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Development and Preliminary Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©

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DEVELOPMENT AND PRELIMINARY PSYCHOMETRIC TESTING OF THE
DRAKE ATRIAL ELECTROGRAM ASSESSMENT SURVEY: DAEGAS©

A DISSERTATION
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN NURSING

THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT HOUSTON
CIZIK SCHOOL OF NURSING

BY

JEANETTE DRAKE, PhD, RN, ACNP-BC

AUGUST 2020
To the Dean for the School of Nursing:


I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Nursing.

Sandra K. Hanneman, PhD, RN, FAAN
Committee Chair

We have read this dissertation and recommend its acceptance:

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Acknowledgements

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Sincere appreciation to Melanie McEwen, PhD and Elda Ramirez, PhD for serving as Nursing Faculty Committee members and for valuable feedback and shared passion for nursing education and patient care.

Deepest gratitude to Sandra K. Hanneman, PhD, for guidance through this entire process; for providing opportunities that opened amazing doors; for support, encouragement, and generous sharing of resources gathered through a lifetime of experience; and for expecting excellence (No GIGO). Your investment in my education is invaluable and a gift I will always treasure.

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Dedication

To my family and friends who continue to be a source of strength, encouragement, insight, and humor and especially to my parents, whose unfailing love, example, and support encourage me to challenge myself.

“That which we persist in doing becomes easier, not that the task itself has become easier, but that our ability to perform it has improved.”

Ralph Waldo Emerson
US essayist & poet (1803 – 1882)

To my patients, who inspire me every day.

To my friend and mentor, Denise LeDoux, APRN, who taught me about AEGs and inspired this idea in the first place.
Abstract

Title: Development and Preliminary Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©

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Background: Critical care nurses (CCNs) who care for postoperative cardiac surgery patients need specialty knowledge, for example, knowledge of atrial electrograms (AEGs). An inadequate audit trail exists for psychometric performance of instruments to measure CCN knowledge of AEGs. A 29-item survey previously pilot tested with a convenience sample of CCNs in the Pacific Northwest had a Kuder-Richardson-20 estimate of internal consistency of .75. The survey was revised to 20 items (14 knowledge and 6 AEG interpretation) and named the Drake Atrial Electrogram Assessment Survey (DAEGAS).

Objectives: The study objectives were to assess evidence for content validity (content validity index, CVI) and internal consistency (Cronbach’s α) and stability (correlation coefficient, r) reliability of the DAEGAS.

Methods: A panel of six AEG experts reviewed the DAEGAS for content validity evidence. The instrument was further revised to 19 items (13 knowledge and 6 AEG interpretation) based on expert feedback. Internal consistency and stability (test/retest; 2-week interval) was assessed with 76 CCNs from the greater Houston metropolitan area. Analyses included descriptive statistics for demographics, content validity index (CVI), Cronbach’s α, and r. The a priori criterion for all psychometric tests was ≥ .80.
Results: The CVI was .93. Cronbach’s α was .51 and test-retest r was .74. Cronbach’s α increased to .60 and r was .73 with removal of three items: two with negative item-total correlation and one that transitioned to a sample question.

Conclusions: Content validity evidence exceeded the a priori criterion. Internal consistency and stability reliability estimates did not meet the a priori criterion, albeit the latter met the criterion recommended by psychometricians for a new instrument. Recommendations include further development of the DAEGAS to improve internal consistency estimates and testing for evidence of other forms of validity such as construct and/or criterion-related. Reliable and valid assessment of CCN knowledge of AEGs will require improved psychometric performance of the DAEGAS.

Key words: atrial electrogram, critical care, instrument, knowledge, psychometrics
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Summary of Study

The dissertation consists of three major sections. The proposal represents work approved by the Dissertation Committee during the proposal defense. The manuscript “Development and Preliminary Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©” contains the study findings. The appendixes include study approvals and materials not included in the proposal or manuscript.

A repeated measures study design was used to address the dissertation objective to estimate stability reliability of the DAEGAS. Two phases of psychometric testing were proposed. Phase 1 would be conducted with a convenience sample of 30 critical care nurses (CCNs), recruited from hospitals with cardiac surgery programs in the greater Houston metropolitan area, to assess estimates of internal consistency and stability reliability of the newly developed DAEGAS. Phase 2 would expand recruitment to a national, randomly selected sample of 5,000 members of the American Association of Critical Care Nurses (AACN) to assess construct validity evidence through factor analysis.

During the proposal defense, the Dissertation Committee recommended adding three additional items to the Demographic Data Sheet: (a) CCN-estimated percentage of patients with temporary atrial and ventricular epicardial pacing wires, (b) estimated frequency of CCN access to atrial wires to perform AEGs, and (c) CCN rating of how valuable the atrial wires are for diagnosis and treatment of cardiac dysrhythmias, using Likert-type scale response options from 1 (not valuable) to 5 (very valuable); the dissertation proposal was revised accordingly. The University of Texas Health Science Center at Houston, The Houston Methodist Hospital, and CHI St. Luke’s Institutional Review Boards (IRBs) approved the study (Appendix A). Completion of the survey
implied informed consent, and the IRBs approved a verbal script for recruitment (Appendix B). Each hospital gave permission to recruit CCNs on-site.

With approval of the Dissertation Committee Chair, changes were made to the study after the proposal defense. A detailed study protocol is in Appendix C. The sample size remained 5,300 for both proposed study phases combined, but restrictions were removed from study sample size and the IRBs approved recruitment of 5,300 CCNs to obtain 308 participants. The IRBs approved the distribution of a one-time test and/or retest reminder card (if return surveys were not received within two weeks of the initial recruiting session or the time the retest survey was mailed to the participant) (Appendix D). Finally, the primary IRB approved additional hospital sites for local recruitment.

Recruiting took place between July 2019 and December 2019 and analyses were completed on 76 test and 55 retest surveys. Internal consistency and stability reliability results did not meet the a priori criterion. The principal investigator (PI) revised the DAEGAS, and expanded Phase 1 recruitment. Items with a negative item-total correlation were revised for clarity and organization, based on participant feedback and consultation with a psychometric survey development expert. Answer options for Items 8 and 9 were decreased from four to two, answer options were clarified (without substantial changes to content), and formatting of several of the item stems and instructions were adjusted.

Recruitment sites were added to total 10 hospitals. Recruitment resumed in December 2019 and continued until restrictions related to the COVID-19 pandemic stopped in-person recruiting (Appendix E). The last participant enrolled February 28, 2020. Follow-up contact with participants via U.S. Mail continued. A total of six test and
two retest surveys were received between March and May 2020; three were removed from analysis because of missing data and the last survey, received May 12, 2020, was marked return to sender/unable to forward. Total sample size for the second round of recruiting was 45 test and 17 retest completed surveys. Data analysis on this sample was not useful and, because of the intervening revisions to the DAEGAS, the data could not be added to the total number of participants from the first round of recruiting. Therefore, results from the initial sample (76 test and 55 retest) are reported in the manuscript.

Despite the small sample size (N = 76), factor analysis was attempted using exploratory factor analysis with principal axis factoring and both oblique and orthogonal rotations (Appendix F). As expected, an optimal, stable solution was not forthcoming. Nonetheless, the attempts laid the framework for future validity testing with the larger, randomly selected national sample of 5,000 CCNs.

The DAEGAS was revised with transition of Item 1 (relevant but not essential content) to a sample question, removal of Items 8 and 9 (relevant but not essential content, and improvements to clarity and organization for all items. The resulting version of the DAEGAS has 16 items and is included in the manuscript. An audit trail of the revisions made is in Appendix G.

Only Phase 1 of the proposed study was completed. The dissertation includes testing of the DAEGAS for evidence of content validity with a panel of experts and item analysis to determine item difficulty and discrimination parameters. The major issue faced with preliminary psychometric testing of the DAEGAS is that the reliability estimates did not meet the a priori criterion. Factor analysis is recommended for future testing of the DAEGAS.
Development and Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©

Dissertation Proposal

Submitted to:
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by
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May 10, 2019
Specific Aims

It is essential that critical care nurses (CCNs) who care for cardiac surgery patients recognize changes in cardiac rhythms and implement appropriate and timely interventions. Atrial dysrhythmias occur in up to 65% of patients within the first few days following cardiac surgery (Maisel, Rawn, & Stevenson, 2001). Because the anatomical origin of the dysrhythmia may be difficult to determine, temporary epicardial pacing wires may be placed in the atria during surgery. The wires can be used to obtain an atrial electrogram (AEG) and facilitate postoperative dysrhythmia diagnosis and treatment (LeDoux, 2010).

The overall objective of the proposed study is to perform psychometric testing of the newly developed Drake Atrial Electrogram Assessment Survey (DAEGAS)©. The purpose of this instrument is to assess CCN knowledge of selected postoperative dysrhythmias using AEGs. With CCNs who care for patients after cardiac surgery, the specific aims are to assess:

1. Internal consistency and stability reliability estimates of the DAEGAS, and
2. Construct validity evidence for the DAEGAS through factor analysis.

At the completion of the proposed research, the expected outcome is the availability of an instrument with evidence of adequate reliability and validity that can be used to assess CCN knowledge of AEGs. This outcome is expected to have an important positive impact because it will provide a psychometrically sound instrument that could be used for future research and to improve practice by providing direction for education related to early and accurate identification of potential rhythm problems; the latter would facilitate appropriate interventions in a variety of cardiac surgery patient care settings. Potential
benefits include improved patient outcomes, lower lengths of ICU and hospital stays, and cost of hospitalization for postoperative cardiac surgery patients. If psychometric testing does not yield evidence of adequate reliability and validity, the DAEGAS will need further revision and evaluation.

**Research Strategy**

**Significance**

Dysrhythmias frequently occur after cardiac surgery and atrial dysrhythmias are the most common (LeDoux, 2010). A review of the literature revealed the usefulness of AEGs in different postoperative cardiac surgery settings: differentiation among varieties of dysrhythmias because AEGs demonstrate augmented P waves (Batra & Balaji, 2008), and definitive diagnosis when the standard 12-lead electrocardiogram (ECG) displays absent P waves and irregular or high-rate rhythms (>150 beats per minute) (Raiten, Patel, & Gutsche, 2015). Practice standards for electrocardiographic monitoring in hospital settings, a scientific statement published by the American Heart Association (AHA), highlight the ability of AEGs to verify atrial activity and encourage their use when diagnosing selected cardiac dysrhythmias in the postoperative cardiac surgery patient population (AHA, 2005). AEGs are valuable because they provide visualization of atrial activity not clearly detected on surface ECG, clarify the relationship between atrial and ventricular activity, and define wide QRS complex rhythms and narrow complex tachydysrhythmias (McRae, 2017).

Miller and Drew (2007) surveyed CCNs (N = 227) who cared for cardiac surgery patients and found that 92% recorded AEGs. When patients had temporary epicardial atrial pacing wires, they were left in place for 1-3 days after cardiac surgery (47%) or
until discharge (26%). Despite the availability of wires for AEG recording, a minority of respondents recorded AEGs often (10%); most (90%) recorded AEGs infrequently or not at all. The authors concluded that understanding how to use and interpret AEGs is valuable because associated clinical decision making could improve patient care and affect morbidity, length of stay, and cost of hospitalization.

Prior studies describing CCN knowledge of postoperative dysrhythmias and AEGs were difficult to locate. Investigator-developed instruments have been used (McRae, Chan, & Imperial-Perez, 2010; Preston, Currey, & Considine, 2015) but the authors did not report evidence for adequate reliability and validity of these instruments.

McRae et al. (2010) developed a new instrument and reported that a panel of content experts from three sites reviewed it for content validity, but the authors did not report selection criteria, number of experts, or quantitative assessment of the expert reviews. A pilot study with six nurses was conducted at one site to evaluate clarity of the instrument and no changes were made based on the results. The main study was then conducted using a repeated measures design. The first test presented five cardiac rhythms without AEG data and the second test included the same five cardiac rhythms with corresponding AEG recordings. The rhythms were chosen based on the AHA practice guidelines (Drew et al., 2005) and the participants (N = 261) were asked to provide rhythm diagnosis. Although the respondents reported that AEGs were easy to perform (very easy = 42%, moderately easy = 36%), the frequency of AEG use was not encouraging as 57% reported using them less than monthly, 24% monthly, 12% weekly, and only 3% daily. Opportunities to perform AEGs existed at each study site because most patients had temporary epicardial atrial pacing wires in place.
Preston et al., (2015) developed two new instruments and reported that content and face validity estimates of both instruments were established by two CCNs and two post-doctoral nurse researchers who reviewed the instruments for question order, content, and clarity. Both instruments drew from a bank of case studies that were reviewed for tracing quality, clarity, and interpretation by three experts including an electrophysiologist, a cardiac surgery nurse educator and cardiac pacemaker rhythm specialist. The authors reported the experts job titles but did not include a quantitative assessment of the reviews. The authors reported 100% inter-rater reliability in scoring the instruments.

Attempts to establish psychometric evidence for reliability and validity should be an integral part of instrument development. Each of the studies that reported using newly developed instruments to assess CCN knowledge of AEGs were reviewed and the evidence was weak.

**Theoretical framework**

The theoretical framework guiding the proposed research is Classical Test Theory (CTT). The aims of CTT, a model for random error assessment (Waltz, Strickland, & Lenz, 2010), are to understand and improve the reliability of psychometric instruments. The theory asserts that an observed score is composed of a true score plus random error (DeVellis, 2017) (Figure 1); random error must be considered in all measurement (Carmines & Zeller, 1979).
Reliability refers to the consistency with which an instrument performs and is a fundamental principle of CTT (DeVellis, 2017). Internal consistency, using Cronbach’s alpha (α), is a method for estimating the reliability of a multiple-item instrument; the recommendation for α level is ≥ .80 (Nunnally & Bernstein, 1994). Because error is random, internal consistency should be tested with each administration. The test-retest method, which reflects stability of results over time, indicates the degree that an instrument is free from random measurement error (Waltz, Strickland, & Lenz, 2010). The property of stability reliability assumes a stable phenomenon; thus, the interval between test and retest should be short enough to assure no change in the phenomenon between the testing periods and long enough to avoid recall. Nunnally and Bernstein recommended an interval of 2 – 4 weeks. Furthermore, those authors emphasized that reliability is a necessary but insufficient condition for validity, the extent to which an instrument measures what it claims to measure. The goal is to have an instrument that demonstrates evidence of adequate reliability and validity.

**Innovation**

Psychometric testing will be performed for the DAEGAS – a new, investigator-developed instrument to assess CCN knowledge of AEGs. If adequate evidence of reliability and validity is found, the DAEGAS could provide reproducible assessment of
AEG knowledge and direct development of focused educational offerings and orientation for nurses, residents, and fellows (surgery and cardiology specialties), and contribute to translating the importance of AEGs and the skill to use them into practice. Providing bedside nurses with AEG training based on reliable and valid assessment of their knowledge may be instrumental in creating positive outcomes for patients and staff.

**Preliminary Studies**

Because no instrument to assess CCN knowledge of AEGs with adequate evidence of reliability and validity was located, the principal investigator (PI) previously pilot-tested a newly developed instrument (precursor to the DAEGAS or pDAEGAS) to assess CCN knowledge of AEGs. The instrument was developed based on a thorough review of the literature including practice standards set forth by the American Association of Critical Care Nurses (AACN), using the American Nurses Association Guide to Test Item Development, and direction from an expert panel. The expert panel consisted of two nurse researchers and one nurse practitioner with combined experience that included acute care/cardiac surgery certification, experience caring for postoperative cardiac surgery patients, knowledge of AEGs, and publication in a nursing textbook chapter on AEGs. The PI reported details regarding the selection of and instructions to the content expert panel, but not a quantitative assessment of their findings (Drake, 2007). The PI administered the pDAEGAS to 32 CCNs who cared for postoperative cardiac surgery patients in the Pacific Northwest. The data were analyzed with an item analysis that included discrimination and difficulty parameters for each item and the Kuder-Richardson-20 (KR-20) estimate of internal consistency. The KR-20 was .75 (Drake), which is lower than the recommended > .80 (Nunnally & Bernstein, 1994).
Recently, the pDAEGAS was revised and changes were made to the content, length, and format of the instrument, now the DAEGAS. Content validity testing of the DAEGAS was completed with an expert panel of researchers, educators, and nurse and physician clinicians. Experts were chosen based on history of publications in refereed journals or textbooks and ≥ 5 years clinical experience with AEG monitoring. Six experts participated in the review of the DAEGAS. This number of experts was chosen to establish content validity evidence with control for chance agreement (Lynn, 1985). Testing included calculation of the content validity index (CVI) for each individual item and the entire instrument. The a priori criterion for adequate evidence of content validity was CVI ≥ .80 (Lynn). The CVI for the DAEGAS was .93. Results for individual items were CVI = .67-1.0. Three items scored .67 (below a priori criterion); two were revised per reviewer comments and one was removed from the instrument. Minor changes were made to the wording of several items (stem and/or answer options), based on expert reviewer comments, and cleaner copies were provided for some of the ECG and AEG rhythm strips.

**Approach**

**Research Design and Setting**

This project will consist of two phases. First, a repeated-measures pilot study will be conducted with local CCNs (using paper and pencil format) to estimate internal consistency and stability reliability of the DAEGAS (Phase 1). Revision of the instrument will be done if Phase 1 results do not meet a priori criteria. Second, a cross-sectional design will be used with random sampling of a larger, national sample (using paper and
pencil format) to estimate internal consistency reliability and construct validity evidence for the DAEGAS (Phase 2).

Sample and Sampling Procedures

Inclusion criteria for study participation during both phases include: (1) registered nurse who works in a critical care unit with patients who have temporary epicardial atrial pacing wires; and (2) employed full-time (> 36 hours/week), part-time (20-36 hours/week), or per-diem. Nurses who care for postoperative cardiac surgery patients without temporary epicardial atrial pacing wires will be excluded from study participation.

A pilot study (Phase 1) will be conducted with a local convenience sample of 30 CCNs, recruited from centers with cardiac surgery programs in the greater Houston area, to assess estimates of internal consistency and stability reliability (Specific Aim 1). The PI will recruit participants and administer each step of Phase 1 (Appendix A).

For Phase 2, a national, randomly selected subset (N = 5,000) of AACN members will be recruited to assess internal consistency and construct validity estimates of the DAEGAS (Specific Aim 2). The subset will be nurses who work in units that care for patients with temporary epicardial atrial pacing wires (e.g., CVICU, CCU, SICU, Telemetry, etc.). AACN has >100,000 members and member demographics demonstrate gender, racial, ethnic, and age diversity, characteristics that are desirable for generalizing psychometric performance of the DAEGAS across the United States population of CCNs. Approximately 50,000 members have elected to receive from AACN requests to participate in research. From these members, AACN will select randomly 5,000 nurse members who work in critical care or telemetry.
With respect to construct validity testing, Nunnally and Bernstein (1994) suggested 10 to 15 participants per instrument item to achieve an adequate sample size for factor analysis. The DAEGAS has 19 items, and the target sample size is 285 CCNs who complete the instrument. Although a sample size of 200 is adequate in most cases for factor analysis on instruments that have \( \leq 40 \) items (Comrey, 1988), a larger sample size increases generalizability of the conclusions (DeVellis, 2017). To account for a low response rate and incomplete responses, 5,000 randomly selected potential participants will be invited to participate.

**Instruments**

The DAEGAS is a 19-item, multiple-choice response, self-administered instrument (Appendix B) that takes approximately 15-20 minutes to complete. It was designed to assess CCN knowledge of AEGs. Six rhythm analysis questions include both ECG and AEG tracings. The Demographic Data Sheet consists of eight items, the first of which determines CCN eligibility to participate in the study; the other items will be used to describe the sample and compare it with AACN membership demographics to ascertain generalizability of study results.

**Data Collection Procedures**

Data collection will commence after approval from the dissertation committee, the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects, and additional institutional review boards required by the local hospitals whose CCNs will be recruited for the Phase 1 pilot study.

For Phase 1, participants will be recruited from critical care and telemetry units of hospitals in the greater Houston metropolitan area (Specific Aim1). The PI will contact
individual hospitals to arrange for sessions (formal/informal) to provide information about the study, answer questions, and recruit participants (Appendix C). The PI will distribute the DAEGAS in paper and pencil format. Nurses who agree to participate in the pilot study will receive a packet containing a test cover letter (Appendix D), Demographic Data Sheet (Appendix E), the DAEGAS, and a pre-addressed, stamped return envelope. Participants will be directed to place the completed Demographic Data Sheet and DAEGAS in the return envelope and mail it as soon as possible. After 2 weeks, participants who complete the first test will be mailed a second study packet containing the retest cover letter (Appendix F), the DAEGAS, and a pre-addressed, stamped return envelope. Participants will be directed to place the completed DAEGAS in the return envelope and mail it as soon as possible. Completed survey packets will be returned to the PI’s mailbox at the University of Texas Health Science Center at Houston Cizik School of Nursing. The returned forms will be matched by code number along with the pre-test designation of A or post-test designation of B per protocol.

For Phase 2, AACN will identify the subpopulation required for Specific Aim 2, randomize potential participant selection, and send labels with potential participant addresses to a third-party vendor that will prepare and mail the study packets. AACN requires that the third-party vendor sign a mailhouse agreement that states they will only use the labels for a one-time mailing; maintain confidentiality of the database; and shall not sell, use, reuse, reproduce, disclose or distribute the mailing list for any other purpose. The PI will not have access to participant information which will ensure anonymity. The third-party vendor will distribute a packet containing a cover letter
(Appendix G), the Demographic Data Sheet, the DAEGAS, and pre-addressed and stamped envelope for survey return.

**Data Management and Analysis**

Surveys with incomplete responses will be excluded from data analysis for both Phase 1 and Phase 2. A database of participant responses will be constructed and then imported into SPSS statistical software (Version 25, IBM Corp, Armonk, New York). Distribution of the data will be assessed by the Kolmogorov-Smirnov test for normality and histograms for both study phases. Demographic characteristics of the sample will be presented using descriptive statistics appropriate for the level of datum and its distribution. For Phase 1, internal consistency reliability of the DAEGAS will be assessed using Cronbach’s $\alpha$; test-retest reliability will be assessed using Pearson’s correlation coefficient, $r$. As mentioned, the a priori criterion for adequate evidence of reliability will be $> .80$ (Nunnally & Bernstein, 1994). For Phase 2, Cronbach’s $\alpha$ and exploratory factor analysis with principal axis factoring will be used to assess construct validity evidence of the data from the national sample. Models will be tested with oblique and orthogonal rotations to determine the optimal solution with factor loading $> .30$, cross loading of $> .20$, and $\geq 3$ items loaded on a factor (Algamdi & Hanneman, 2018; Ferguson & Cox, 1993).

**Study Limitations**

A potential problem is reduced generalizability of study findings due to a low response rate. The PI will work closely with AACN and the third-party mailing house to identify and resolve any issues that arise (e.g., wrong addresses). The mailing list is limited to one use and prohibits sending a reminder notification to improve participation.
An additional random sampling frame of ≥ 1,000 AACN members may be contacted, after IRB approval, if needed to obtain the target sample of 285 completed surveys. An electronic version could be posted to the AACN website research page and an invitation to participate could be sent to members via the AACN electronic newsletter but the response rate for this approach has resulted in very low rates of return as noted by others (Hiler, Hickman, Reimer & Wilson, 2019).

**Study Timeline**

The study is expected to be conducted over a 9 - 12 month period, with Phase 1 conducted during the months of April, May, and June 2019, and Phase 2 thereafter (Appendix H).

**Human Subjects**

No risks for participants in this study are anticipated. A statement that participation in this study is voluntary and that completion of the survey will imply informed consent will be included in the cover letters. Confidentiality will be maintained for the Phase 1 sample and participants in Phase 2 will be anonymous to the PI and dissertation committee members. Demographic data will be aggregated when study results are published and presented.
References


*International Journal of Selection and Assessment, 1*(2), 84-94.


Appendix A

Study Protocol
Study Protocol

Development and Psychometric Testing of the Drake Atrial Electrogram Assessment Survey (DAEGAS©)

Obtain Approvals

1. Obtain approval for the study (Phase 1 and Phase 2) from the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects.
2. Obtain Phase 1 study approvals from hospitals in the Houston metropolitan area and their institutional review boards, if required.

Local Pilot Study (Phase 1)

Assemble supplies

1. Cover letter (on Cizik School of Nursing letterhead) for pilot study (200)
2. Demographic Data Sheet (100)
3. Original printed copies of the DAEGAS (200)
4. Envelopes (200): 100 to mail study forms to participants and 100 pre-addressed and stamped for return of completed study forms
5. First-class stamps (200)
6. Labels (200): 100 for mail to participants and 100 for pre-addressed envelopes

Administer DAEGAS twice (test-retest and internal consistency)

1. Recruit volunteer CCNs (N = 30) from hospitals with cardiac surgery programs in the greater Houston region
   1.1 Contact individual hospitals via email/phone and in person; work closely with unit leadership contacts at each hospital; connect with CCN staff via email and/or in person; meet with participants in person to begin the study
   1.2 Obtain participant’s mailing address
2. Assign each participant a study identification code number (first initial of last name and number beginning with X01, X02, X03…X30) followed by A (for test) or B (for retest)
3. Mail test packets: test cover letter, demographic data sheet, DAEGAS, and pre-addressed and stamped return envelope
4. Review returned test study packets; if incomplete responses noted, exclude from analysis
5. Wait 2 weeks
6. Mail retest study packets: retest cover letter, DAEGAS, and pre-addressed and stamped return envelope
7. Review returned retest study packets; if incomplete responses noted, exclude from analysis
8. Construct database (using Excel) and import into SPSS statistical software (Version 25)
9. Test for internal consistency (Cronbach’s α) and test-retest stability reliability (Pearson’s correlation coefficient, r)
10. Compare results against a priori criterion (≥ .80)

**National Study (Phase 2)**

**Assemble supplies**

1. Electronic versions of study Cover letter (on Cizik School of Nursing letterhead), Demographic Data Sheet, and DAEGAS for third-party mailing house
2. Mail house agreement from the American Association of Critical Care Nurses (AACN); available online
3. Credit card: payment to AACN for mailing list rental and third-party mailing house services
4. AACN website has list rental service information online at [www.aacn.org](http://www.aacn.org) then search list rental; send specific questions to listrental@aacn.org

**Administer DAEGAS to national sample**

1. Contact AACN and place order for 5,000 randomly selected CCN members who work in units that care for patients with temporary epicardial atrial pacing wires
2. Provide third-party mailing house with the mailing house agreement (available on the AACN website with list rental information); contents for study packets (cover letter, demographic data sheet, DAEGAS, and pre-addressed, stamped return envelope); and return address for the PI’s mailbox at the University of Texas Health Science Center Cizik School of Nursing
3. Allow participants 4 weeks to return completed packets
4. Review returned study packets; if incomplete responses noted, exclude from analysis
5. Construct database in Excel and import into SPSS statistical software
6. Analyze data
   a. run descriptive statistics on the demographics and DAEGAS items
   b. run internal consistency
   c. assess distribution of the data with histogram and Kolmogorov-Smirnov test
   d. run exploratory factor analyses with principal axis factoring and both oblique and orthogonal rotations
7. Compare the Cronbach’s alpha and optimal factor analysis solution against a priori criteria
Appendix B

Drake Atrial Electrogram Assessment Survey (DAEGAS©)
Drake Atrial Electrogram Assessment Survey (DAEGAS®)

Circle the letter corresponding to the best answer for each item.

1. Dysrhythmias can result from abnormalities of:
   a. Impulse initiation
   b. Conduction
   c. Both impulse initiation and conduction
   d. Neither impulse initiation nor conduction

2. Heart block dysrhythmia commonly occurs after valve surgery (aortic/mitral) due to:
   a. Hypovolemia
   b. Edema near the conduction system
   c. Sympathomimetic drugs
   d. Decreased cardiac output

3. P waves may be absent or unclear on electrocardiogram (ECG) for all the following except:
   a. Small amplitude produced by depolarization of the ventricle
   b. Small amplitude produced by depolarization of the atria and/or artifact
   c. Distance of the sensing electrodes from the heart
   d. Superimposition of the QRS complex and/or T wave

4. An atrial electrogram (AEG) can be obtained by:
   a. Recording a rhythm tracing using the ground lead that is attached directly to the surface of the chest wall
   b. Recording a rhythm tracing using an epicardial pacing wire that is attached directly to the atrial epicardium
   c. Recording a rhythm tracing using Leads I or II
   d. Recording a rhythm tracing using Lead V1

5. To obtain an atrial electrogram (AEG), it is most important to:
   a. Get a written/verbal order from the physician
   b. Use the portable 12-lead ECG machine
   c. Accurately identify the atrial epicardial wire(s)
   d. Disconnect the standard 5-lead surface monitoring system

6. Where do the temporary epicardial atrial pacing wires typically exit the patient’s chest relative to the sternum?
   a. Right
   b. Left
   c. Both right and left
   d. Center
7. Which of the statements about safe handling of temporary epicardial atrial pacing wires is incorrect?
   a. Small amounts of electrical current can cause micro shock leading to potentially lethal dysrhythmias
   b. Wearing gloves is optional if proper handwashing and drying are completed prior to touching the wires
   c. Touching the bed frame before touching the wires will discharge static electricity
   d. Micro shock can cause potentially lethal dysrhythmias

8. Which of the following measures electrical activity between two temporary epicardial atrial pacing wires attached to the myocardium?
   a. Unipolar
   b. Bipolar
   c. Both unipolar and bipolar
   d. Neither unipolar nor bipolar

9. Which of the following atrial electrograms (AEGs) will give a pure atrial tracing without ventricular effect?
   a. Unipolar
   b. Bipolar
   c. Both unipolar and bipolar
   d. Neither unipolar nor bipolar

10. An atrial electrogram (AEG) done simultaneously with surface electrocardiogram (ECG) is helpful in each of the following instances, except:
    a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V
    b. The rhythm is rapid or irregular
    c. There is difficulty in differentiating P waves and QRS complexes
    d. Identification of atrial activation on surface ECG rhythm tracing is unclear

11. Which of the following is a **relative contraindication** for obtaining an atrial electrogram (AEG)?
    a. Within 6 hours of admission from OR (immediately postop)
    b. Patient develops new onset tachycardia of unknown origin
    c. Patient is dependent on atrial pacing
    d. Rhythm on the bedside monitor changes and looks like atrial fibrillation
12. The following are all indications for obtaining an atrial electrogram (AEG), except:
   a. Identify atrial activity that is not clearly detected on surface electrocardiogram (ECG)
   b. Identify ventricular activity that is not clearly detected on surface ECG
   c. Clarify the relationship between atrial and ventricular activity
   d. Determine the origin of a wide-complex rhythm (example: supraventricular tachycardia with aberrant ventricular conduction vs. ventricular tachycardia)

13. An atrial electrogram (AEG) can be obtained using each of the following, except:
   a. Portable 12-lead ECG machine
   b. Multi-channel telemetry or portable bedside monitor with dual lead display capability
   c. Single lead implanted cardiac defibrillator (ICD)
   d. Dual lead (atrial and ventricular) permanent pacemaker

Questions 14-19 on next page
The following rhythm report shows sinus rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). Each rhythm strip is 6 seconds.

14. Identify the P waves using the AEG leads below and circle the correct letter that corresponds with a P wave here: 

15. Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here:

16. Identify the P waves using the AEG leads below and circle the correct letter that corresponds with a P wave here:

17. Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here:
18. Identify the rhythm using the following surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). This rhythm strip is 6 seconds.
   a. Accelerated AV junctional rhythm with unifocal PVC’s
   b. Sinus bradycardia
   c. AV Junctional rhythm
   d. Accelerated idioventricular rhythm

19. Identify the rhythm using the following surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). This rhythm strip is 6 seconds.
   a. Complete heart block rhythm
   b. AV Junctional rhythm with retrograde P waves
   c. Accelerated idioventricular rhythm
   d. Junctional tachycardia
Appendix C

Permission to Recruit On-Site
Permission to Recruit On-Site

Dear ___________________________ (Director / Nurse Manager),

My name is Jeanette Drake and I am a PhD student at the University of Texas Health Science Center at Houston.

I am conducting psychometric testing of a newly developed instrument (DAEGAS©) that will assess critical care nurse knowledge of atrial electrograms (AEGs) in postoperative cardiac surgery patients. The **information that nurses provide is essential** in assessing reliability and validity evidence for this instrument; nurse knowledge of AEGs is **not** the focus of the study.

Your unit has been chosen to participate because you provide care for postoperative cardiac surgery patients who have temporary epicardial atrial pacing wires.

Participation in this study is voluntary and consent to participate is implied by completing and returning the study materials. No risks to the nurses are associated with this study. They may withdraw at any time and for any reason without retaliation or negative consequence.

Participants will be asked to complete the DAEGAS twice, 2 weeks apart. It should take approximately 15-20 minutes to complete the 8-item demographic sheet (first time only) and the DAEGAS. Once completed, nurses will mail the study packet back to me and I will send them the retest packet in 2 weeks. They will be asked to mail the retest packet when completed. Self-addressed and stamped envelopes will be included in each study packet. The results will be reported as part of my doctoral dissertation.

I am asking for your permission to enter the units you manage to recruit critical care nurses to participate in my research study. I have been granted approval to begin research by the Institutional Review Board of the Committee for the Protection of Human Subjects at the University of Texas Health Science Center at Houston (HSC-SN-19-0462). They require that I obtain a letter of support from unit administration that states you have granted me permission to begin recruiting on your unit(s). If you would like to sign and date this letter at the bottom, you could email it back to me or Fax it to the number below to grant permission.

I would like to answer any questions you have and arrange for times that you feel are the most convenient for me to be on your unit(s) to recruit participants for my study. I could meet with you in person, talk via phone call, or email.

Thank you in advance for considering my request.

Sincerely,

Jeanette Drake PhD(c), RN, MN, ACNP-BC
University of Texas Health Science Center at Houston, PhD in Nursing Student, Cizik School of Nursing
6901 Bertner Ave. Office #566
Houston, Texas 77030
Fax: (713) 500-0266
Email: jeanette.drake@uth.tmc.edu

Signed: ________________________________ Date: __________________
(Name, Title)
Appendix D

Phase 1 Test Cover Letter: Information Statement
Phase 1 Test Cover Letter: Information Statement

Dear Critical Care Nurse:

I am asking for your help with my research study. I am conducting psychometric testing of a newly developed instrument (DAEGAS©) that will assess critical care nurse knowledge of atrial electrograms (AEGs) in postoperative cardiac surgery patients. The **information that you provide is essential** in **assessing reliability and validity evidence for this instrument**; your knowledge of AEGs is **not** the focus of the study.

You have been chosen to participate because you are currently employed in a unit that cares for postoperative cardiac surgery patients who have temporary epicardial atrial pacing wires. Your participation in this study is voluntary and consent to participate will be implied by completing and returning the study materials. To ensure **confidentiality**, you will be assigned a study identification code and only members of the research team will have access to the code and related study information. Please do not write your name or address on any of the materials in the study packet.

No risks to you are associated with this study. You may withdraw at any time and for any reason without retaliation or negative consequence.

You will be asked to complete the DAEGAS twice, 2 weeks apart. It should take approximately 15-20 minutes to complete the 8-item demographic sheet (first time only) and the DAEGAS. **If your answer is ☒ No** to the first question on the demographic data sheet, please place all the study packet contents in the pre-addressed and stamped envelope and mail it back to me.

Please do not use reference materials or consult with others to complete the DAEGAS as this could alter the validity of the study. After completing the demographic sheet and DAEGAS, please place all study materials in the pre-addressed and stamped envelope and mail it back to me **as soon as possible**.

Thank you for your willingness to participate in this nursing research study. Results will be reported as part of my doctoral dissertation.

Sincerely,

Jeanette Drake PhD(c), RN, MN, ACNP-BC
PhD Student in Nursing
University of Texas Health Science Center at Houston,
Cizik School of Nursing
6901 Bertner Ave. Office #566
Houston, Texas 77030
Email: jeanette.drake@uth.tmc.edu
Appendix E
Demographic Data Sheet
Demographic Data Sheet

1. Do you care for postoperative cardiac surgery patients who have temporary atrial epicardial pacing wires?
   □ Yes  □ No

If your answer is No, please stop here and place all the study packet contents in the self-addressed, stamped return envelope and drop it in the mail.

If your answer is Yes, you meet the criteria to participate in this study. Please continue with the demographic data questions and complete the DAEGAS.

2. Age: ______ years

3. Highest degree in nursing: Check the box that corresponds with the most accurate response
   □ Diploma or Associate degree  □ DNP degree
   □ Baccalaureate degree  □ PhD degree
   □ Master’s degree  □ Other: ______________________________

4. Current employment in nursing: ______ hours/week

5. Critical care work experience on units with patients who have temporary epicardial atrial pacing wires: ______ years

6. Estimate the percentage of patients you have cared for in the past year that have temporary epicardial pacing wires: Atrial ______ %  Ventricular ______ %

7. How often do you access temporary atrial epicardial pacing wires to perform an atrial electrogram (AEG)? ______ /week  ______ /month  ______ /year

8. How valuable to you are temporary atrial epicardial pacing wires for use in diagnosis and treatment of cardiac dysrhythmias?
   Not Valuable  Somewhat Valuable  Very Valuable
   1-------------------2-------------------3-------------------4-------------------5
Appendix F

Phase 1 Retest Cover Letter: Information Statement
Phase 1 Retest Cover Letter: Information Statement

Dear Critical Care Nurse:

Thank you for participating in my research study. I am conducting psychometric testing of a newly developed instrument (DAEGAS©) that will assess critical care nurse knowledge of atrial electrograms (AEGs) in postoperative cardiac surgery patients. The **information that you provide is essential** in **assessing reliability and validity evidence for this instrument**; your knowledge of AEGs is **not** the focus of the study.

You have been chosen to participate because you are currently employed in a unit that cares for postoperative cardiac surgery patients who have temporary epicardial atrial pacing wires. Your participation in this study is completely voluntary and consent to participate will be implied by completing and returning the demographic sheet and the DAEGAS. To ensure **confidentiality**, you will be assigned a study identification code and only members of the research team will have access to the code and related study information. Please do not write your name or address on any of the materials in the study packet.

No risks to you are associated with this study. You may withdraw at any time and for any reason without retaliation or negative consequence.

**This is the retest** and should take approximately 15-20 minutes to complete. Please do not use reference materials or consult with others to complete the DAEGAS as this could alter the validity of the study. When complete, place the study packet contents in the pre-addressed and stamped envelope and mail it back to me **as soon as possible**.

Thank you, again, for your willingness to participate in this nursing research study. Results will be reported as part of my doctoral dissertation.

Sincerely,

Jeanette Drake PhD(c), RN, MN, ACNP-BC
PhD Student in Nursing
University of Texas Health Science Center at Houston,
Cizik School of Nursing
6901 Bertner Ave. Office #566
Houston, Texas 77030
Email: jeanette.drake@uth.tmc.edu
Appendix G

Phase 2 Study Cover Letter: Information Statement
Phase 2 Study Cover Letter: Information Statement

Dear Critical Care Nurse:

I am asking you to participate in my research study. I am conducting psychometric testing of a newly developed instrument (DAEGAS©) that will assess critical care nurse knowledge of atrial electrograms (AEGs) in postoperative cardiac surgery patients. The information that you provide is essential in assessing reliability and validity evidence for this instrument; your knowledge of AEGs is not the focus of the study.

You have been chosen to participate because you are currently employed in a unit that cares for postoperative cardiac surgery patients who have temporary epicardial atrial pacing wires. Your participation in this study is completely voluntary and consent to participate will be implied by completing and returning the demographic sheet and the DAEGAS. Participants will be anonymous. Please do not write your name or address on any of the materials in the study packet.

No risks to you are associated with this study. You may withdraw at any time and for any reason without retaliation or negative consequence. Per policy of the American Association of Critical-Care Nurses (AACN), this will be the only time I contact you.

It should take approximately 15-20 minutes to complete the 8-item demographic sheet and the DAEGAS. If your answer is ☒ No to the first question on the demographic data sheet, place all the study packet contents in the pre-addressed and stamped envelope and mail it back to me.

Please do not use reference materials or consult with others to complete the DAEGAS as this could alter the validity of the study. After completing the demographic sheet and DAEGAS, please place all study materials in the pre-addressed and stamped envelope and mail it back to me as soon as possible.

Thank you for your willingness to participate in this nursing research study. Results will be reported as part of my doctoral dissertation.

Sincerely,

Jeanette Drake PhD(c), RN, MN, ACNP-BC
University of Texas Health Science Center at Houston,
PhD in Nursing Student, Cizik School of Nursing
6901 Bertner Ave. Office #566
Houston, Texas 77030
Fax: (713) 500-0266
Email: jeanette.drake@uth.tmc.edu
# Appendix H

## Proposal Timeline

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Month Day, 2020

Kathleen Ahern Gould PhD, RN
Editor, Dimensions of Critical Care Nursing
dccneditor@wolterskluwer.com

Dear Dr. Gould:

I am submitting a manuscript entitled, “Development and Preliminary Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©” for possible publication in Dimensions of Critical Care Nursing. As the title suggests, this manuscript reports the development and preliminary psychometric testing results of the survey.

The benefit of a psychometrically sound instrument is valid and reproducible measurement of critical care nurse knowledge of atrial electrograms, and diagnosis of selected dysrhythmias using them, in the care of postoperative cardiac surgical patients.

The manuscript has not been submitted elsewhere and represents original research. Please let me know if I may provide additional information to help you with your decision.

Sincerely,

Jeanette Drake, PhD, RN, ACNP-BC
University of Texas Health Science Center at Houston
Cizik School of Nursing
6901 Bertner Ave, Office #585
Houston, Texas 77030

(206) 930-3834 (cell)
(713) 500-9939 (office)
Jeanette.Drake@uth.tmc.edu
Abstract

Title: Development and Preliminary Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©

Background: Critical care nurses (CCNs) who care for postoperative cardiac surgery patients need specialty knowledge, for example, knowledge of atrial electrograms (AEGs). An inadequate audit trail exists for psychometric performance of instruments to measure knowledge of AEGs.

Objectives: To revise a previously tested instrument and assess evidence for content validity (content validity index) and internal consistency (Cronbach’s α) and stability (correlation coefficient, r) reliability.

Methods: The instrument was revised to 20 items and named the Drake Atrial Electrogram Assessment Survey (DAEGAS). A panel of six AEG experts reviewed the DAEGAS for content validity evidence. The instrument was further revised to 19 items (13 knowledge and 6 AEG interpretation) and tested with 76 CCNs from the greater Houston metropolitan area. The a priori criterion for all psychometric tests was ≥ .80.

Results: The CVI was .93. Cronbach’s α was .51 and test-retest r was .74. Cronbach’s α increased to .60 and r was .73 with removal of three items: two with negative item-total correlation and one that transitioned to a sample question.

Discussion: Content validity evidence exceeded the a priori criterion. Internal consistency and stability reliability estimates did not meet the a priori criterion, albeit the latter met the criterion recommended by psychometricians for a new instrument. Recommendations include further development of the DAEGAS to improve internal consistency estimates and testing for evidence of other forms of validity such as construct
and/or criterion-related. Reliable and valid assessment of CCN knowledge of AEGs will require improved psychometric performance of the DAEGAS.

**Key words:** atrial electrogram, critical care, instrument, knowledge, psychometrics
**Background**

It is essential that critical care nurses (CCNs) who care for cardiac surgery patients recognize dysrhythmias postoperatively and implement appropriate and timely interventions. Atrial dysrhythmias occur in up to 65% of patients the first few days after cardiac surgery (Maisel et al., 2001). The anatomical origin of the dysrhythmia may be difficult to determine. Temporary epicardial pacing wires may be placed in the atria during surgery; these wires can be used to obtain an atrial electrogram (AEG) and facilitate postoperative diagnosis and treatment of dysrhythmias (LeDoux, 2010).

The literature reveals the usefulness of AEGs in postoperative cardiac surgery settings: differentiation among varieties of dysrhythmias because AEGs demonstrate augmented P waves (Batra & Balaji, 2008), and definitive diagnosis when the standard 12-lead electrocardiogram (ECG) displays absent P waves and irregular or high-rate rhythms (>150 beats per minute) (Raiten, et al., 2015). Practice standards for electrocardiographic monitoring in hospital settings, a scientific statement published by the American Heart Association, encourages the use of AEGs when diagnosing selected cardiac dysrhythmias in postoperative cardiac surgery patients (AHA, 2004). AEGs are valuable because they provide visualization of atrial activity not clearly detected on surface ECG (Conti & Ware, 2002), clarify the relationship between atrial and ventricular activity, and define wide QRS complex rhythms and narrow-complex tachydysrhythmias (McRae, 2017).

Miller and Drew (2007) surveyed CCNs (N = 227) who cared for cardiac surgery patients; they found that 92% of the sample reported that at least one surgeon placed atrial epicardial wires. The CCNs reported that the wires were left in place for < 24 hours.
(5%), 1-3 days after cardiac surgery (47%), until ICU discharge (13%), until hospital discharge (26%), or varied widely (10%). Despite the availability of wires for AEG recording, a minority of respondents recorded AEGs often (10%); most (90%) recorded AEG’s infrequently or not at all. The authors emphasized that understanding how to use and interpret AEGs is valuable because the associated clinical decision making could improve patient care and reduce morbidity, length of stay, and cost of hospitalization.

In prior studies describing CCN knowledge of postoperative dysrhythmias and AEGs, investigator-developed instruments have been used (McRae et al., 2010; Preston et al., 2015), but the authors did not report evidence for adequate reliability and validity of these instruments.

McRae et al. (2010) developed a new instrument and reported that a panel of content experts from three sites reviewed it for content validity. However, the authors did not report selection criteria, number of experts, or quantitative assessment of the expert reviews. A pilot study with six nurses was conducted at one site to evaluate clarity of the instrument and no changes were made based on the evaluation. The main study then was conducted using a repeated measures design. The first test presented five cardiac rhythms without AEG data and the second test included the same five cardiac rhythms with corresponding AEG tracings. The rhythms were chosen based on the American Heart Association practice guidelines (Drew et al., 2005) and the participants (N = 261) were asked to provide rhythm diagnosis. Although the respondents reported that AEGs were easy to perform (very easy = 42%, moderately easy = 36%), the frequency of AEG use was not encouraging as 57% reported using them less than monthly, 24% monthly, 12%
weekly, and only 3% daily. Opportunities to perform AEGs existed because most patients had temporary epicardial atrial pacing wires in place.

Preston et al. (2015) developed two new instruments and reported that content and face validity estimates of both instruments were established by two CCNs and two post-doctoral nurse researchers who reviewed the instruments for question order, content, and clarity. Both instruments drew from a bank of case studies reviewed for tracing quality, clarity, and interpretation by three experts including an electrophysiologist, a cardiac surgery nurse educator, and cardiac pacemaker rhythm specialist. The authors did not report a quantitative assessment of the reviews for validity evidence. The authors did report 100% inter-rater reliability in scoring the instruments.

Testing evidence for reliability and validity should be an integral part of instrument development. Such evidence, however, is weak in each of the studies that examined newly developed instruments to assess CCN knowledge of AEGs.

**Objectives**

The objective of the present study was to test preliminary psychometric performance of the newly developed Drake Atrial Electrogram Assessment Survey (DAEGAS©) by assessing evidence for content validity and internal consistency and stability reliability with CCNs who care for patients after cardiac surgery.

**Methods**

The study was approved by expedited review by the University of Texas Health Science Center at Houston and clinical agency institutional review boards (IRBs). Completion of the survey indicated informed consent and participants could exit the study at any time, for any reason, without consequences.
Design and Sample

A repeated measures design supported test-retest of the DAEGAS with a convenience sample of 76 CCNs from 10 hospitals in the greater Houston metropolitan area with critical care units that provide care for postoperative cardiac surgery patients. The inclusion criterion was CCN who cares for postoperative cardiac surgery patients with temporary atrial epicardial pacing wires.

Instruments

The study instruments consisted of a Demographic Data Sheet (test only) and the DAEGAS (test and retest). The Principal Investigator (PI) previously developed an instrument to assess CCN knowledge of AEGs (precursor to the DAEGAS or pDAEGAS) based on a review of the literature, including practice standards set forth by the American Association of Critical Care Nurses (AACN), using the American Nurses Association Guide to Test Item Development, and direction from an expert panel (Drake, 2007). The pDAEGAS was pilot tested with 32 CCNs in the Pacific Northwest who cared for postoperative cardiac surgery patients. Item analysis included Kuder-Richardson-20 (KR-20) estimate of internal consistency reliability. The KR-20 was .75 (Drake), which is lower than the recommended ≥ .80 (Nunnally & Bernstein, 1994). Recently, the pDAEGAS was revised and named the Drake Atrial Electrogram Assessment Survey (DAEGAS©).

The Demographic Data Sheet consists of eight items, the first of which determines CCN eligibility to participate in the study. Three items describe the sample and three focus on CCN experience with and access to temporary atrial epicardial pacing wires.
wires. The last item requests that the CCN rate how valuable/useful these wires are, using Likert-type scale response options from 1 (not valuable) to 5 (very valuable).

The DAEGAS is a 19-item, multiple-choice response, self-administered, paper and pencil instrument that takes approximately 15-20 minutes to complete. Six rhythm analysis questions include both ECG and AEG tracings.

**Recruitment and Data Collection Procedures**

An expert panel of four nurses and two physician researchers, educators, and clinicians evaluated the DAEGAS for content validity evidence. The PI chose the experts based on history of publications in refereed journals or textbooks and > 5 years clinical experience with AEG monitoring. Six experts is a number sufficient to establish content validity evidence with control for chance agreement (Lynn, 1986).

Data for reliability testing came from CCNs. After IRB and hospital permission to approach CCNs on the work units, the PI discussed the study with individuals or small groups working day and night shifts between July 2019 and February 2020. The PI reinforced that CCNs with experience caring for patients with temporary atrial epicardial pacing wires were needed to test the psychometric performance of the DAEGAS and that CCN knowledge was not the focus of the study. CCNs who agreed to participate in the study gave the PI their name and home mailing address and received a unique study identification code for use on the DAEGAS and return envelopes. Participants were encouraged to complete the DAEGAS at a time and place that would allow them to concentrate and not feel rushed. All had the opportunity to select a treat as a small token of appreciation.
The PI handed the survey packet, containing a cover letter, Demographic Data Sheet, the DAEGAS, and self-addressed stamped return envelope, to the potential participant. Authors of several studies reported higher rates of return for mailed surveys (26% to 40%) (Beckstrand et al., 2019; Beckstrand et al., 2018) than electronic surveys (<2%) (Kleinpell et al., 2019; Hiler et al., 2018). Two weeks after receiving the completed test, the PI mailed the retest study packet, containing a cover letter that explained the retest phase of the study, the DAEGAS, and another self-addressed, stamped return envelope, to the participant’s home mailing address. A one-time reminder card was mailed to the participant if the test and/or retest did not arrive within 2 weeks. The instruments were checked for missing items, recorded as received, and filed in a secure cabinet in the PI’s locked office at the School of Nursing.

**Data Management and Analysis**

A content validity index (CVI) was computed for each individual item and the entire instrument. Experts rated each as not relevant (1), unable to assess or requires major revision (2), relevant, may need minor revision (3), and very relevant (4). They also had an opportunity to include comments with each item. Item scores of 3 or 4 were totaled and divided by the number of expert reviewers (item CVI); then the scores of each item were totaled and divided by the number of items (scale CVI).

For reliability testing, the PI manually entered the data from completed instruments into a database in SPSS statistical software (IBM, version 25) using the study codes for identification. Returned surveys with missing responses were excluded from the analyses. Inter-rater reliability (IRR) of data entry between the PI and a research assistant
was assessed using five (10%) test-retest surveys selected using a random number

Frequencies and percentages were used to describe nominal, median and
interquartile range (IQR) abnormally distributed, and mean ± SD normally distributed
continuous data. Distribution of the data was assessed by the Kolmogorov-Smirnov test
for normality and histogram. The Pearson Product-moment correlation coefficient (r) was
used to test the relation between CCN years of experience caring for postoperative
cardiac surgery patients and score on the DAEGAS; alpha was set at .05. Internal
consistency reliability was estimated with Cronbach’s α, and test-retest stability
reliability with r. The a priori criterion for adequate psychometric performance was ≥ .80
(Lynn, 1986; Nunnally & Bernstein, 1994).

Item analysis was done using ScanTron Plus software to obtain item difficulty and
discrimination information and internal consistency evaluation for the test sample.

Results

Validity Estimates

The item CVIs varied from .67 to 1.0; the overall CVI was .93 and met the a
priori criterion (Table 1). Items 7, 10, and 14 did not meet the a priori criterion. Experts
included specific comments about the items (Table 2). Based on this feedback, Items 10
and 14 were revised, more legible copies of ECG and AEG rhythm strip tracings were
provided for Items 15-16, 17-18, 19, and 20, and Item 7 was removed from the 20-item
DAEGAS before distribution to CCNs for reliability testing.

A total of 172 CCNs were enrolled in the study; 76 (44%) completed the test and
55 (72%) completed the retest. Returned surveys with missing responses (n = 7 test; n = 3
retest) were excluded; there was no pattern noted for the missing data. IRR for data entry was 1.0; exceeding the a priori criterion.

**Sociodemographic Data**

The number of participants varied from 3 at suburban to 46 at urban hospitals. Table 3 shows the characteristics of the sample. The modal participant was between 30 and 39 years old, had a baccalaureate degree, and worked full-time. The modal participant also had between 2 and 5 years of experience in a critical care unit that admitted patients with temporary epicardial pacing wires. These participants never accessed the pacing wires to perform an AEG, despite reporting AEGs as somewhat valuable for diagnosing and treating postoperative dysrhythmias. The modal participant reported that 0 - 25% of the patient caseload within the past year had epicardial atrial and 76 – 100% ventricular pacing wires.

No correlation was found between critical care work experience on units with patients who have temporary epicardial atrial pacing wires and DAEGAS test score \((r = -.04, df = 75, p = .711)\).

**Distribution of the data**

The DAEGAS test data approximated the normal distribution; the retest data did not and showed a left skew. The mean test score was 61.53 (+14.17 SD) and median retest score was 68.42 (IQR = 21.05).

**Reliability estimates**

Cronbach’s α for the DAEGAS test (N = 76) was .51 and .69 for the retest (N = 55). The test-retest reliability estimate was .74. Test-retest reliability was calculated
separately for knowledge (Items 1 - 13, \( r = .60 \)) and interpretation (Items 14 - 19, \( r = .56 \)) questions.

Seven items had a weak or negative item-total correlation (Items 1, 6, 7, 8, 9, 13, 16). Items 1, 6, and 16 had lower item-total correlation with minimal change in \( \alpha \) if deleted. Items 7, 8, 9, and 13 had negative item-total correlation and \( \alpha \) increased if the items were deleted. Items were examined and considered for revision or removal. Cronbach’s \( \alpha \) increased to .60 (test) and .72 (retest) and test-retest \( r \) was .73 with the removal of items 8 and 9 and transition of item 1 to a sample question.

**Item analysis**

Consistent with Cronbach’s \( \alpha \) testing in SPSS, \( \alpha \) was 0.49 ± 2.6 with ScanTron Plus testing. Most of the items (14) rated fair or good discrimination and medium difficulty (Table 4).

**Discussion**

The purpose of this study was to conduct preliminary psychometric testing of a newly developed instrument, the DAEGAS©, to assess CCN knowledge of AEGs and selected postoperative dysrhythmias using AEGs. The objectives were to revise the instrument, assess evidence for content validity, and with CCNs who care for patients after cardiac surgery, assess internal consistency and stability reliability estimates. Content validity evidence exceeded the a priori criterion. Internal consistency and stability reliability estimates did not meet the a priori criterion, albeit the latter met the criterion recommended by psychometricians for a new instrument.
Validity Testing

Assessment of content validity is crucial to determine quality and relevance of the items in an instrument. Carmines and Zeller (1979) defined validity as the extent to which an instrument can be relied on to measure what it is intended to measure. Lynn (1986) outlined the rigor required for validity testing. This included a recommendation for a minimum of five experts to provide for control of chance agreement; with six or more experts, one or two may disagree and the instrument could still be assessed as valid. The six experts chosen for this study provided feedback that reflected thoughtful consideration of each item. Content validity testing is indispensable and worth the rigor (Lynn). Although multiple types of validity evidence are desirable and need to be tested for the DAEGAS, the instrument has evidence of the foundational content validity.

Reliability Testing

Reliability refers to the consistency with which an instrument is able to yield similar responses with repeated measures. It is a fundamental principle of Classical Test Theory (DeVellis, 2017). Internal consistency, using Cronbach’s alpha (α), is a type of reliability for a multiple-item instrument (Nunnally & Bernstein, 1994) such as the DAEGAS. For this study, the sample size was 50% larger than the recommended 50 (DeVet et al., 2011), thus inviting consideration of other possible explanations for an inadequate estimate.

Nunnally & Bernstein (1994) recommended a reliability estimate >.70 or >.80 as the goal, with the lower criterion appropriate for a newly developed instrument as is the case with the DAEGAS. Whereas the test-retest correlation met the lower criterion (r =
.74), the Cronbach’s α did not (α = .51), and neither met the a priori criterion for this study.

Others (Hanneman & Gusick, 2005) have used .70 as the a priori criterion for stability reliability when multiple formats (e.g., Likert-type scale, visual analog scale, fill-in-the-blank) are embedded in one instrument. In such cases, even though the total instrument may contain an adequate number of items, the items per format are few. Test-retest is an appropriate method for estimating reliability, but the lower a priori criterion of .70 may be justified with an instrument that has multiple formats. The DAEGAS has a consistent response option format (stem with four answer options) but an inconsistent conceptual basis in what is being asked with the questions: knowledge vs interpretation, with the latter being dependent on the former, especially for Items 14 - 19, which require participants to identify parts of waveforms to provide a diagnosis. If the a priori criterion were $\geq .70$, the DAEGAS would have evidence of adequate stability reliability.

The test-retest method, which reflects stability of results over time, indicates the degree that an instrument is free from random measurement error (Waltz, Strickland, & Lenz, 2010). Polit and Beck (2017) recommended a sample size of 50 - 100 participants for conducting test-retest reliability. The study sample achieved this recommendation. The property of stability reliability assumes a stable phenomenon and AEG knowledge and interpretation is expected to be stable if participants are not exposed to AEG education in the interim between the test and retest. Nunnally & Bernstein (1994) recommended an interval of 2 - 4 weeks between test and retest, short enough to assure no change in the phenomenon between the testing periods and long enough to avoid participant recall. As part of recruitment, the PI asked each participant to refrain from
studying or discussing content about AEGs during the interval between test and retest. Insufficient variability is problematic for adequate reliability estimation; the range of scores for the DAEGAS test sample was 26%-95% and for the retest sample 32%-89%, thereby lessening suspicion that insufficient variability compromised reliability estimates.

Reliability estimates increase as the items in an instrument increase, assuming the items tap the concept(s) of interest (Nunnally & Bernstein, 1994). Some decrease in reliability was expected when the number of DAEGAS items was reduced in the revisions from the 29-item pDAEGAS to the 19-item DAEGAS tested in the present study. Items that were removed contained some repetitive content and multiple item/response formats (two and four multiple choice answer options and true/false). Content in the deleted pDAEGAS items was synthesized into other questions and a 4-option answer format was used for all items. The result was response format similarity, non-redundant content, and a more appealing length. When designing an instrument, DeVellis (2017) recommended that researchers balance brevity with reliability, even though adding items can bolster internal consistency estimates. For use in the clinical setting with CCNs, the DAEGAS needs to be long enough to assess adequately the construct of AEG knowledge, but not so long that it decreases compliance with completion of the instrument. Surveys returned with missing data were 8% of the test sample and 3% of the retest sample; these findings do not strongly support the idea that instrument length was problematic. The option exists to return items that were removed from the pDAEGAS but their content was absorbed by the DAEGAS and decisions regarding required instrument length should consider well-crafted questions that are
designed to adequately test the desired construct versus just increasing the length of the instrument (DeVellis).

Heterogeneity of the sample can affect reliability positively and homogenous samples (e.g., more similar scores) lower the reliability coefficient, however, the wide range of scores and recruiting CCNs from 10 different sites in the greater Houston metropolitan area should strengthen the claim of at least partial heterogeneity (Polit & Beck, 2017).

Similar to earlier findings (Miller & Drew, 2007), the present findings suggest that CCNs may not know about obtaining and using AEGs. CCNs reported that up to 50% of patients have temporary atrial epicardial wires in place, yet few obtained an AEG. Updated practice standards for electrocardiographic monitoring in hospital settings, a scientific statement published by the American Heart Association (AHA, 2017), include AEG monitoring as required education for clinicians who care for patient populations with temporary atrial epicardial pacing wires. Nursing leadership, including educators, should annually assess the electrocardiographic monitoring needs of patients and plan annual CCN education and updates accordingly. Miller and Drew offered suggestions to improve the use of AEGs including collaboration with surgeons who support the importance and value of AEGs, the need for education, standardized protocols, and mentoring focused on AEGs, institutional interest, and empowering CCNs to perform an AEG. These suggestions could be representative of the reasons the sample in the present study did not include AEGs in their practice on a more regular basis. The DAEGAS could be useful to help identify the gap in CCN knowledge and evaluate the effectiveness of AEG training programs.
Although the purpose of this study was not testing CCN knowledge of AEGs, correlation of years worked with patients who have temporary atrial epicardial pacing wires and DAEGAS test score demonstrated that, in this sample of 76 CCNs, experience did not improve performance. This finding strengthens the suggestion that CCNs may not know about obtaining and using AEGs and provides additional support for future use of the DAEGAS to guide unit-specific education.

DAEGAS Revised

After reviewing the results, the DAEGAS was revised for future testing. Items 8 and 9 had the most negative item-total correlations. They had poor discrimination and hard/medium difficulty as well as relevant, but not essential, content; they were removed from the instrument. Comparatively, Items 7 and 13 had less negative item-total correlations. These items had fair discrimination and medium difficulty along with content deemed relevant and essential; they were retained.

One content expert commented that Item 1 focuses on related knowledge but is not directly related to knowledge of AEGs. A sample question should cue participants to style and content of the items on the instrument without influencing how they respond. Item 1 was transitioned to become the sample question because it met these requirements and was the only fair discrimination and easy rated difficulty item.

The questions were re-evaluated for clarity and organization and no substantial content changes were made. Words like EXCEPT and CONTRAINDICATION were capitalized, bolded, and underlined. For Items 11-12, 13-14, 15, and 16 the ECG and AEG rhythm strip graphics were placed between the instructions and questions. Heavy horizontal lines were added to separate the item clusters more clearly. These revisions
yield a 16-item (10 knowledge, and 6 interpretation) DAEGAS; this version (Figure 1) should be used in future research and clinical education.

Limitations

Limitations of the study are a convenience sample. The results may not be generalizable to CCNs beyond the Houston metropolitan area. Interruptions to mail service in Houston occurred during Hurricane Imelda. It is unknown if some surveys were lost in the hurricane or from rerouting of mail to several different cities over several months. A larger sample size was precluded further by the COVID-19 pandemic. Although follow-up reminders and retest survey packets, sent by U.S. mail, were permitted, the return rate of completed surveys decreased during the pandemic.

Conclusions and Implications

The study results represent preliminary testing of the psychometric properties of the DAEGAS; further testing of the instrument is needed. There was adequate evidence of content validity. Reliability estimates did not meet the a priori criterion. Further development of the DAEGAS may improve the reliability estimates. The instrument should be tested for evidence of construct and/or criterion-related validity. Reliable and valid assessment of CCN knowledge of AEGs will require improved psychometric performance of the DAEGAS or a lower a priori criterion for adequate reliability evidence.
Acknowledgements

The author thanks Sandra K. Hanneman, PhD, RN; Melanie McEwen, PhD, RN; Elda Ramirez, PhD, RN, FNP-BC; and Vincent Conti, MD; who served as members of the author’s dissertation committee. Special thanks to the CCNs who volunteered to participate in this study.

Financial Disclosures

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References


Sandau, K. E., Funk, M., Auerbach, A., Barsness, G. W., Blum, K., Cvach, M., ...

Drake Atrial Electrogram Assessment Survey (DAEGAS©): Revised for Future Study

**Sample Question:**

Postoperative atrial dysrhythmias can result from:
- a. Impulse initiation or conduction abnormalities
- b. Electrolyte or metabolic disturbances
- c. Hypoxia or myocardial ischemia
- d. All the above*

*All the answer options can cause postoperative atrial dysrhythmias. d is the correct answer

**Survey Questions 1 – 10:** Circle the letter corresponding to the best answer for each item.

1. Heart block dysrhythmia commonly occurs after valve surgery (aortic/mitral) due to:
   - a. Hypovolemia
   - b. Edema near the conduction system
   - c. Sympathomimetic drugs
   - d. Decreased cardiac output

2. P waves may be absent or unclear on electrocardiogram (ECG) for all the following **EXCEPT**:
   - a. Small amplitude from depolarization of the atria
   - b. Superimposition of the QRS complex and/or T wave
   - c. Distance of the surface ECG sensing electrodes from the heart
   - d. Small amplitude from depolarization of the ventricles

3. An atrial electrogram (AEG) can be obtained by:
   - a. Recording a rhythm tracing using the ground lead that is attached directly to the surface of the chest wall
   - b. Recording a rhythm tracing using an epicardial pacing wire that is attached directly to the atrial epicardium
   - c. Recording a rhythm tracing using Leads I or II
   - d. Recording a rhythm tracing using Lead V1

4. To obtain an atrial electrogram (AEG), it is most important to:
   - a. Get a written/verbal order from the physician
   - b. Use the portable 12-lead ECG machine
   - c. Accurately identify the atrial epicardial wire(s)
   - d. Disconnect the standard 5-lead surface monitoring system
5. Where do the temporary epicardial atrial pacing wires typically exit the patient’s chest?
   a. Right side of the patient’s sternum
   b. Left side of the patient’s sternum
   c. Both right and left side of the patient’s sternum
   d. Center of the patient’s sternum

6. All the following statements about safe handling of temporary epicardial atrial pacing wires are true **EXCEPT**:
   a. Small amounts of electrical current can cause micro shock (which can cause potentially lethal dysrhythmias)
   b. Wearing gloves is optional if proper handwashing and drying are completed prior to touching the wires
   c. Touching the bed frame before touching the wires will discharge static electricity
   d. The exposed uninsulated portion of the wires should be protected with a finger cot, glove, plastic needle cap, needle barrel, or ear plug

7. An atrial electrogram (AEG) done simultaneously with surface electrocardiogram (ECG) is helpful in each of the following instances **EXCEPT**:
   a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V
   b. The rhythm is rapid or irregular
   c. There is difficulty in differentiating P waves and QRS complexes
   d. Identification of atrial activation if surface ECG rhythm tracing is unclear

8. Which of the following is a **CONTRAINICATION** for obtaining an atrial electrogram (AEG)?
   a. Within 6 hours of admission from OR (immediately postop)
   b. Patient develops new onset tachycardia of unknown origin
   c. Patient is dependent on atrial pacing
   d. Rhythm on the bedside monitor changes and looks like atrial fibrillation

9. The following are all indications for obtaining an atrial electrogram (AEG) **EXCEPT**:
   a. Identify atrial activity that is not clearly detected on surface electrocardiogram (ECG)
   b. Identify ventricular activity that is not clearly detected on surface ECG
   c. Clarify the relationship between atrial and ventricular activity
   d. Determine the origin of a wide-complex rhythm (example: supraventricular tachycardia with aberrant ventricular conduction vs. ventricular tachycardia)
10. An atrial electrogram (AEG) can be obtained using each of the following EXCEPT:
   a. Portable 12-lead ECG machine
   b. Multi-channel telemetry or portable bedside monitor with dual lead display
   c. Single lead implanted cardiac defibrillator (ICD) placed in the ventricle
   d. Dual lead (atrial and ventricular) permanent pacemaker

Questions 11 – 16 continued next page.
For Questions 11 and 12: The following rhythm strips show sinus rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.

11. Identify the P waves using the AEG leads above and circle the correct letter that corresponds with a P wave here:

12. Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here:

For Questions 13 and 14: The following rhythm strips show the same rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.

13. Identify the P waves using the AEG leads above and circle the correct letter that corresponds with a P wave here:

14. Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here:
For Question 15: The following rhythm strips show the same rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.

15. The above rhythm is:
   a. Accelerated AV junctional rhythm with unifocal PVCs
   b. Sinus bradycardia
   c. AV Junctional rhythm
   d. Accelerated idioventricular rhythm

Figure 1. DAEGAS revised for future testing

For Question 16: The following rhythm strips show the same rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.

16. The above rhythm is:
   a. Complete heart block rhythm
   b. AV junctional rhythm with retrograde P waves
   c. Accelerated idioventricular rhythm
   d. Junctional tachycardia
Table 1

*Expert Rating of the DAEGAS*

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<tr>
<th>Item #</th>
<th>Expert 1 MD</th>
<th>Expert 2 APRN</th>
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<th>Expert 4 MN RN</th>
<th>Expert 5 PhD RN</th>
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*Note.* APRN, advanced practice registered nurse; DAEGAS, Drake Atrial Electrogram Assessment Survey. Revised and retained Items 10 and 14; removed Item 7; total 19 items (CVI = .93)
Table 2

*Content Expert Comments*

<table>
<thead>
<tr>
<th>Item</th>
<th>Comments by Content Experts (E)</th>
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<tbody>
<tr>
<td>Q 1</td>
<td>E1: Good</td>
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<tr>
<td></td>
<td>E2: Question does not directly relate to knowledge of AEG (related knowledge)</td>
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<tr>
<td>Q 2</td>
<td>E1: Heart block not associated with pulmonic valve surgery; the surgery is uncommon in adults. Suggest adding type of valve surgery.</td>
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<td></td>
<td>E2: Does not directly relate to AEG knowledge (related knowledge)</td>
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<tr>
<td>Q 3</td>
<td>No comments</td>
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<tr>
<td>Q 4</td>
<td>E1: OK</td>
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<td>E3: Important question but RNs may get caught up on the term essential</td>
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<td>E6: Concept is appropriate, but choice A may or may not be true at different hospitals, suggest it be changed.</td>
</tr>
<tr>
<td>Q 5</td>
<td>E1: OK</td>
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<td>E6: While this would be expected knowledge of a critical care RN, don’t know that it is considered very relevant, as the wires are labeled, there may be multiple wires, and you may not be able to tell what wire it is just by seeing where it exits the chest.</td>
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<td>Q 6</td>
<td>E1: Answer b typo. It should be if.</td>
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<td>E2: Answer b, the word “is” should be replaced with the word “if”</td>
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<td>E6: Choice B does not make sense – wording needs to be changed (typo)</td>
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<td>Q 7</td>
<td>E1: OK</td>
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<td>E6: Too much detail to expect of every critical care RN</td>
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<td>Q 8</td>
<td>E1: OK</td>
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<tr>
<td>Q 9</td>
<td>E1: Requires distance between pair of wire electrodes not too long.</td>
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</table>
| Q 10 | E1: I do not like this question. RE: answer a – would be better if about superimposition of the QRS complex, and/or T wave; RE: answer c – the standard limb leads are bipolar, so this confounds this answer. RE: answer d: this option is too complicated. It may not be successful, so AF is still present; it may have adversely affected the sinus node (these patients often need permanent pacemakers); maybe instead, here is where you can introduce the possibility of superimposition.  
E2: Replace answer d with another or modify it. MAZE patients may be in junctional rhythm, but it is not that the p waves are unclear or obscured but rather absent.  
E5: Difficult for me as I am not that familiar with the ECG post-Cox/Maze procedures. I deducted the correct answer.  
E6: I can’t understand this question well enough to judge its relevance |
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q 11</td>
<td>E1: OK</td>
</tr>
</tbody>
</table>
| Q 12 | E1: OK  
E2: Patients can be safely disconnected from atrial pacing for a minute or so to check the underlying rhythm with an AEG. If only requiring atrial pacing rhythm is generally junctional and BP may drop 10 mmHg or so for a brief period of time; this is acceptable. If going to call it a contraindication, call it a relative contraindication. |
| Q 13 | E1: OK  
E4: Good basic question! |
| Q 14 | E1: OK  
E4: Not familiar with C & D  
E6: Probably too advanced for average critical care RN; not necessarily knows capabilities of rhythm analysis of an ICD or permanent pacemaker. |
| Q 15 | E1: OK  
E3: AEG a little hard to read, grid doesn’t copy well. Would like letters done differently, no white box, consider arrows to make very clear. The letters for answer choices should look distinctly different than the  
E4: EKG strip is hard to evaluate. |
| Q 16 | E2: EKG strip quality poor, hard to read. Put 4 options a, b, c, d, or you may get handwritten answers that are hard to interpret.  
E3: Please refer to comments about labeling from previous question  
E4: Do you have a better waveform to use? |
|---|---|
| Q 17 | E1: OK  
E2: EKG strip quality poor, hard to read. Put 4 options a, b, c, d, or you may get handwritten answers that are hard to interpret.  
E3: Grid of the EKG a little hard to see, please refer to previous comments  
E4: Complicated rhythm |
| Q 18 | E1: OK  
E2: EKG strip quality poor, hard to read. Put 4 options a, b, c, d, or you may get handwritten answers that are hard to interpret.  
E4: Good rhythm for basic QRS recognition. |
| Q 19 | E1: OK, but should read AV junctional rhythm here and elsewhere  
E2: EKG strip quality poor, hard to read. Large boxes are hard to see on the rhythm strip; identify the strip is 6 seconds; estimating rate is easier to do.  
E3: See previous comments about graphic and labeling  
E4: Are V2 and V3 AEG rhythm |
| Q 20 | E1: Probably an AV junctional rhythm with complete heart block. However, need longer rhythm strip; AEGs we see never come late enough to assess possible atrial capture beats.  
E2: EKG strip quality poor, hard to read. Large boxes are hard to see on the rhythm strip; identify the strip is 6 seconds; estimating rate is easier to do.  
E4: Is V2 the reference lead and V3 the AEG? |
### Table 3

**Sample Demographic Characteristics**

<table>
<thead>
<tr>
<th>Demographic Variable</th>
<th>Frequency</th>
<th>Sample Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29 years</td>
<td>18</td>
<td>24%</td>
</tr>
<tr>
<td>30-39 years</td>
<td>35</td>
<td>46%</td>
</tr>
<tr>
<td>40-49 years</td>
<td>13</td>
<td>17%</td>
</tr>
<tr>
<td>50+ years</td>
<td>10</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Highest degree in nursing:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma or Associate degree</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Baccalaureate degree</td>
<td>57</td>
<td>75%</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>13</td>
<td>17%</td>
</tr>
<tr>
<td>DNP degree</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>PhD degree</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Current employment in nursing:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time (36+ hours/week)</td>
<td>74</td>
<td>97%</td>
</tr>
<tr>
<td>Part time (20-36 hours/week)</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Per Diem</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Critical care work experience on units with patients who have temporary epicardial atrial pacing wires:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 years</td>
<td>13</td>
<td>17%</td>
</tr>
<tr>
<td>2-5 years</td>
<td>34</td>
<td>45%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>11-15 years</td>
<td>7</td>
<td>9%</td>
</tr>
<tr>
<td>&gt; 15 years</td>
<td>14</td>
<td>18%</td>
</tr>
<tr>
<td>Demographic Variable</td>
<td>Frequency</td>
<td>Sample Percentage %</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Percentage of patients with temporary epicardial pacing wires cared for in the past year:</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Atrial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-25%</td>
<td>40</td>
<td>53%</td>
</tr>
<tr>
<td>26-50%</td>
<td>21</td>
<td>28%</td>
</tr>
<tr>
<td>51-75%</td>
<td>8</td>
<td>10%</td>
</tr>
<tr>
<td>76-100%</td>
<td>7</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Ventricular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-25%</td>
<td>14</td>
<td>18%</td>
</tr>
<tr>
<td>26-50%</td>
<td>15</td>
<td>20%</td>
</tr>
<tr>
<td>51-75%</td>
<td>16</td>
<td>21%</td>
</tr>
<tr>
<td>76-100%</td>
<td>30</td>
<td>40%</td>
</tr>
<tr>
<td>Left blank</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Frequency CCNs access temporary atrial epicardial pacing wires to perform an AEG?</td>
<td>AEG frequency</td>
<td>% frequency</td>
</tr>
<tr>
<td>#/ Week: valid = 49 (missing = 27; zero = 38)</td>
<td>1-5 / week</td>
<td>13% / Week</td>
</tr>
<tr>
<td>#/ Month: valid = 48 (missing = 28; zero = 36)</td>
<td>1-28 / month</td>
<td>16% / Month</td>
</tr>
<tr>
<td>#/ Year: valid = 57 (missing = 19; zero = 37)</td>
<td>1-150 / year</td>
<td>26% / Year</td>
</tr>
<tr>
<td>How valuable to you are temporary atrial epicardial pacing wires for us in diagnosis and treatment of cardiac dysrhythmias?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Not Valuable</td>
<td>11</td>
<td>14%</td>
</tr>
<tr>
<td>2 = Barely Valuable</td>
<td>7</td>
<td>9%</td>
</tr>
<tr>
<td>3 = Somewhat Valuable</td>
<td>24</td>
<td>32%</td>
</tr>
<tr>
<td>4 = Valuable</td>
<td>13</td>
<td>17%</td>
</tr>
<tr>
<td>5 = Very Valuable</td>
<td>21</td>
<td>28%</td>
</tr>
</tbody>
</table>

*Note.* AEG, atrial electrogram; CCNs, critical care nurses
Table 4

*Item Analysis Summary*

<table>
<thead>
<tr>
<th>Discrimination</th>
<th>Difficulty</th>
<th>Hard (0-50)</th>
<th>Medium (50-85)</th>
<th>Easy (85-100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (&lt; 0.1)</td>
<td></td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Fair (0.1-0.3)</td>
<td></td>
<td>16, 19</td>
<td>7, 10, 11, 13,</td>
<td>1</td>
</tr>
<tr>
<td>Good (&gt; 0.3)</td>
<td></td>
<td></td>
<td>2, 3, 4, 5, 6, 12, 14, 15, 17, 18</td>
<td></td>
</tr>
</tbody>
</table>
Dissertation Appendixes

Appendix A

Institutional Review Board Approval Documents
NOTICE OF APPROVAL TO BEGIN RESEARCH

June 05, 2019


Number of Subjects Approved: Target 5030

PROVISIONS: This approval relates to the research to be conducted under the above referenced title and/or to any associated materials considered by the Committee for the Protection of Human Subjects, e.g. study documents, informed consent, etc.

APPROVED: By Expedited Review and Approval

REVIEW DATE: 06/05/2019

APPROVAL DATE: 06/05/2019

CHAIRPERSON: L. Maximilian Buja, MD

Subject to any provisions noted above, you may now begin this research.

PLEASE NOTE: Due to revisions to the common rule that went into effect July 19, 2018, this study that was approved under expedited approval no longer needs to submit for continuing review. Changes to the study, adverse events, protocol deviations, personnel changes, and all other types of reporting must still be submitted to CPHS for review and approval. When this study is complete, the PI must submit a study closure report to CPHS.

CHANGES: The principal investigator (PI) must receive approval from the CPHS before initiating any changes, including those required by the sponsor, which would affect human subjects, e.g. changes in methods or procedures, numbers or kinds of human subjects, or revisions to the informed consent document or procedures. The addition of co-investigators must also receive approval from the CPHS. ALL PROTOCOL REVISIONS MUST BE SUBMITTED TO THE SPONSOR OF THE RESEARCH.

INFORMED CONSENT DETERMINATION:

Waiver of Documentation of Informed Consent
HMRI IRB 3

NOTIFICATION OF INITIAL APPROVAL TO BEGIN RESEARCH (EXPEDITED)

To: Dr. Jeanette Drake
Date: July 31, 2019
From: Susan M. Miller, MD, MPH - HMRI IRB Chair

Study ID: Pro00022504
Title: DAEGAS study 2019

The Institutional Review Board reviewed your Request for Expedited Review and the above named project is determined to qualify for Expedited status according to 45 CFR 46.110. This study was approved on 07/30/2019 and will require submission of a study update on 07/29/2020 per: 2018 Requirements 45CFR46 (f) (minimal risk study and not federally funded).

PROVISIONS: Unless otherwise noted, this approval relates to the research to be conducted under the above referenced title and/or to any associated materials considered by expedited review, e.g. study documents, etc.

DAEGAS study 2019(0.01)
6.5.2019 Outcome Letter pdf
DAEGAS verbal script
DAEGAS questionnaire
DAEGAS 19-items 4 single side pages.pdf(0.01)

CATEGORY #7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.110 (2) and (b)(3). This listing refers only to research that is not exempt.)

The IRB has determined all the specified criteria for a waiver or an alteration were met in accordance with 45 CRF 164.512(i). Under this approval, the following data elements may be used/accessed in connection with this study:
• HIPAA waiver to review charts for questionnaires or interviews, names, addresses and any
other unique identifying number, characteristic, or code, unless otherwise permitted by the Privacy Rule for re-identification

Please note that prior to accessing these data elements, you should provide this letter of IRB approval to the applicable medical records personnel. Any changes to this Waiver of Authorization request must be approved by the IRB before the changes can take place.

Waiver of Written or Signed Consent: 45 CFR 46.117 (c): Waiver of Documentation of Informed Consent

CHANGES: Should you choose to make any changes to the protocol that would involve the inclusion of human subjects or identified data from humans, please submit the change via MORTI to the Committee for the Protection of Human Subjects for review. Please note that prior to starting any experiments, it is your responsibility to give a copy of this document to all research personnel involved in the project and to discuss the project with each employee. Please ensure that only the most current IRB approved consent may be used during the study. Any changes to the protocol or consent must be approved by the IRB before the changes can take place.

To post information on this clinical trial to the HMRI website, the study must be listed on ClinicalTrials.gov. Please enter the ClinicalTrials.gov Identifier (i.e., the NCT number) and the Brief Summary from that listing for this trial by clicking on the Submit Web Info activity button in the left navigation list on the study page in the MORTI IRB Module.

If you have any questions or comments, please contact the Office of Research Protection at IRB@houstonmethodist.org.

The HMRI IRB is organized, operates, and is registered with the United States Office for Human Research Protections according to the regulations codified in the United States Code of Federal Regulations at 45 CFR 46 and 21 CFR 56. The HMRI IRB operates under the HMRI Federal Wide Assurance No. FWA0000438, as well as those of hospitals and institutions affiliated with the Institute.

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Houston Methodist Research Institute
6670 Bertner
Houston, TX 77030
DATE: July 19, 2019

TO: Jeanette Drake

PROJECT TITLE: [1463884-1] Development and Psychometric Testing of the Drake Atrial Electrogram Assessment Survey; DAEGASID

SUBMISSION TYPE: New Project - Ceding Request

ACTION: Request to Cede IRB Review APPROVED

EFFECTIVE DATE: July 19, 2019

REVIEW TYPE: Administrative Review

Thank you for your submission to the Catholic Health Initiatives Institute for Research and Innovation Institutional Review Board (CHIRB). The CHIRB has APPROVED your request to rely upon the University of Texas HSC-H Committee for the Protection of Human Subjects.

Please note the following:

1. It is your responsibility to obtain any additional local institutional or departmental required approvals prior to initiating your study.

2. You must submit a modification request to CHIRB when there is a change in personnel working on this study.

3. You must notify the CHIRB when the study is closed at the University of Texas HSC-H Committee for the Protection of Human Subjects.

4. You must notify the CHIRB when the University of Texas HSC-H Committee for the Protection of Human Subjects makes a determination of an Unanticipated Problem involving risks to subjects or others, serious or continuing noncompliance, or suspension or termination of IRB approval.

If you have any questions at any time, please feel free to contact the CHIRB at 1-844-626-2299 or CHIRB@CatholicHealth.net. Please include your project title and reference number in all correspondence with the CHIRB so that we can best assist you.

Thank you.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Catholic Health Initiatives Institute for Research and Innovation Institutional Review Board (CHIRB)'s records.
Appendix B

Verbal Script
Study Title:
Development and Psychometric Testing of the Drake Atrial Electrogram Assessment Survey: DAEGAS©

Principal Investigator:
Jeanette Drake PhD(c), RN, MN, ACNP-BC
University of Texas Health Science Center
Cizik School of Nursing
6901 Bertner Avenue
Center for Nursing Research, Office 566
Houston, Texas 77030
Email: jeanette.drake@uth.tmc.edu

IRB Number: HSC-SN-19-0462

My name is Jeanette Drake and I am a PhD student in the Cizik School of Nursing at the University of Texas Health Science Center at Houston (UTHealth).

I am conducting a study to test the reliability and validity of a 19-item instrument (DAEGAS) that will be used to assess Critical Care Nurses knowledge of atrial electrograms using temporary atrial epicardial pacing wires. The purpose of my study is to test the instrument…not the nurses’ knowledge.

In order to do that, I need your help. I am inviting you to participate because you provide care for postoperative cardiac surgery patients that have may these wires.

If you agree to participate, I will give you the test study packet today and when you mail it back to me, I’ll wait 2 weeks and then send you the retest study packet in the mail. You will be asked to complete 8 demographic questions (once) and the DAEGAS twice. This should take approximately 15-20 minutes each time.

Once you complete each study packet, you will place all the study materials in a pre-addressed and stamped envelope (that will be provided) and return them to me by mail.

I will ask you to share your name and mailing address with me today. Your information will be kept confidential. The only time I will use your address is to send you the retest study packet.
You will be given a study ID code that will represent the first initial of your last name, numeric order of recruitment (ex. 01, 02, 03, etc.) and then the letter A for the test and B for the retest. Your personal information will be protected and only available to the study team (me and my co-investigator). Please do not put personal information on any of the study materials other than your study ID code.

There are no identified risks to you for taking part in this study. Again, the focus of this study is on the instrument. Participation is voluntary and you may stop at any time.

If you have any complaints, suggestions, or questions about your rights as a research volunteer, you may contact the UTHealth Committee for the Protections of Human Subjects (CPHS) at 713-500-7943.

If you have any questions regarding this study, you may contact the principal investigator at the Email address above.

Do you have any questions for me? Would you like to take part in this study?

Thank you for inviting me here today and for your time to listen and consider becoming a participant. Your feedback is essential for the success of this project.
Appendix C

Study Protocol
**Study Protocol**

Development and Psychometric Testing of the Drake Atrial Electrogram Assessment Survey (DAEGAS©)

**Obtain Approvals**

1. Obtain approval for the study from the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects.
2. Obtain Phase 1 study approvals from hospitals in the Houston metropolitan area and their institutional review boards if required.

**Local Pilot Study (Phase 1)**

**Assemble supplies**

1. Cover letter (on Cizik SON letterhead) for pilot study (300)
2. Demographic Data Sheet (300)
3. Original printed copies of the DAEGAS (300)
4. Envelopes (600): 600 to hand deliver and mail study forms to participants and 600 pre-addressed and stamped for return of completed study forms
5. First-class stamps (600)
6. Labels (600): 300 for mail to participants and 300 for pre-addressed envelopes

**Administer DAEGAS twice (test-retest and internal consistency)**

1. Recruit volunteer CCNs (N = 50) from hospitals with cardiac surgery programs in the greater Houston region
   1.1 Contact individual hospitals via email/phone and in person; work closely with unit leadership contacts at each hospital; meet with CCN participants in person to begin the study; follow verbal script for
   1.2 Obtain participants mailing address
2. Assign each participant a study identification code number (first initial of last name and number beginning with X01, X02, X03…X30) followed by A (for test) or B (for retest)
3. Mail test packets: test cover letter, demographic data sheet, DAEGAS, and pre-addressed and stamped return envelope
4. Review returned test study packets; if incomplete responses noted, exclude from analysis
5. Wait 2 weeks
6. Mail retest study packets: retest cover letter, DAEGAS, and pre-addressed and stamped return envelope
7. Mail one-time reminder card if test and/or retest not received
8. Review returned retest study packets; if incomplete responses noted, exclude from analysis
9. Construct database (using Excel) and import into SPSS statistical software (Version 25)
10. Test for internal consistency (Cronbach’s $\alpha$) and test-retest stability reliability (Pearson’s correlation coefficient, $r$)

11. Compare results against a priori criterion ($\geq .80$)

**National Study (Phase 2)**

**Assemble supplies**

1. Electronic versions of study Cover letter (on Cizik SON letterhead), Demographic Data Sheet, and DAEGAS for third-party mailing house

2. Mail house agreement from the American Association of Critical Care Nurses (AACN); available online

3. Credit card: payment to AACN for mailing list rental and third-party mail house services

4. AACN website has list rental service information online at www.aacn.org then search list rental; send specific questions to listrental@aacn.org

**Administer DAEGAS to national sample**

1. Contact AACN and place order for 5,000 randomly selected CCN members who work in units that care for patients with temporary epicardial atrial pacing wires

2. Provide third-party mailing house with the mailing house agreement (available on the AACN website with list rental information); contents for study packets (cover letter, demographic data sheet, DAEGAS, and pre-addressed, stamped return envelope); and return address for the PI’s mailbox at the University of Texas Health Science Center Cizik School of Nursing

3. Allow participants 4 weeks to return completed packets

4. Review returned study packets; review; if incomplete responses noted, exclude from analysis

5. Construct database in Excel and import into SPSS statistical software

6. Analyze data
   a. run descriptive statistics on the demographics and DAEGAS items
   b. run internal consistency
   c. assess distribution of the data with histogram and Kolmogorov-Smirnov test
   d. run exploratory factor analyses with principal axis factoring and both oblique and orthogonal rotations

7. Compare the Cronbach’s alpha and optimal factor analysis solution against a priori criteria
Appendix D

Reminder Cards (Test and Retest)
Reminder Cards (Test and Retest)

Dear DAEGAS Study Participant:

Thank you for agreeing to participate in my study about Atrial Electrograms. I have recruited XXX nurses and have received XX complete test-retest packets. My sample size goal is XX to achieve statistical significance.

Your participation is both voluntary and incredibly important to the success of my research. I need you to help me test the reliability of the questions. Your knowledge is NOT being tested. Your experience is needed to test the reliability of the questions.

Please complete the DAEGAS test questionnaire and return it in the self-addressed, stamped envelope.

If you need another copy of the questionnaire, email: Jeanette.Drake@uth.tmc.edu

**Your feedback is essential!** Please complete and return the packets ASAP!

The deadline to complete this part of the study is *in just a few weeks*!

---

Dear DAEGAS Study Participant:

Thank you for completing and submitting the DAEGAS test questionnaire!

Your participation is both voluntary and incredibly important to the success of this research.

Please complete the DAEGAS retest questionnaire and return it in the self-addressed, stamped envelope.

If you need another copy of the questionnaire, email: Jeanette.Drake@uth.tmc.edu

**Your feedback is essential!** Please complete and return ASAP!

The deadline to complete this part of the study is *in just a few weeks*!
Appendix E

COVID-19 Research Restrictions Letter
COVID-19 Research Restrictions Letter

To: UTHealth Research Community
From: Michael Blackburn, PhD
       Executive Vice President and Chief Academic Officer
Date Sent: Thursday, March 19, 2020
Subject: Clinical Research

As UTHealth continues to monitor federal and state COVID-19 response recommendations, we remain committed to protecting the safety and well-being of our community while preserving our research mission. I want to thank all our laboratory-based researchers for quickly implementing shift schedules for lab personnel and putting research preparedness plans in place.

At this time, we ask that clinical researchers stop new enrollment in research studies that involve in-person contact. Specifically, research studies that involve in-person contact with research participants at all UT Physician clinics, Memorial Hermann locations, and Harris Health System locations should cease new enrollment immediately. This decision is intended to minimize exposure of patients, participants, and research staff. Additionally, we want to be mindful of the availability of PPE and other clinic and hospital resources and prioritize patient care. Research studies that do not require in-person contact with participants (e.g., research studies utilizing online surveys, telephone calls, or chart reviews, etc.) may continue. Additional guidance on handling research visits for participants who are already enrolled in research studies, FDA Guidance on Conduct of Clinical Trials during the COVID-19 pandemic, and a sample action plan for handing participant visits is available on the IRB website.

This is a continuously evolving situation, and I ask research leaders to maintain frequent communication with faculty and staff in your schools and departments to share these updates and ensure compliance.

Please continue to check the COVID-19 website and your emails for additional guidance.
Appendix F

Additional Data Analysis: Factor Analysis Most “Optimal” Solution
Appendix F

Additional Data Analysis: Factor Analysis Most “Optimal” Solution

<table>
<thead>
<tr>
<th></th>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreQ2C</td>
<td>.328</td>
<td>-.175</td>
<td>-.475</td>
<td>-.329</td>
<td>.164</td>
<td></td>
</tr>
<tr>
<td>PreQ3C</td>
<td>.424</td>
<td>-.061</td>
<td>-.139</td>
<td>.091</td>
<td>.011</td>
<td></td>
</tr>
<tr>
<td>PreQ4C</td>
<td>.034</td>
<td>-.088</td>
<td>.119</td>
<td>.067</td>
<td>.352</td>
<td></td>
</tr>
<tr>
<td>PreQ5C</td>
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<td>-.121</td>
<td>-.171</td>
<td>-.054</td>
<td>.553</td>
<td></td>
</tr>
<tr>
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<td>-.137</td>
<td>-.134</td>
<td>.452</td>
<td>.094</td>
<td>.239</td>
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</tr>
<tr>
<td>PreQ10C</td>
<td>.538</td>
<td>.032</td>
<td>.245</td>
<td>.101</td>
<td>.262</td>
<td></td>
</tr>
<tr>
<td>PreQ11C</td>
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<td>.226</td>
<td>.051</td>
<td>-.157</td>
<td>.411</td>
<td></td>
</tr>
<tr>
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<td>-.032</td>
<td>.063</td>
<td>-.090</td>
<td>-.126</td>
<td></td>
</tr>
<tr>
<td>PreQ14C</td>
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<td>-.893</td>
<td>.089</td>
<td>-.100</td>
<td>.009</td>
<td></td>
</tr>
<tr>
<td>PreQ15C</td>
<td>.120</td>
<td>-.799</td>
<td>.028</td>
<td>-.052</td>
<td>.096</td>
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<tr>
<td>PreQ16C</td>
<td>.029</td>
<td>-.103</td>
<td>.562</td>
<td>-.134</td>
<td>-.126</td>
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<tr>
<td>PreQ17C</td>
<td>.164</td>
<td>.152</td>
<td>.358</td>
<td>-.126</td>
<td>.099</td>
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<td>PreQ18C</td>
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<td>-.027</td>
<td>-.075</td>
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<tr>
<td>PreQ19C</td>
<td>-.120</td>
<td>-.096</td>
<td>.143</td>
<td>-.761</td>
<td>-.035</td>
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</table>

Note. Construct validity testing (conducted using SPSS, version 25) was attempted and unsuccessful. A priori criteria were ≥ .3 for factor loading, ≥ .2 for cross-loading, and ≥ 3 items per factor. The most “optimal” solution is presented. Extraction Method: Principal Axis Factoring (minus Q1Q7Q8Q9Q13). Rotation Method: Direct Oblimin (converged in 16 rotations). Two factors were revealed but with only 3 items loading cleanly on each. Factor 1 cleanly loaded on Items 3, 10, and 12 (consider rhythm clarification using AEG). Factor 3 cleanly loaded on Items 6, 16, and 17 (consider wire location identification and AEG interpretation).

Kaiser-Meyer-Olkin Measure of Sampling Adequacy. .519

Bartlett’s Test of Sphericity

<table>
<thead>
<tr>
<th>Approx. Chi-Square</th>
<th>202.612</th>
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<tr>
<td>df</td>
<td>91</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. KMO Measure of Sampling adequacy does not meet standard (≥ .6) and suggests sample size is not adequate. Bartlett’s Test of Sphericity is significant, indicating appropriate correlations and not an identity matrix.
Communalities are low (≤ 0.3) for 5 items, suggesting less correlation to other items and difficulty loading on a factor. Item 11 (.825) is high (≥ .8) and could indicate multicollinearity.

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial</th>
<th>Extraction</th>
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</thead>
<tbody>
<tr>
<td>PreQ2C</td>
<td>.386</td>
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<tr>
<td>PreQ3C</td>
<td>.195</td>
<td>.213</td>
</tr>
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<td>PreQ4C</td>
<td>.207</td>
<td>.164</td>
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<tr>
<td>PreQ5C</td>
<td>.250</td>
<td>.351</td>
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<tr>
<td>PreQ6C</td>
<td>.210</td>
<td>.316</td>
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<td>PreQ10C</td>
<td>.314</td>
<td>.463</td>
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<tr>
<td>PreQ11C</td>
<td>.214</td>
<td>.256</td>
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<tr>
<td>PreQ12C</td>
<td>.292</td>
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<td>PreQ14C</td>
<td>.679</td>
<td>.825</td>
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<td>PreQ15C</td>
<td>.685</td>
<td>.720</td>
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<td>PreQ16C</td>
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<td>PreQ17C</td>
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<td>.224</td>
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<tr>
<td>PreQ18C</td>
<td>.200</td>
<td>.193</td>
</tr>
<tr>
<td>PreQ19C</td>
<td>.214</td>
<td>.598</td>
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</tbody>
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Scree Plot showed 5 factors that differentiated discontinuity in the steepness of the slope and explained 40% of the variance among the inter-correlations of the variables.
Appendix G

DAEGAS Versions
<table>
<thead>
<tr>
<th>Item</th>
<th>DAEGAS to content Experts (March 2019)</th>
<th>DAEGAS Local Sample (July 2019)</th>
<th>DAEGAS Revised (May 2020)</th>
</tr>
</thead>
</table>
| Q1   | Arrhythmias can result from abnormalities of:  
  a. Impulse initiation  
  b. Conduction  
  c. Both impulse initiation and conduction  
  d. Neither impulse initiation and conduction | Dysrhythmias can result from abnormalities of:  
  a. Impulse initiation  
  b. Conduction  
  c. Both impulse initiation and conduction  
  d. Neither impulse initiation nor conduction | Sample question:  
Postoperative atrial dysrhythmias can result from:  
  a. Impulse initiation or conduction abnormalities  
  b. Electrolyte or metabolic disturbances  
  c. Hypoxia or myocardial ischemia  
  d. All of the above*  
*All the answer options can cause postoperative atrial dysrhythmias; d is the correct answer |
| Q2   | Heart block arrhythmia commonly occurs after valve surgery due to:  
  a. Hypovolemia  
  b. Edema near the conduction system  
  c. Sympathomimetic drugs  
  d. Decreased cardiac output | Heart block dysrhythmia commonly occurs after valve surgery (aortic/mitral) due to:  
  a. Hypovolemia  
  b. Edema near the conduction system  
  c. Sympathomimetic drugs  
  d. Decreased cardiac output | Heart block dysrhythmia commonly occurs after valve surgery (aortic/mitral) due to:  
  a. Hypovolemia  
  b. Edema near the conduction system  
  c. Sympathomimetic drugs  
  d. Decreased cardiac output |
| Q3   | An atrial electrogram (AEG) can be obtained by:  
  a. Recording a rhythm tracing using the ground lead that is attached directly to the surface of the chest wall  
  b. Recording a rhythm tracing using an epicardial pacing wire that is attached directly to the atrial epicardium  
  c. Recording a rhythm tracing using Leads I or II  
  d. Recording a rhythm tracing using Lead V1 | P waves may be absent or unclear on electrocardiogram (ECG) for all the following  
  except:  
  a. Small amplitude produced by depolarization of the ventricle  
  b. Small amplitude produced by depolarization of the atria and/or artifact  
  c. Distance of the sensing electrodes from the heart  
  d. Superimposition of the QRS complex and/or T wave | P waves may be absent or unclear on electrocardiogram (ECG) for all the following  
  EXCEPT:  
  a. Small amplitude from depolarization of the atria  
  b. Superimposition of the QRS complex and/or T wave  
  c. Distance of the surface ECG sensing electrodes from the heart  
  d. Small amplitude from depolarization of the ventricles |
<table>
<thead>
<tr>
<th>Item</th>
<th>DAEGAS to content Experts (March 2019)</th>
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</tr>
</thead>
</table>
| **Q4** | To obtain an atrial electrogram (AEG), it is most important to:  
a. Get a written/verbal order from the physician  
b. Use the portable 12-lead ECG machine  
c. Accurately identify the atrial epicardial wire(s)  
d. Disconnect the standard 5-lead surface monitoring system | An atrial electrogram (AEG) can be obtained by:  
a. Recording a rhythm tracing using the ground lead that is attached directly to the surface of the chest wall  
b. Recording a rhythm tracing using an epicardial pacing wire that is attached directly to the atrial epicardium  
c. Recording a rhythm tracing using Leads I or II  
d. Recording a rhythm tracing using Lead V1 | An atrial electrogram (AEG) can be obtained by:  
a. Recording a rhythm tracing using the ground lead that is attached directly to the surface of the chest wall  
b. Recording a rhythm tracing using an epicardial pacing wire that is attached directly to the atrial epicardium  
c. Recording a rhythm tracing using Leads I or II  
d. Recording a rhythm tracing using Lead V1 |
| **Q5** | The atrial epicardial wires typically exit the patient’s chest on which side of the sternum?  
a. Right  
b. Left  
c. Both right and left  
d. Always left | To obtain an atrial electrogram (AEG), it is most important to:  
a. Get a written/verbal order from the physician  
b. Use the portable 12-lead ECG machine  
c. Accurately identify the atrial epicardial wire(s)  
d. Disconnect the standard 5-lead surface monitoring system | To obtain an atrial electrogram (AEG), it is most important to:  
a. Get a written/verbal order from the physician  
b. Use the portable 12-lead ECG machine  
c. Accurately identify the atrial epicardial wire(s)  
d. Disconnect the standard 5-lead surface monitoring system |
| **Q6** | Which of the statements about safe handling of epicardial wires is incorrect?  
a. Small amounts of electrical current can cause micro shock leading to potentially lethal arrhythmias  
b. Gloves do not have to be worn when handling epicardial wires if proper handwashing and drying are completed prior to touching the wires  
c. Touching the bed frame before touching the epicardial wires will discharge static electricity  
d. Micro shock can cause potentially lethal dysrhythmias | Where do the temporary epicardial atrial pacing wires typically exit the patient’s chest relative to the sternum?  
a. Right  
b. Left  
c. Both right and left  
d. Center | Where do the temporary epicardial atrial pacing wires typically exit the patient’s chest?  
a. Right side of the patient’s sternum  
b. Left side of the patient’s sternum  
c. Both right and left side of the patient’s sternum  
d. Center of the patient’s sternum |
<table>
<thead>
<tr>
<th>Item</th>
<th>DAEGAS to content Experts (March 2019)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Q7</td>
<td>Two types of atrial electrograms (AEGs) that can be obtained from pericardial wires are: a. Trans-septal and epicardial b. High bundle of His and myocardial c. Unipolar and bipolar d. Transesophageal and transvenous</td>
<td>Which of the statements about safe handling of temporary epicardial atrial pacing wires is incorrect? a. Small amounts of electrical current can cause micro shock leading to potentially lethal dysrhythmias b. Wearing gloves is optional if proper handwashing and drying are completed prior to touching the wires c. Touching the bed frame before touching the wires will discharge static electricity d. Micro shock can cause potentially lethal dysrhythmias</td>
<td>All of the following statements about safe handling of temporary epicardial atrial pacing wires are true EXCEPT: a. Small amounts of electrical current can cause micro shock (which can cause potentially lethal dysrhythmias) b. Wearing gloves is optional if proper handwashing and drying are completed prior to touching the wires c. Touching the bed frame before touching the wires will discharge static electricity d. The exposed uninsulated portion of the wires should be protected with a finger cot, glove, plastic needle cap, needle barrel, or ear plug</td>
</tr>
<tr>
<td>Q8</td>
<td>Which of the following measures electrical activity between two atrial epicardial wires attached to the myocardium? a. Unipolar b. Bipolar c. Both unipolar and bipolar d. Neither unipolar or bipolar</td>
<td>Which of the following measures electrical activity between two temporary epicardial atrial pacing wires attached to the myocardium? a. Unipolar b. Bipolar c. Both unipolar and bipolar d. Neither unipolar nor bipolar</td>
<td>An atrial electrogram (AEG) done simultaneously with surface electrocardiogram (ECG) is helpful in each of the following instances EXCEPT: a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V b. The rhythm is rapid or irregular c. There is difficulty in differentiating P waves and QRS complexes d. Identification of atrial activation if surface ECG rhythm tracing is unclear</td>
</tr>
<tr>
<td>Item</td>
<td>DAEGAS to content Experts (March 2019)</td>
<td>DAEGAS Local Sample (July 2019)</td>
<td>DAEGAS Revised (May 2020)</td>
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</tbody>
</table>
| **Q9** | Which of the following atrial electrograms (AEGs) will give a pure atrial tracing without ventricular effect?  
a. Unipolar  
b. Bipolar  
c. Both unipolar and bipolar  
d. Neither unipolar nor bipolar | Which of the following atrial electrograms (AEGs) will give a pure atrial tracing without ventricular effect?  
a. Unipolar  
b. Bipolar  
c. Both unipolar and bipolar  
d. Neither unipolar nor bipolar | An atrial electrogram (AEG) done simultaneously with surface electrocardiogram (ECG) is helpful in each of the following instances, *except:*  
a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V  
b. The rhythm is rapid or irregular  
c. There is difficulty in differentiating P waves and QRS complexes  
d. Identification of atrial activation on surface ECG rhythm tracing is unclear |
| **Q10** | P waves may be unclear or obscured on ECG for all the following *except:*  
a. Smaller amplitude produced by depolarization of the ventricle  
b. Smaller amplitude produced by depolarization of the atria and/or artifact  
c. Distance of the sensing electrodes from the heart  
d. Status/post Cox-Maze procedure | An atrial electrogram (AEG) done simultaneously with surface electrocardiogram (ECG) is helpful in each of the following instances, *except:*  
a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V  
b. The rhythm is rapid or irregular  
c. There is difficulty in differentiating P waves and QRS complexes  
d. Identification of atrial activation on surface ECG rhythm tracing is unclear | Which of the following is a *relative contraindication* for obtaining an atrial electrogram (AEG)?  
a. Within 6 hours of admission from OR (immediately postop)  
b. Patient develops new onset tachycardia of unknown origin  
c. Patient is dependent on atrial pacing  
d. Rhythm on the bedside monitor changes and looks like atrial fibrillation |
<table>
<thead>
<tr>
<th>Item</th>
<th>DAEGAS to content Experts (March 2019)</th>
<th>DAEGAS Local Sample (July 2019)</th>
<th>DAEGAS Revised (May 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td>An atrial electrogram (AEG) done simultaneously with surface ECG is helpful in each of the following instances, <em>except</em> when: a. The telemetry monitor shows bradycardia with pronounced first degree block in Lead II and Lead V b. The rhythm is rapid or irregular c. There is difficulty in differentiating P waves and QRS complexes d. Identification of atrial activation on surface ECG rhythm tracing is unclear</td>
<td>Which of the following is a <em>relative contraindication</em> for obtaining an atrial electrogram (AEG)? a. Within 6 hours of admission from OR (immediately postop) b. Patient develops new onset tachycardia of unknown origin c. Patient is dependent on atrial pacing d. Rhythm on the bedside monitor changes and looks like atrial fibrillation</td>
<td>The following are all indications for obtaining an atrial electrogram (AEG), <em>except</em>: a. Identify atrial activity that is not clearly detected on surface electrocardiogram (ECG) b. Identify ventricular activity that is not clearly detected on surface ECG c. Clarify the relationship between atrial and ventricular activity d. Determine the origin of a wide-complex rhythm (example: supraventricular tachycardia with aberrant ventricular conduction vs. ventricular tachycardia)</td>
</tr>
</tbody>
</table>
| Q12   | Which of the following is a *contraindication* for obtaining an atrial electrogram (AEG)? a. Within 6 hours of admission from OR (immediately postop) b. Patient develops new onset tachycardia of unknown origin c. Patient is dependent on atrial pacing d. Rhythm on the bedside monitor changes and looks like atrial fibrillation | The following are all indications for obtaining an atrial electrogram (AEG), *except*: a. Identify atrial activity that is not clearly detected on surface electrocardiogram (ECG) b. Identify ventricular activity that is not clearly detected on surface ECG c. Clarify the relationship between atrial and ventricular activity d. Determine the origin of a wide-complex rhythm (example: supraventricular tachycardia with aberrant ventricular conduction vs. ventricular tachycardia) | **For Questions 11 and 12:** The following rhythm report shows *sinus rhythm* on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; arrows to parts of waveform on graphic) 
Identify the P waves using the AEG leads above and **circle** the correct letter that corresponds with a **P wave** here: A B C D
Identify the QRS complexes using the AEG leads above and **circle** the correct letter that corresponds with a **QRS complex** here: A B C D |
<table>
<thead>
<tr>
<th>Item</th>
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<th>DAEGAS Revised (May 2020)</th>
</tr>
</thead>
</table>
| Q13  | The following are all indications for obtaining an atrial electrogram (AEG), *except*:  
  a. Identify atrial activity that is not clearly detected on surface ECG  
  b. Identify ventricular activity that is not clearly detected on surface ECG  
  c. Clarify the relationship between atrial and ventricular activity  
  d. Determine the origin of a wide-complex rhythm (example: supraventricular tachycardia with aberrant ventricular conduction vs. ventricular tachycardia)  
  An atrial electrogram (AEG) can be obtained using each of the following, *except*:  
  a. Portable 12-lead ECG machine  
  b. Multi-channel telemetry or portable bedside monitor with dual lead display capability  
  c. Single lead implanted cardiac defibrillator (ICD)  
  d. Dual lead (atrial and ventricular) permanent pacemaker  
  For Questions 13 and 14: The following rhythm report *show the same rhythm* on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; arrows to parts of waveform on graphic)  
  Identify the P waves using the AEG leads above and circle the correct letter that corresponds with a P wave here: A B C D  
  Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here: A B C D  
| Q14  | An atrial electrogram can be obtained using each of the following, *except*:  
  a. Portable 12-lead ECG machine  
  b. Multichannel telemetry or portable bedside monitor with dual lead display capability  
  c. Single lead Implanted cardiac defibrillator (ICD)  
  d. Dual lead permanent pacemaker  
  The following rhythm report shows sinus rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). Each rhythm is 6 seconds.  
  Identify the P waves using the AEG leads below and circle the correct letter that corresponds with a P wave here: A B C D  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; arrows to parts of waveform on graphic)  
  Q15: The following rhythm strips *show the same rhythm* on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds.  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic)  
  The above rhythm is:  
  a. Accelerated AV junctional rhythm with unifocal PVCs  
  b. Sinus bradycardia  
  c. AV Junctional rhythm  
  d. Accelerated idioventricular rhythm |
<table>
<thead>
<tr>
<th>Item</th>
<th>DAEGAS to content Experts (March 2019)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Q15</td>
<td>The following rhythm report shows sinus rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3) Identify the P waves using the AEG below. Identify the correct letter that corresponds with a P wave. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; A, B, C, D boxes on graphic)</td>
<td>Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here: A B C D</td>
<td>Q16: The following rhythm strips show the same rhythm on both surface ECG (Lead V1) and atrial electrogram (AEG) (Leads V2, V3). Each rhythm strip is 6 seconds. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic) The above rhythm is: a. Complete heart block rhythm b. AV junctional rhythm with retrograde P waves c. Accelerated idioventricular rhythm d. Junctional tachycardia</td>
</tr>
<tr>
<td>Q16</td>
<td>Identify the QRS complexes using the AEG above. Identify the correct letter that corresponds with a QRS complex. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; A, B, C, D boxes on graphic)</td>
<td>Identify the P waves using the AEG leads below and circle the correct letter want corresponds with a P wave here: A B C D (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; arrows to parts of waveform on graphic)</td>
<td></td>
</tr>
<tr>
<td>Q17</td>
<td>Identify the P waves using the AEG below. Identify the correct letter that corresponds with a P wave. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; A, B, C, D boxes on graphic)</td>
<td>Identify the QRS complexes using the AEG leads above and circle the correct letter that corresponds with a QRS complex here: A B C D</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td><strong>DAEGAS to content Experts (March 2019)</strong></td>
<td><strong>DAEGAS Local Sample (July 2019)</strong></td>
<td><strong>DAEGAS Revised (May 2020)</strong></td>
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</tbody>
</table>
| Q18  | Identify the QRS complexes using the AEG above. Identify the correct letter that corresponds with a QRS complex. (V1 surface ECG, V2 AEG, V3 AEG waveform graphic; A, B, C, D boxes on graphic) | Identify the rhythm using the following surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). This rhythm strip is 6 seconds. a. Accelerated AV junctional rhythm with unifocal PVC’s  
  b. Sinus bradycardia  
  c. AV Junctional rhythm  
  d. Accelerated idioventricular rhythm  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic) |  |
| Q19  | Identify the rhythm using the following ECG (Lead V1) and AEG (Leads V2, V3). a. Accelerated junctional rhythm with unifocal PVC’s  
  b. Sinus bradycardia  
  c. Junctional rhythm  
  d. Accelerated idioventricular rhythm  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic) | Identify the rhythm using the following surface ECG (Lead V1) and atrial electrogram (AEG) (Unipolar Leads V2, V3). This rhythm strip is 6 seconds. a. Complete heart block rhythm  
  b. AV Junctional rhythm with retrograde P waves  
  c. Accelerated idioventricular rhythm  
  d. Junctional tachycardia  
  (V1 surface ECG, V2 AEG, V3 AEG waveform graphic) |  |
<table>
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</tr>
</thead>
</table>
| Q20  | Identify the rhythm using the following ECG (Lead V1) and AEG (Leads V2, V3).  
|      | a. Complete heart block rhythm  
|      | b. Junctional rhythm with retrograde P waves  
|      | c. Accelerated idioventricular rhythm  
|      | d. Junctional tachycardia  
|      | (V1 surface ECG, V2 AEG, V3 AEG waveform graphic) | | |

*Note.* ECG and AEG rhythms not displayed for last 6 items on each version due to size limitation creating decreased legibility.
Appendix H

Curriculum Vitae
CURRICULUM VITAE
Jeanette Drake, PhD, RN, ACNP-BC

EDUCATION:
University of Texas Health Science Center PhD August 2020
at Houston (UTHealth), Cizik School of Nursing
Houston, Texas

**Dissertation:** Development and Preliminary Psychometric Testing of the Drake
Atrial Electrogram Assessment Survey: DAEGAS©
(Major Professor, Sandra K. Hanneman, PhD, RN, FAAN)

UTHealth, Cizik School of Nursing Post-Master’s May 2018
Houston Texas in Education

Adult Acute Care Nurse Practitioner program MS March 2007
University of Washington School of Nursing
Seattle, Washington

**Thesis:** Critical Care Nurses’ Knowledge of Selected Arrhythmias and the Use of
Atrial Electrograms in Postoperative Cardiac Surgical Adult Patients
(Major Professor, Susan L. Woods, PhD, RN, FAHA, FAAN)

Brigham Young University School of Nursing BSN December 1990
Provo, Utah

PROFESSIONAL POSITIONS:

**Graduate Research Assistant** June 2016 – August 2020
UTHealth, Cizik School of Nursing
Provide support for research studies of
Sandra K. Hanneman, PhD, RN, FAAN
Department of Research
Houston, Texas

**Simulation Specialist** July 2018 – August 2020
Houston Methodist Hospital, Texas Medical Center
Center for Nursing Research, Education, and Practice
Houston, Texas

**Nurse Practitioner** 2015 - 2016
Memorial Hermann Hospital, Texas Medical Center
Heart and Vascular Institute
Houston, Texas
PROFESSIONAL POSITIONS (Cont’d.):

Nurse Practitioner 2008 - 2015
Cleveland Clinic Foundation Medical Center
Cardiothoracic Intensive Care Units
Cleveland, Ohio

Clinical Nurse: RN II 2002 - 2008
University of Washington Medical Center
5SE Cardiothoracic Intensive Care Unit
Seattle, Washington

Clinical Nurse: PRN 2001 - 2002
American Fork Hospital
American Fork, Utah

Clinical Educator: CVICU, CCU, MICU 1996 - 2001
Utah Valley Regional Medical Center
Provo, Utah

Clinical Nurse: RN 1990 - 1996
Utah Valley Regional Medical Center
Provo, Utah

LICENSES AND CERTIFICATIONS:

1990 - Present  ACLS and BLS certification – American Red Cross
2007 - Present  Acute Care Nurse Practitioner, ACNP-BC
                American Nurses Credentialing Center
2015 - Present  Certified Nurse Practitioner
                Texas Board of Nursing
2015 - Present  Registered Nurse
                Texas Board of Nursing
2008 - 2019  Controlled substance registration certificate
              United States Department of Justice
              Drug Enforcement Administration (DEA)
PROFESSIONAL MEMBERSHIPS:

2007 - Present  American Association of Nurse Practitioners (AANP)
2007 - Present  American Nurses Association (ANA)
2006 - Present  Sigma Theta Tau International, Nursing Honor Society
               Zeta Pi Chapter, Leadership Succession Committee (2017 - 2020)
1990 - Present  American Association of Critical-Care Nurses (AACN)

PUBLICATIONS:


PRESENTATIONS:

Clinical Practice


PRESENTATIONS (Cont’d.):


Drake, J. (2018-2020). Designer and Presenter of Simulation Scenario Training for groups including: Graduate Nurses, Progressive Care Nurses, Critical Care Nurses, Nurse Practitioners, and Medical Residents and for Acute Care and Critical Care unit based Mock Codes.


Research


AWARDS AND RECOGNITION:

3rd Quarter 2013 Caregiver Celebrations Excellence Award
Cleveland Clinic Foundation; Cleveland, Ohio

May 2014 Honors Awards
August 2013 Cleveland Clinic Foundation; Cleveland, Ohio
December 2012
December 2011

October 2014 Excellence Awards
November 2012 Cleveland Clinic Foundation; Cleveland, Ohio

September 2005 Foundation for the Elimination of Diseases Attacking the Immune System in Memory of J. Patrick Barnes: The DAISY Award

GRANTS: