow. Good quick assessment tool when evaluating burn patients.	1, (20%)

Discussion/Interpretations

Main Findings

Updated educational resources and information for referring providers are necessary in order to ensure proper burn care and appropriate referrals as regional Burn Centers continue to diminish and the expertise needed to care for burn patients declines. Referrals to TUKHS inpatient and outpatient Burnett Burn Center have demonstrated that referring facilities who over or under estimate burn size usually result in inappropriate referrals. The BBAMT was originated in hopes to assist and improve transferring facilities in the burn wound triage and referral process. This is the first investigation into the use of and perceptions of the evidence based BBAMT with outlying providers.

The purpose of this study was to obtain a better understanding of outlying providers use and access to the BBAMT and to gain insight into provider's perceptions on how well the tool assists in determining burn %TBSA and burn depth, and in the referral process. According to the transfer center call data and the returned surveys, the majority of referring facilities do not have the BBAMT or have access to it. The initial assessment is what guides the immediate clinical management and need for follow up. Discovering that 64% of the transferring facilities did not have access to the tool may be one explanation for discrepancies in burn %TBSA and depth between the referring providers and the burn providers. These differences are generally the cause of under triage or more frequently expensive and inefficient over triage (Saffle, Edelman, Theurer, Morris, & Cochran, 2009).

This study gave us an understanding that most providers agreed or strongly agreed that the tool was easy to understand and they felt confident using it. A theme surfaced by the comment of one of the respondents that the tool is valuable, user friendly, and easy to follow; it

is a good quick assessment tool when evaluating burn patients. This response is contrary to the report that the tool is too overwhelming for a quick reference. Most felt the tool was constructive, so the reported theme that the tool is overly complex may be due to inexperience with burn patients and the BBAMT by that provider.

Determining burn depth and %TBSA can be difficult to evaluate by providers with little burn experience, and this is why the tool has two sections that focus on proper assessment guidelines. According to the questionnaire, most respondents agreed that the tool was helpful in determining %TBSA and burn depth. The mean for this question was lower (4.1) indicating that some were neutral or may have disagreed that the tool was helpful in these burn assessment aspects. The "Rule of nines", "Rule of palms", and Lund-Browder chart are the most common methods of estimation, with the Lund-Browder and 'Rule of nines" providing better estimation accuracy (Armstrong et al., 2016). The BBAMT highlights the "Rule of nines" and Lund-Browder chart. These questionnaire responses may suggest that more clarification and education are needed on proper method use.

A section was arranged on the BBAMT that displays the American Burn Association (ABA) specific referral criteria to an inpatient Burn Center. Most respondents agreed that this portion of the tool was helpful, but again it yielded a mean of 4.1 indicating that some were neutral about how effective this piece was. After review of the final open-ended question an important theme emerged by two respondents indicating that this section needed more clarification – not just on inpatient referral, but also outpatient referral to a burn center. This could also be an explanation for inappropriate referrals; if providers are uncertain whether to refer to inpatient or outpatient, they may just transfer to inpatient, because that is the only referral criteria provided by the ABA and on the BBAMT. Uncertainty by referring providers typically

leads to avoidable inpatient transfers; better education and communication on proper burn assessments can help minimize these inappropriate transfers (Baartmans et al., 2012).

The last theme that arouse from the surveys was regarding proper fluid resuscitation methods. The BBAMT provides a basic fluid rate and does not explain how to calculate fluid resuscitation. The one provider stated there needs to be more clarification on what rate to start fluids for larger size burns. This is a complex topic as in order to properly calculate the fluid rate one must properly calculate the burn %TBSA accurately. Patients can be given more fluid boluses than are indicated, because of overestimation. A patients' co-morbidities and how stable they are also play a role in fluid resuscitation. "Future education efforts should emphasize the importance of calculating TBSA to guide need for fluid resuscitation and restricting fluid boluses" to those who do not need them (Carter, Leonard, & Rae, 2018).

Strengths and Weaknesses

We acknowledge that a weakness of this study design was in keeping the referring provider on the phone long enough to collect the information needed. Informing the transfer center not to disconnect the call after collecting patient information was helpful to complete the data collection from the referring provider. This study protocol was strengthened by creation of an algorithm for the referral calls; it included a script for the charge nurse that would help simplify the flow of information and prevent gaps by unanswered questions. Education was key for call center staff members on proper data collection and implementation of the project. Even after collaboration with team members and creation of an algorithm to guide the transfer center call, data collection was still challenging and it affected the number of surveys returned.

An additional limitation was the small sample size for returned surveys. This was in part due to not initiating the algorithm questions during the transfer call, providers not offering their

email addresses, and by survey emails being rejected by the email provider. A larger sample size would be useful to allow more detailed stratification on information and features of the BBAMT. In order to obtain more accurate perceptions and use of the BBAMT for the whole population, a larger sample size could have been obtained if the study was continued for a longer period of time or during the more busy seasons of winter and summer. Even with the small sample size this needs assessment was valuable in identifying the common referral facilities that do not have access to the BBAMT. The last limitation is it may not be possible to extrapolate these results to other settings outside of TUKHS; this is due to the generalization of the results and the uniqueness of this project to TUKHS.

Recommendations

Burn providers have a professional responsibility to educate non-burn providers on proper assessment methods and techniques to help reduce discrepancies in burn estimation. Accurate burn assessments can diminish the number of patients who are over or under triaged and benefit the healthcare system by reducing unnecessary costs, resources, and risk of complications. The BBAMT is a strategy of -TUKHS Burnett Burn Center to further expand referring provider's knowledge base in the burn wound triage and referral process. Improved understanding of referring providers use and perceptions of the BBAMT has created an opportunity for future recommendations. The first recommendation is to refine the %TBSA and Burn Depth sections of the BBAMT to promote clarity and more accurate assessments for referring providers. The next recommendation involves clarifying Burn Center referral criteria on the BBAMT to include a distinction between inpatient versus outpatient referral in order to improve patient care and better utilize healthcare resources. The third recommendation is to determine the ED Medical Director and Trauma Manager's contact information at referring

facilities who do not have access to the BBAMT. And distribute the updated BBAMT to these contacts to ensure the tool is posted in an accessible location for referring providers to utilize in the care of future burn patients. The next recommendation is to follow up with referring facilities in 3 – 6 months to ensure the BBAMT is being utilized and develop a follow up survey for referring providers to assess further needs or barriers to the BBAMT use. The fifth recommendation includes carrying out further investigation into %TBSA differences between referring facilities and burn providers for those who use the tool versus those who do not. This can determine if the tool has an influence on burn provider discrepancies. And the last recommendation is complete further investigation into remote burn assessments via telemedicine using handheld devices. This can also be a means for referring provider educational opportunities.

Conclusion

A comprehensive literature review revealed that referring institutions tend to overestimate burn size by a significant amount when compared to a Burn Center estimation. A variety of methods have been established and researched, but the Lund-Browder chart seems to be the most accurate method of estimation. The TUKHS Burnett Burn Center and OBWCC receive constant referrals and it is a frequent occurrence that burns are over or underestimated. Recognizing this, the Burnett Burn Assessment and Management Tool was created and distributed to surrounding facilities and a need to assess outlying providers use and perceptions of the tool was identified. The Three-Phase Model by Witkin and Altschuld helped guide this study design and any possible future research. Survey results identified gaps that allowed for expanded educational efforts to improve the tool, creation of an implementation plan, and continued evaluation efforts. In conclusion by determining the needs of outlying providers and

creating new solutions we hope to see a decrease in estimation discrepancies, which will ultimately benefit the healthcare community by allowing for more appropriate burn referrals.

References

Agarwal, P. & Sahu, S. (2010). Determination of hand and palm area as a ratio of body surface area in Indian population. *The Indian Journal of Plastic Surgery, 43*(1), 49-53.

Altschuld, J. W. & Kumar, D. D. (2010). *Needs assessment: An overview.* Thousand Oaks, CA: Sage.

Altschuld, J. W. & Witkin, B. R. (2000). *From needs assessment to action: Translating needs into solution strategies.* Thousand Oaks, CA: Sage.

Altschuld, J. W., & Watkins, R. (2014). A primer on needs assessment: More than 40 years of research and practice. In J. W. Altschuld & R. Watkins (Eds.), *Needs assessment: Trends and a view toward the future*. New Directions for Evaluation, 144, 5–18.

American Burn Association. (2018). *National burn awareness week.* Retrieved from http://ameriburn.org/wp-content/uploads/2018/01/aba_infographic_011918.pdf

American Burn Association & American College of Surgeons, Committee on Trauma. (2007). Guidelines for the operation of burn centers. *The Journal of Burn Care & Research, 28*(1), 134-141.

Armstrong, J. R., Willard, L., Gonzalez, B., Sandhu, J., & Mosier, M. J. (2016). Quantitative analysis of estimated burn size accuracy for transfer patients. *The Journal of Burn Care & Research, 38*(1), 30-35.

Atiyeh, B., Dibo, S. A., & Janom, H. H. (2014). Telemedicine and burns: An overview. *Annals of Burns and Fire Disaster, 27*(2), 87-93.

Baartmans, M. G. A., Van Baar, M. E., Boxma, H., Dokter, J., Tibboel, D., & Nieuwenhuis, M. K. (2012). Accuracy of burn size assessment prior to arrival in Dutch burn centres and its

consequences in children: A nationwide evaluation. *Injury, International Journal of the Care of the Injured, 43*, 1451-1456.

Berkebile, B. L., Goldfarb, W., & Slater, H. (1986). Comparison of burn size estimates between prehospital reports and burn center evaluations. *The Journal of Burn Care & Research, 7* (5), 411-412.

Boissin, C., Laflamme, L., Wallis, L., Fleming, J., & Hasselberg, M. (2015). Photograph-based diagnosis of burns in patients with dark-skin types: The importance of case and assessor characteristics. *Burns, 41*, 1253-1260.

Carter, N. H., Leonard, C., & Rae, L. (2018). Assessment of outreach by a regional burn center: Could referral criteria revision help with utilization of resources? *Journal of Burn Care & Research, 39*(2), 245-251.

Center for Disease Control. (n.d.). *Burns.* Retrieved from https://www.cdc.gov/masstrauma/factsheets/public/burns.pdf

Collis, N., Smith, G., & Fenton, O. M. (1999). Accuracy of burn size estimation and subsequent fluid resuscitation prior to arrival at the Yorkshire Regional Burns Unit: A three-year retrospective study. *Burns, 25*, 345-351.

Face, S. & Dalton, S. (2017). Consistency of total body surface area assessment in severe burns: Implications for practice. *Emergency Medicine Australasia, 29,* 429-432.

Giretzlehner, M., Dirnberger, J., Owen, R., Haller, H. L., Lumenta, D. B., & Kamolz, L. P. (2013). The determination of total burn surface area: How much difference? *Burns, 39,* 1107-1113.

Hammond, J. S. & Ward, C. G. (1987). Transfers from emergency room to burn center: Errors in burn size estimation. *The Journal of Trauma, 27*(10), 1161-1165.

Harish, V., Raymond, A. P., Issler, A. C., Lajevardi, S. S., Chang, L., Maitz, P. K.M., & Kennedy, P. (2015). Accuracy of burn size estimation in patients transferred to adult Burn Units in Sydney Australia: An audit of 698 patients. *Burns, 41*, 91-99.

Lloyd, E. C., Rodgers, B. C., Michener, M., & Williams, M. S. (2012). Outpatient burns: Prevention and care. *American Family Physician, 85*(1), 25-32.

McCulloh, C., Nordin, A., Talbot, L. J. Shi, J., Fabia, R., & Thakkar, R. K. (2018). Accuracy of prehospital care providers in determining total body surface area burned in severe pediatric thermal injury. *The Journal of Burn Care & Research, 39*(4), 491-496.

Papadakis, M. A. & McPhee, S. J. (2017). *Current medical diagnosis & treatment (56th Ed.).* New York, NY: McGraw Hill Education.

Pham, C., Collier, Z., & Gillenwater, J. (2018). Changing the way we think about burn size estimation. *The Journal of Burn Care & Research*. Advance online publication. Retrieved from https://academic-oup-com.proxy.kumc.edu/jbcr/advance-article/doi/10.1093/jbcr/iry050/5104866

Saffle, J. R., Edelman, L., Theurer, L., Morris, S. E., & Cochran, A. (2009). Telemedicine evaluation of acute burns is accurate and cost-effective. *The Journal of Trauma Injury, Infection, and Critical Care, 67*(2), 358-365.

Thom, D. (2017). Appraising current methods for preclinical calculation of burn size – A pre-hospital perspective. *Burns, 43*, 127-136.

University of Michigan. (2017). *Estimating the size of burn.* Retrieved from https://www.uofmhealth.org/health-library/sig254759

Wachtel, T. L., Berry, C. C., Wachtel, E. E., & Frank, H. A. (1999). The inter-rater reliability of estimating the size of burns from various burn area chart drawings. *Burns, 26*, 156-170.

Warner, P. M., Coffee, T. L., & Yowler, C. J. (2014). Outpatient burn management. *Surgical Clinics of North America, 94*(4), 879-892.

Watkins, R. (2008). *Models.* Retrieved from https://www.needsassessment.org/namodels.html

Wibbenmeyer, L., Kluesner, K., Wu, H., Eid, A., Heard, J., Mann, B.,…Peek-Asa, C. (2015). Video-enhanced telemedicine improves the care of acutely injured burn patients in a rural state. *Journal of Burn Care and Research, 37*(6), 531-538.

Wiktor, A. J., Madsen, L., Carmichael, H., Smith, T., Zanyk, S., Amani, H., & Wagner, A. L. (2018). Multiregional utilization of a mobile device app for triage and transfer of burn patients. *The Journal of Burn Care and Research*. Advanced online publication. Doi:10.1093/jbcr/iry041

Witkin, B. R. & Altschuld, J. W. (1995). *Planning and conducting needs assessments: A practical guide.* Thousand Oaks, CA: SAGE Publications, Inc.

Appendix A

Burnett Burn Center

Burn Assessment and Management

These guidelines are given to assist emergency personnel in the initial management of a burn patient prior to transfer to the Burn Center.

Accredited by the American Burn Association and the American College of Surgeons

Conduct Initial Assessment

Primary Survey: Use ABCDEF to check the patient's status:

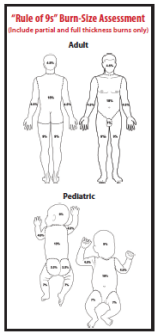
- **A** Airway/C spine immobilization
- **B** Breathing and ventilation
- **C** Circulation
- **D** Disability, neurologic deficit
- **E** Expose (remove all clothing and jewelry) Environmental control (keep warm)
- **F** Fluid

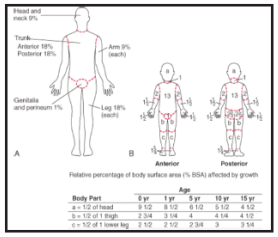
Secondary Survey: Use head-to-toe approach

- Remove all clothing and jewelry
- Quickly assess percentage of skin involved and depth of burn
- Cover patient with clean, dry sheet
- Keep warm: Hypothermia occurs rapidly
- Avoid use of ice or ointments
- If material is stuck to the skin, do no attempt to remove
- For circumferential burns, elevate burn extremity above the level of the heart
- May consider Saran Wrap to reduce heat loss

Calculate the Percent of Total Burn Surface Area (Exclude Erythema)

- Use the "Rule of Nines" to estimate burn size for adult and pediatric patients.
- Use Lund & Browder chart to estimate pediatric percentages by age.
- Include only partial (second degree) and full thickness (third degree) burns.





To Estimate Scattered Burns: The size of the patient's hand (palm with fingers closed) represents 1% of his or her total burn surface area.

Begin Fluid Resuscitation

If burn size is **greater than 10% pediatric or greater than 15% adult**, initiate fluid resuscitation.

Start 2 large-bore IVs (may be inserted through burned skin if necessary). Note: If IVs are started through burn tissue, a tape alternative may be required to ensure securement.

Adults: Start LR at 500mls/hr.

Do not exceed 500mls IVF without discussing ongoing resuscitation needs with a burn attending

Caution: Start IVF at 250 ml/hr for patients who have pre-existing cardiac or pulmonary disease or those more than 70 years old.

Pediatric: Start LR at 20 ml/kg/hr up to 500ml/hr.

Avoid: Fluid challenge unless patient is hypotensive due to trauma

Burn Injury Depth Classifications

First Degree Burn/Superficial

These burns are not included in the percentage of total body surface

- Only epidermis is involved
- Skin is pink, red and dry with no blistering
- Heals in 3-5 days, usually does not scar
- Minimal risk of infection

Second Degree Burn/Partial Thickness

- Epidermis and dermis involved
- Skin is bright red, pearl-pink, painful and moist.
- May have small to large blisters
- Rapid fluid loss may occur with large burns
- Heals in 10 days -2 weeks
- Pain control indicated
- **Fluid resuscitation may be indicated**
- **Capillary refill present**

Third Degree Burn/Full Thickness

- Epidermis and dermis destroyed
- Fascia and muscle may be involved
- Appears tan, leathery, charred or white and may be depressed below surrounding tissue
- Painful at edge of burn, otherwise insensate
- Pain control indicated
- **Fluid resuscitation may be indicated**
- **Capillary refill absent**

Special Types of Burn Management

Chemical Burns

- Remove contaminated clothing
- Brush off powder and solid chemicals from clothing
- Irrigate involved skin with water or saline for at least 20 minutes or until the burning sensation is relieved

Caution: Do not delay transporting patient; may need to continue irrigation en route.

Electrical Burns

The danger from an electrical shock depends on voltage, current, pathway and co-morbidities.

- **Initiate fluid resuscitation regardless of burn size.**
- Assess for associated injuries:
  - Cardiac arrest
  - Dysrhythmias – treat per ACLS protocol
  - Respiratory failure
  - Muscle pain and contractions
  - Seizures
  - Numbness and tingling
  - Unconsciousness
- Special Circumstances: High-voltage electrical injuries require trauma immobilization and evaluation.

Flame/Scald/Contact Burns

- Remove all clothing and items such as jewelry
- Cover the burned area loosely with a dry dressing or clean sheets/blankets
- Do not apply ice or ointments
- May need to initiate fluid resuscitation

Smoke Inhalation

- Administer 100% oxygen.
- Monitor patency of airway closely

Contact the Burn Center for definitive management.

When to Refer a Patient to the Burn Center

The American Burn Association identifies the following burn injuries and conditions as criteria for referral to a certified Burn Center.

1. Second degree (partial thickness) burns that are greater than 10% of the total body surface area.
2. Burns that involve the face, hands, feet, genitalia, perineum or major joints.
3. Third degree (full thickness) burns in any age group.
4. Electrical burns, including lightning injury.
5. Chemical burns.
6. Inhalation injury.
7. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery or affect mortality.
8. Any patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greater risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient's condition may be stabilized initially in a trauma center before transfer to a burn center. Physician judgment is necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
9. Burned children in hospitals that don't have qualified personnel or appropriate equipment for the care of children.
10. Patients with burn injury who will require special social, emotional, or rehabilitative intervention.

Excerpted from *Guidelines for the Operation of Burn Centers* (pp. 79-86), Resources for Optimal Care of the Injured Patient 2006, Committee on Trauma, American College of Surgeons.

About the Burnett Burn Center

The Gene and Barbara Burnett Burn Center is the only adult burn center in the greater Kansas City area that is accredited by the American Burn Association and the American College of Surgeons.

The multidisciplinary burn team provides long-term continuity of care for adult and pediatric patients whose injuries require specialized treatment and rehabilitation.

We treat all types of burns and wounds including:

- Chemical, electrical, flame and scald burns
- Large areas of skin loss from accidents or disease processes (e.g., toxic epidermal necrolysis, severe dermatitis or necrotizing fasciitis), which can result in extensive chronic wounds that are difficult to heal.

The Burnett Burn Center offers state-of-the-art equipment, an on-site operating room, hydrotherapy, and complete rehab and support services for adults and children. Services include:

- Plastic surgery and reconstruction
- Occupational and physical therapy/hand rehabilitation
- School re-entry program
- Family and burn survivor support
- Outpatient Burn and Wound Care Clinic
- Burn prevention and awareness resources

Call our Transfer Center toll free at

877-738-7286

for urgent or same-day admissions, or questions about acute burn injuries and urgent or emergent problems related to burns or wounds

For information regarding small burn management or to make a referral, call the Outpatient Burn and Wound Clinic at 913-588-5475.

Appendix B

THE UNIVERSITY OF KANSAS HEALTH SYSTEM

Burnett Burn Center
Admission Call Record

NOTE: A * ☐ indicates exclusion for direct admission and the patient must stop in the KU ED

Date: Choose an item. Time (of call): Referring Hospital: Location:
Referring Phone Number: Name of Referring Physician: Name of RN at Referring Hospital:
Name of Patient: Age: DOB: Male ☐ Female ☐ MRN
Medical History (to include ETOH/substance abuse:

Nature and Extent of Current Injury:

1. Exact Time of Injury: Place: ☐ outside ☐ inside
2. Circumstances of Injury:

Fall:	Yes * ☐ No ☐	MVA:	
	Yes *☐ No ☐		
Explosion:	Yes *☐ No ☐	Other with Suspicion for trauma:	
	Yes *☐ No ☐		
Unknown mechanism	Yes *☐ No ☐	Found down in a house fire	
	Yes *☐ No ☐		
High Voltage Electrical (>1000v.)	Yes *☐ No ☐	Other:	

☐ Flame Source of Flame:
☐ Contact Source of Contact: warming Blanket
☐ Scald Type of Liquid:
☐ Chemical Type: Has decon. been completed? Yes ☐ No*☐
☐ Electrical Source of Contact: High Voltage: Yes *☐ No ☐
☐ Radiation Type:
☐ Inhalation Injury Signs/Symptoms:
☐ Skin condition/other:

3. Areas of Injury and Total TBSA % (exclude 1st degree):

4. Associated Injuries: Choose an item.
5. Current VS and respiratory status indicative of imminent failure/arrest: Yes *☐ No ☐

BP: HR: RR: SpO2: Temp: EtCO2:
IVF/Rate: Foley: Yes *☐ No ☐ Oxygen/route: Dressings/Coverings:
Tetanus Toxoid Administered: Yes ☐ No ☐ Narcotics Administered/Dose and Route:
Mode of Transport: Estimated Time of Arrival: Departure Time from Referring Facility:
Confirmed by phone call/RN initials:

Name of Burn Center medical team member to be present at time of admission:

Patient Accepted for Admission to the Burn Center: Yes *☐ No ☐ Accepting Physician:

For Direct Admission: Yes *☐ No ☐ (Check "no" if a * ☐ indicates stop point/exclusion for direct admission)

Through Emergency Department: Yes ☐ No ☐

Follow-up in OBWCC: Yes *☐ No ☐ **Date of appointment:** **Time:** ☐ **1030** ☐ **1300** **(Select One)**

(If Yes fax email form to woundclinic@kumc.edu, Karla Oberle, and Jennifer Parks)

Pt. phone number: **Pt. Street Address:** **Pt. Zip code**

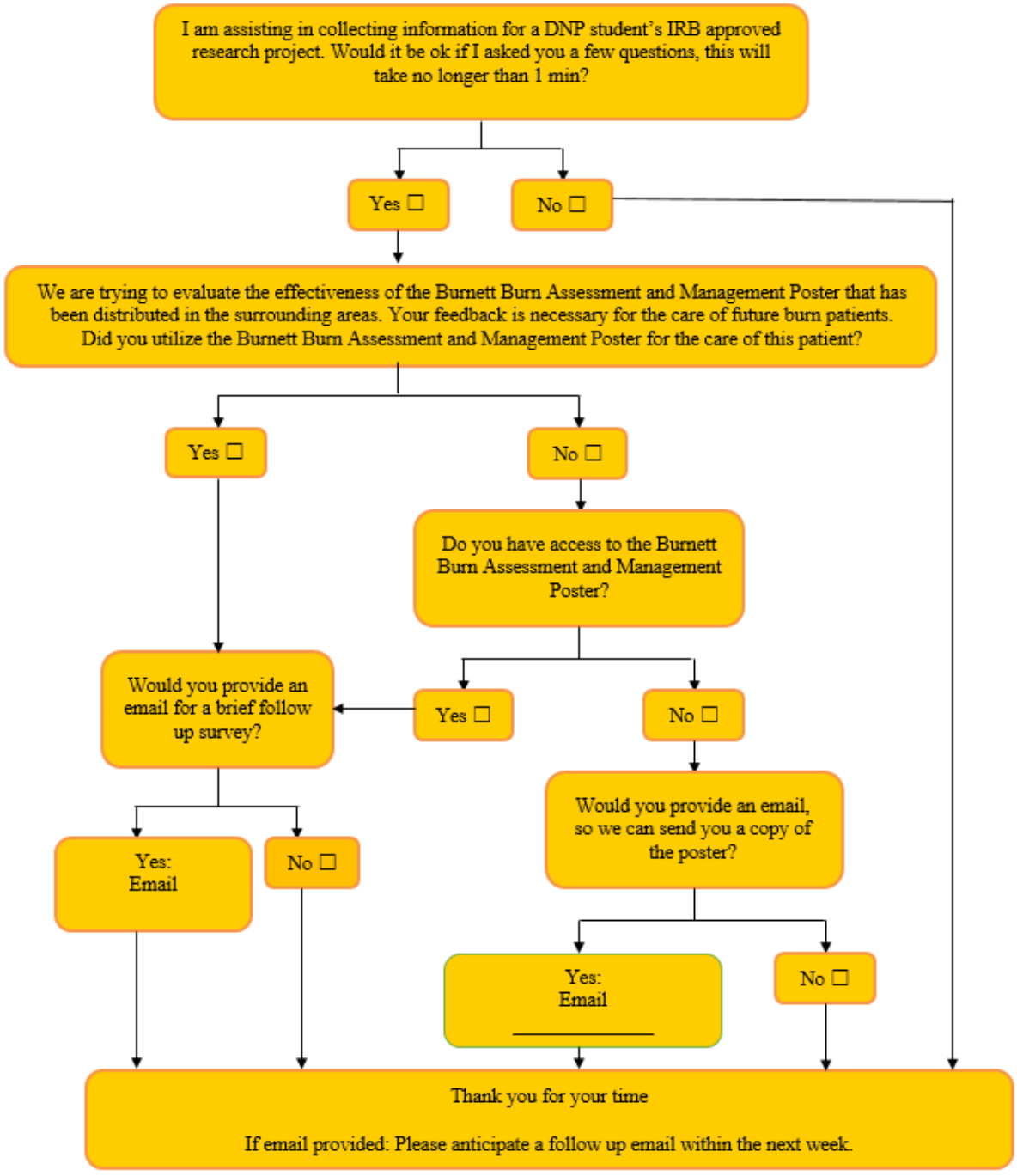
Insurance: Yes *☐ No ☐ **If Yes / Insurance Provider:**

Burn Center Unit Coordinator / Charge Nurse Signature:

THIS FORM IS NOT PART OF THE MEDICAL RECORD- DO NOT SCAN

NUR52-1051
Revised 08/07, 01/11, 7/13, 3/15,11/16,4/17,Reviewed 02/05, 02/07, 2/08

Appendix C


I am assisting in collecting information for a DNP student's IRB approved research project. Would it be ok if I asked you a few questions, this will take no longer than 1 min?
Yes ☐
No ☐
We are trying to evaluate the effectiveness of the Burnett Burn Assessment and Management Poster that has been distributed in the surrounding areas. Your feedback is necessary for the care of future burn patients. Did you utilize the Burnett Burn Assessment and Management Poster for the care of this patient?
Yes ☐
No ☐
Do you have access to the Burnett Burn Assessment and Management Poster?
Would you provide an email for a brief follow up survey?
Yes ☐
No ☐
Yes: Email
No ☐
Would you provide an email, so we can send you a copy of the poster?
Yes: Email _____
No ☐
Thank you for your time
If email provided: Please anticipate a follow up email within the next week.

Appendix D

Burnett Burn Assessment and Management Tool (BBAMT) Survey					
Providers years of experience	0-2 yrs. ☐	3-5 yrs. ☐	6-9 yrs. ☐	10-15 yrs. ☐	15+ yrs. ☐
Education Level					
Zip Code					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The BBAMT is easily accessible at your hospital or clinic	1	2	3	4	5
The BBAMT is easy to understand	1	2	3	4	5
I feel confident using the BBAMT	1	2	3	4	5
The BBAMT is helpful when determining burn percentage of total body surface area (%TBSA)	1	2	3	4	5
The BBAMT is helpful when determining burn depth	1	2	3	4	5
When determining to refer to inpatient or outpatient the BBAMT is helpful	1	2	3	4	5
Is there anything else you would like to tell us about the BBAMT (Improvements; Positives; Negatives; Barriers)					