The SUDDEN Project

Project Manual and Methodology

University of North Carolina at Chapel Hill
UNC Cardiology
Department of Electrophysiology

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Version 3.0

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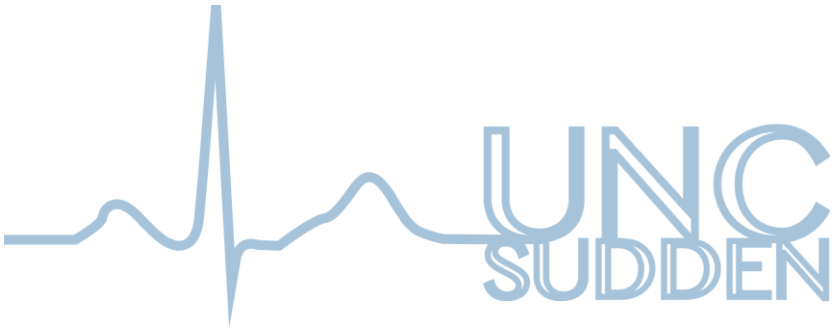

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Foreword

This manual, entitled ***Project Manual and Methodology*** Version 3.0, is one of a series of protocols and manuals of operation for the SUDDEN Project. Manual 1 provides the justification, design and goals of the SUDDEN Project. Manual 2 describes the general methodology and project management. Manual 3 is an updated guideline for the SUDDEN Project

1.0 Project Management

The SUDDEN Project is funded by a combination of private donations and departmental funds and is directed by the Electrophysiology Division of UNC Cardiology. Operations of the project are managed by the SUDDEN Project Steering Committee.

The Steering Committee is supported by collaborators, committees and other support staff responsible for the project design, implementation, operation and oversight. The project design process is outlined in Manual 1.

1.1 Steering Committee

The Steering Committee (SC) is charged with both short and long-term planning for the project, management of day to day operations, developing strategic alliances, securing necessary funding, as well as general oversight and compliance with the mission of the University of North Carolina at Chapel Hill. Committee members:

J. Paul Mounsey, MD, Chairman of the Steering Committee
Ross Simpson, Jr, MD, Principal Investigator
Irion W Pursell, Jr., RN, Co-Principal Investigator
Jane H Brice, MD, MPH
Philip A Bromberg, MD
Daniel Lackland, DrPH
Leah McCall Devlin, DDS, MPH
Francis Roosevelt Gilliam, III, MD
Thomas R. Griggs, MD
Gerardo Heiss, MD, MSc, PhD
Herbert G. Garrison, III, MD
John Butts, MD
Mary George, MD
Linda L. Raftery
George A. Stouffer, III, MD

1.2 Project Committees

The following standing committees were chartered by the Steering Committee:

1.2.1 Ethics Committee

The functions of the Ethics Committee (EC) include identifying and assessing the risks and potential benefits of research; evaluating the process and materials that will be used; evaluating the notification of next of kin process regarding ancillary findings from DNA research; evaluating risks to subjects' and/or next of kin's confidentiality; and examining any other issues that may affect the ethical acceptability of the research in the community. The committee meets quarterly, or as necessary, as determined by the Chairman. The EC reports their findings to the Chairman of the SC. Ethics Committee members:

Francis Roosevelt Gilliam, III, MD, Chairman
Jonathan Berg, MD, PhD
Paula Miller, MD
Katherine Higgins, M.Div
James P. Hummel, MD

1.2.2 Writing Committee

The Writing Committee (WC) oversees all aspects of data access, project publications and presentations, from initial manuscript approval to final approval for submission to journals. WC members:

Ross Simpson, Jr., MD, Chairman
J. Paul Mounsey, MD
Irion Pursell, RN
Thomas Griggs, MD
Bradley Layton, PhD
Feng Chang Lin, PhD

1.2.3 Quality Assurance Committee

The Quality Assurance Committee (QAC) is chaired by a member of the SC. The Chairman is responsible for developing the QA protocol and identifying quality assurance projects for both the project protocols and endpoint subject screening process. The QAC can recruit and employ auditors and other experts as needed. The Committee meets quarterly to discuss protocol adherence and quality control issues for referral identification, subject adjudication, data management protocols and other processes as identified by the committee chairman. QAC members:

Thomas Griggs, MD, Chairman
Feng Chang Lin, PhD
Clarence Potter

1.3 Support Staff

Specialized support staff will be recruited and employed at the discretion of the SC. Current support staff includes a Data Manager, Bio Statistician, Medical Students, Post Graduate Interns, Undergraduate Interns, and a Cardiology Fellow.

1.3.1 Data Manager

The Data Manager (DM) is responsible for all project data management. Specific responsibilities of the DM are establishing rigorous data management procedures, training staff to adhere to these procedures, and conducting periodic quality control checks in conjunction with the QAC to make sure the procedures are being followed. Currently the DM position is outsourced to Clarence Potter, Senior Clinical Data Manager, NC TraCS Institute.

1.3.2 Bio Statistician

Bio Statistician services are provided by Dr. Feng-Cheng Lin, of the NC TraCS Institute.

1.3.3 Post Graduate Interns

Post graduate interns support the investigators in the procurement of electronic death certificates, medical records, medical examiner records, subject screening, document preparation, data entry, database management, and data analysis.

1.3.4 Undergraduate Interns

Undergraduate interns support the investigators in document preparation, data entry, database management, and data analysis.

1.4 Oversight

Internal oversight is the responsibility of the Steering and Quality Assurance Committees. External oversight is provided by NC TraCS Regulatory Core which oversees the research, ensures proper documentation, record keeping, and adherence to all components that constitute good research practice. Specific functions include, reviewing research protocol, evaluating adequacy of project documentation, and compliance with regulatory and institutional requirements. Regulatory Core will determine monitoring schedule and where indicated, by monitoring, will provide the SC Chairman with recommendations for improvement of the project processes.

1.5 Communication

All routine project related communication will be approved by the SC Chairman and Principal Investigator. It will be distributed through The UNC Office of Research Communications, telephone: (919) 962-6136, email: endeavors@unc.edu. Interview and speaking request related to SUDDEN Project research must be approved by the SC Chairman. Crisis communication, in the event of such a need, will be handled by the Chairman of the Steering Committee with guidance from the EC Chairman.

1.5.1 Press Release and Media

In general, press releases and findings made available to the media by SUDDEN will bring attention to findings presented at scientific meetings and being published in the scientific literature.

Investigators are required to get prior approval and keep the SC informed of contacts with representatives of the national media and of information that they have supplied. Release of general descriptive information about the SUDDEN Project for local use (such as a local newspaper, university newsletter or state medical society journal) does not require prior approval. Use of

centrally prepared materials for such purposes is encouraged. A copy of any resultant article should be sent to the SC Chairman.

1.5.2 Lectures and Informal Presentations

No formal approval is required for lectures and informal presentations so long as they do not constitute the initial release of SUDDEN results.

1.6 Publication Policy

Overall responsibility for any publication related to the SUDDEN Project lies with the Writing Committee (WC), which has developed procedures for generating manuscripts and abstracts as well as the formal requirements for approval prior to submission.

The overall aim of this process is to encourage the preparation of manuscripts and abstracts while also providing appropriate control over their quality and content. The process also serves to avoid inappropriate duplication.

The WC is composed of five members, all of whom are active in the SUDDEN Project. The WC meeting schedule will be determined by the Chairman.

The WC maintains a list of all abstracts/publications/presentations and is responsible for tracking their progress using a series of tracking procedures, including presentations made from outside UNC. Tracking results are presented to the SC quarterly.

The WC oversees all aspects of the publication process, from the initial manuscript approval through final approval for submission to journals. All approvals are by majority vote of Committee members.

Any investigator granted approval for an abstract, manuscript or other publication will have exclusive rights to the topic and be protected from encroachment from other investigators as long as acceptable progress is being made to the project goals. Determination of acceptable progress and the authority to grant, extend, modify or withdraw approval of the project lies solely with the WC.

1.6.1 Outline of the Preparation and Approval Process

1) Publications and presentations usually arise from individual investigators.
2) The Steering Committee occasionally designates a topic and selects a writing group and its lead author.
3) The manuscript proposal including the lead author and list of writing group members is submitted to the Writing Committee for approval. The project has a standardized form that is used to submit all manuscript proposals (Appendix 1)
4) After approval by the Writing Committee, the author prepares and communicates data needs to the Data Manager.

5) The Writing Committee is responsible for tracking progress of the manuscript. The lead author is responsible for submitting quarterly progress reports to the Writing Committee.
6) The Writing Committee maintains a database of all manuscripts and status.

1.6.2 Authorship

The lead author of the writing group will be listed as the first author. The lead author also has the responsibility for listing the co-authors in the appropriate order. The Steering Committee serves as final arbitrator of any conflicts.

1.6.3 Manuscript and Abstract Generation

Individuals interested in preparing a manuscript or abstract on a specific topic must submit their proposals, including the names of the writing group members, to the Writing Committee for approval. The proposal must include a clear statement of the nature of the publication, the hypotheses to be addressed, and the types of statistical computations or data summarizations likely to be required.

The Writing Committee has the responsibility for reviewing and approving these proposals, both for appropriateness and for a priority designation. Once the specifications for the manuscript have been approved, the requirements for statistical computing can be formally communicated to the Data Manager. Requests will be processed according to the priorities specified by the Writing Committee. The Data Manager serves as the liaison to the writing group, both for communications about computing issues and for providing or obtaining appropriate statistical input.

The Writing Committee reviews the progress that each writing group is making toward the completion of its task and makes changes required for the timely completion of each manuscript or abstract.

2.0 Ancillary Studies Policy

2.1 General Policy

To enhance the value of SUDDEN, the Steering Committee welcomes proposals from individual investigators to carry out ancillary studies and to promote the advancement of science.
Nevertheless, to protect the integrity of SUDDEN and the privacy of its participants, such ancillary studies must be reviewed and approved by the Steering Committee and must be externally funded.

2.2 Definition of Ancillary Study

An ancillary study is one not described in the SUDDEN protocol and involves data collection or data analyses under additional funding. The core SUDDEN Project includes DNA analysis and post mortem ECHOs; these are not considered ancillary studies.

2.3 Requirements for Approval of an Ancillary Study

An ancillary study must receive approval before a grant to support it is submitted. Approval will be based on finding that the ancillary study will have scientific merit but will not do any of the following:

1) Interfere with the completion of the main objective of SUDDEN.
2) Adversely affect referral source cooperation.
3) Create a serious diversion of project resources
4) Jeopardize the public image of SUDDEN.
5) Use SUDDEN Project resources without reimbursement.

2.4 Application Process

Request for ancillary study are submitted to the Chairman of the SC in writing and will be reviewed by the SC for acceptance, rejection or modification.

3.0 Project Methodology

The processes of the SUDDEN Project are intended to comprehensively capture potential out of hospital sudden unexpected deaths and, through a detailed screening process, establish a cohort of confirmed out of hospital sudden unexpected deaths. The processes are designed to not only be reproducible, but also scalable to a state and/or national level.

3.1 Working Definition – Out of Hospital Sudden Unexpected Death

Out-of-hospital sudden unexpected death (OHSUD) is defined as sudden unexpected pulseless condition that meets the following criteria: (1) event occurs anywhere outside the hospital, (2) subject is eighteen years old or older, (3) subject is younger than 65 years old, (4) event is either witnessed or unwitnessed, with no time constraints on when the subject was last seen alive and symptom free. Subjects with terminal illness, DNR, and/or hospice care are excluded on the basis that such deaths were expected. All subjects with an identifiable non-natural etiology of sudden death, such as trauma, drowning, suicide, homicide, and a lethal toxicology report, as defined by the North Carolina Office of the Chief Medical Examiner, are excluded.

3.1.1 Data Collection and REDCap

Data collection, throughout the project continuum, is done in a systematic, repetitive manner allowing all data to be validated prior to analysis. Our data collection software, REDCap is a dynamic, customizable system that directly interfaces with most statistical analysis software and allows for multiple levels of data quality assurance reporting. The system is housed on a UNC secure server with multiple levels of security and backup. All data input and output is handled by Central Data Collection. Central Data Collection consists of project-dedicated personnel, computers, and office space to ensure consistent interpretation and entry of data, as well as, confidentiality of subjects' personal health information.

3.1.2 Electronic Death Certificate

Statewide electronic death certificates are procured from the North Carolina Bureau of Vital Records each September for the previous year. This delay is necessary to acquire finalized and accurate electronic death certificates, which are subject to change in the preceding months. Electronic death certificates are electronically accessed from Vital Statistics, downloaded, and imported into Microsoft ACCESS, where they are housed until screening.

3.1.3 Electronic Death Certificate Screen

The HIPAA compliant SUDDEN Chief Data Officer completes an initial screening of the electronic death certificate (EDC). All death certificates are electronically screened based on the information provided on the death certificate. Subjects are screened based on the following exclusion criteria: (1) 17 years or younger at the time of the event, (2) 65 years or older at the time of the event, (3) location of death indicated as inpatient, ER/Outpatient, or nursing home, (4) manner of death indicated as suicide or homicide, and (5) non-residents of county of death. This allows us to capture all people that potentially died unexpectedly outside of the hospital between ages 18 and 64 for the entire state.

3.1.4 Emergency Medical Services Records

Emergency Medical Services (EMS) records are referred to SUDDEN from each participating county and/or state. EMS agencies run an automated, electronic query of their EMS clinical software to extract all "Dead on Scene/ Non-Transported" cases. Query terms are based on NEMSIS III coding (Appendix 2) and are thus scalable to state and national databases. The queried reports are emailed to SUDDEN monthly and uploaded into SUDDEN EMS REDCap, a separate REDCap system for housing and tracking the EMS records.

3.1.4.1 Emergency Medical Services Contract

Each participating Emergency Medical Service signs a Data Use Agreement that outlines the relationship, activities and responsibilities of the referring entity and the project (Appendix 3). Attached to the Data Use Agreement is the project IRB (Appendix 4).

3.1.5 Electronic Death Certificate and EMS Record Matching

After SUDDEN procures electronic death certificates and EMS records, the HIPPA compliant Chief Data Officer facilitates a matching process to pair the electronic death certificates with the corresponding EMS records. An automated matching process links EMS records to electronic death certificates using four data points: 1) last name; 2) date of birth; 3) date of death; and 4) county of death. Those EMS records that do not match on these four points will be manually linked. Subjects with EMS records but no corresponding electronic death certificate are excluded from the study because they were either filtered out on the electronic death certificate screen (3.1.3) or survived the event.

3.1.6 Medical Examiner Records Procurement

If the attendant at death was indicated as the county or state Medical Examiner (ME) on the electronic death certificate, the report of Medical Examiner is requested. A request is submitted through the North Carolina Office of the Chief Medical Examiner website (http://www.ocme.dhhs.nc.gov/docrequest.shtml). The external exam, toxicology report, and full autopsy are all requested. An external exam is expected for every subject seen by the ME, but a toxicology report and a full autopsy are only sent for subjects receiving those examinations. The date of record request and the date of record received are logged into REDCap for internal tracking.

3.1.7 Medical Record Procurement

Medical record requests are conducted under HIPAA Regulation CFR 164.512 "HIPAA Regulations Regarding Public Health Information, Research on decedent's protected health information" (Appendix 5). Medical records, dated within two years of date of death, are requested for all subjects. This includes, but are not limited to, hospital discharge summaries, clinic notes, primary care provider notes, procedure notes, imaging, and labs.

Initial requests for medical records are made to subject's attendant at death: a physician, the medical examiner, county coroner or county health director. The attendant at death is identified through the electronic death certificate. If the death attendant is determined to be anyone other than a medical examiner, county coroner or county health director, i.e. a physician, nurse practitioner, D.O or physician's assistant, then a "Request for Medical Records Letter" is mailed to the attendant provider (Appendix 6). If a provider does not respond to our request in 30 days, they are contacted by phone to determine the status of the request.

Medical record requests are also sent to all of the major hospitals in the subject's county of residence that have agreed to participate in the SUDDEN study. All hospital medical records are requested via a 'Medical Record Request Packet' letter which includes a copy of SUDDEN's IRB approval (Appendix 4), a copy of the HIPAA regulations under which records are being requested (Appendix 5), and the subject's SUDDEN death certificate ID number, name, date of birth, date of death, and residence address (Appendix 7).

Hospital medical records are accessed electronically for several hospitals, including the UNC Medical Record Database, EPIC, Highpoint Regional Medical Center's Medical Record Database, ChartMaxx, and Novant Health Presbyterian Medical Center's Medical Record Database, NH Link. Pertinent medical records, dated within two years of date of death, are printed and included in the subject's file.

When medical records are received, they are reviewed in order to identify other providers. If additional PCPs or specialists, other than attendant at death, are identified in the medical records, then a request for medical records are sent to those providers as well. At the Central Data

Collection, medical records are filed in the subject's chart in reverse chronological order. The files are kept in a secure, fireproof filing cabinet on the 6th floor of the Burnett-Womack Building on the UNC Main Campus. All data is scanned to a password protected, encrypted secure server, an electronic backup is made, and the physical file is shredded and securely disposed

3.1.8 Subject Screening

Two HIPAA compliant post-graduate research interns independently complete a subject screening for exclusion criteria to determine final disposition, included or excluded, of presumed sudden unexpected death cases. Their task is to determine 1) whether the patient's terminal event meets the project inclusion criteria for the project and 2) disposition of the case: included, excluded or unsure. If the interns do not agree or they are unsure about final disposition, the subject file is sent to Primary Escalation for further screening The Primary Escalation Committee is composed of two cardiologists from UNC that do not belong to any other committee in SUDDEN. These cardiologists are assigned to each case with each screener individually reviewing the records. Members of the primary escalation committee are provided all available subject information, including referral data, medical records, diagnostics, labs, meds, autopsy and toxicology reports, and death certificate data. If the screener identifies missing information in the file pertinent to the process, they may send the case back to Central Data Collection with specific requests for additional data.

Post Graduate Interns and members of the Primary Escalation committee must include/exclude a subject based on the following parameters:

1) **Inclusion Criteria for Project:**
   a) Sudden, unexpected, natural death outside of the hospital
   b) Between age 18 and 64 years old at time of death
   c) Subject is free-living (i.e. not living in a nursing home, rehabilitation facility, or prison)
   d) Subject is Resident of county of death

2) **Exclusion Criteria for Project:**
   a) Expected death – i.e.; hospice, Do Not Resuscitate or other advanced directive, terminal illness
   b) Non-natural cause of death – i.e.: trauma, violent death, overdose, drowning, suicide, homicide
   c) Subject is not "free living"- i.e. exclude subjects whose primary residence at the time of terminal event was a nursing home, rehabilitation facility, or prison. Do NOT exclude assisted living.
   d) Non-resident of the county of death
   e) At least one lethal dosage of any substance (based off the NC Office of the Chief Medical Examiner standards)
   f) At least three toxic dosages of any substance (based off the NC Office of the Chief Medical Examiner standards)

Each Post Graduate Intern must choose one of the following for case disposition:

1) Included in project
2) Excluded from project
3) Unsure (Sent to Primary Escalation)

Each member of the primary escalation committee must choose one of the following for case disposition:

1) Included in project
2) Excluded from project
3) Unsure (Sent to Secondary Escalation)

If the two members of the primary escalation committee disagree or either one is unsure about the disposition the subject file is sent to secondary escalation for further screening. The Secondary Escalation Committee is composed of one cardiologists from UNC that do not belong to any other committee in SUDDEN. This cardiologist will independently review the subjects' record and screen each for exclusion criteria to determine the final disposition, included or excluded. His or her tasks are to determine 1) whether the subjects' terminal event meets the project's inclusion criteria and 2) determine the disposition of the case: included or excluded. Secondary escalation is the last possible step in the screening process. This screener is responsible for making a final decision in regards to subject disposition, included or excluded from the final cohort.

The screener must include or exclude a subject based on the following parameters:

1) **Inclusion Criteria for Project:**
   a) Sudden, unexpected, natural death outside of the hospital
   b) Between age 18 and 64 years old at time of death
   c) Subject is free-living
   d) Subject is Resident of county of death

2) **Exclusion Criteria for Project:**
   a) Expected death – i.e.; hospice, Do Not Resuscitate or other advanced directive, terminal illness
   b) Non-natural cause of death – i.e.: trauma, violent death, overdose, drowning, suicide, homicide
   c) Subject is not "free living"- i.e. exclude subjects whose primary residence at the time of terminal event was a nursing home, rehabilitation facility, or prison. Do NOT exclude assisted living.
   d) Non-resident of the county of death
   e) At least one lethal dosage of any substance (based off the NC Office of the Chief Medical Examiner standards)
   f) At least three toxic dosages of any substance (based off the NC Office of the Chief Medical Examiner standards)

The secondary escalation screener must choose one of the following for case disposition:

1) Included in project
2) Excluded from project

3.1.9 Training – Primary and Secondary Escalation Committees

Each member of the primary and secondary escalation committees underwent training via three mock cases administered by the project PI. Calculation of inter-rater variability and agreement will be used to monitor the effectiveness of, and or, need for additional training.

3.1.10 Physical Death Certificate Procurement

Physical death certificates are only requested for cases included into the final cohort. A "Request for Physical Death Certificates Letter" is mailed to the Register of Deeds Office in the subjects' county of death with the required payment. When a response from the register of deeds is received, information regarding the retrieval or absence of it is recorded. For the subjects for whom a physical death certificate is received, the death certificates are screened for a determination of the death attendant and that information is recorded into REDCap.

3.1.11 Quality Assurance of Included Cohort and Excluded Cases

After all cases have undergone subject screening and review from the escalation committee, if necessary, a quality assurance process begins to ensure that no errors were made in screening for included cases. All of the cases included in the study cohort are reviewed to ensure that all inclusion criteria are met and that the cases exhibit no exclusion criteria. A random sample of 10% of the cases that were excluded during secondary screening or during escalation, are reviewed during Quality Assurance. All cases in this sample will be reviewed to ensure that at least one exclusion criteria is met and that the methodology used in this study was effective. If 10% of incorrectly classified cases are identified, steps will be taken to refine the study methods, address inconsistencies, and re-educate research participants. After the quality assurance check, no more changes made to the final disposition of each case.

3.1.12 Death Committee

Death Committee

Two pathologists, independent of the SUDDEN project, will determine cause of death for all the cases included in the final cohort.

Training - Death Committee

Each member of the death committee underwent SUDDEN protocol and REDCap data entry training via three mock cases administered by the project PI. A quality assurance check and agreement will be used to monitor the effectiveness of or need for additional training.

Death Committee Determination of Cause of Death

After the cases have been screened for final inclusion into or exclusion from the study, all of the cases included in the final cohort will be sent to the Cause of Death Committee for the determination of cause of death. The death committee will consist of two pathologists who are completely independent of the study. These pathologists will individually review the cases and then come to a consensus on the cause of death. The causes of death will be determined according to the CDC Physicians' Handbook on Medical Certification of Death (http://www.cdc.gov/nchs/data/misc/hb_cod.pdf).

The death committee will be required to determine immediate cause of death, conditions leading to immediate cause of death, the underlying cause of death, and other contributing conditions to the cause of death according to the CDC standards. For clarity, parenthetical statements and abbreviations are not used when reporting the cause of death. The information provided will be recorded on the Cause of Death committee coversheet for each case.

4.0 Data Entry and Protocol

4.1 Data Entry

All cases included in the SUDDEN cohort and those for which a cause of death has been determined by the Death Committee will go through the process of data entry. This will be conducted by HIPAA approved medical students who have undergone the appropriate training.

Data Entry Schedule

1. Cause of Death Committee data entered for all cases included in the study
2. Medical Examiner data entered for all cases included in the study
3. Comorbidity data entered, obtained from all available records, hospital medical records, clinical medical records, and Medical Examiner Reports, for all cases included in the study
4. EMS Referral data entered for all cases included in the study
5. Medication data entered for all cases included in the study
6. Physical Death Certificate data entered for all cases included in the study

1) Cause of Death Committee Data Entry

Trained individuals within SUDDEN will enter the data from the Cause of Death Committee Coversheet into REDCap.

2) Medical Examiner Report Data Entry

Trained interns within SUDDEN will enter the required information from the external exam, full autopsy (if available), and toxicology report (if available) into the appropriate instrument in REDCap.

3) Comorbidity Data Entry

Trained medical students within SUDDEN will screen all available records, including but not limited to hospital medical records, clinical medical records, Medical Examiner reports for comorbidity information.

Comorbidity information comes from any of three sources: 1) Medical Records, either hospital or clinical; 2) Medical Examiner External Exam; 3) Full Autopsy. The comorbidity data is logged into REDCap as is the source of the information.

SUDDEN comorbidity protocol, definitions, and the RedCap abstraction tool are described in Appendix 8.

4) Physical Death Certificate Data Entry

Trained interns within SUDDEN will enter the required information from the Physical Death Certificate (when available) into the appropriate instrument in REDCap.

5) EMS Referral Data Entry

Trained interns within SUDDEN will enter information regarding witnessed and unwitnessed death ascribed from the EMS referrals (if available). Individuals will read the chief narrative to determine if a death was witnessed or unwitnessed. A death is witnessed if EMS mentions that someone was with the conscious subject and then witnessed them 'go down' (become unconscious) or if someone was on the phone with a conscious subject when the subject became unresponsive. A death is unwitnessed if EMS makes no mention of bystander comments, or if family or bystanders were not aware in that moment when the subject had an arrest. Sometimes EMS will note the last time a family member or bystander saw the patient alive or talked to them on the phone. Use this time and the 'Call Received Time' in EMS referrals to determine the number of hours since the subject was last seen alive. If information is available, it is logged into REDCap.

6) Medication Data Entry

Trained interns within SUDDEN will enter information regarding subject's medications at the time of death. The medications taken from the most recent medication list provided in the patient file: the sources of these lists include medical examiner reports or medical records. This medication list is considered the "master" list. Medications are not taken from the source is the source is earlier than two years prior to the date of death. When available, information about the dosage, route, and frequency, and schedule of the drug are documented.

5.0 Data Management

Two post-graduate interns are responsible for the validity of the data entry process. One intern enters data and another intern compares with source document.

5.1 Data Entry Plan

Data Entry Guidelines
Undergraduate interns, post-graduate interns, and medical students trained in house, enter all data using Single Key Entry protocol. One intern enters the data and a second intern prints the results and compares with source documents.

Data Querying
All data queries are done using REDCap's "Report Builder" function by the Data Manager. All data request must be approved by the WC.

Corrections
Self-evident corrections can be made by interns as identified. Once data is validated and locked, only the Data Manager can make corrections, which are logged in Data Correction Log Book.

Verification and Validation of Data
Using tools available in REDCap, SUDDEn staff perform Programmed/Automated Checks (edit checks), including Range Checks, Value Checks and Logical Checks.

5.2 Data Analysis

General Data Analysis
Data analysis will be done using mixed methodology, drawing from the disciplines of clinical epidemiology, statistics, health services research and management sciences. Analysis software is SAS version 9.3.

Power calculations will be performed to determine the number of data points needed for each variable. Demographic and clinical characteristics will be summarized using frequencies for categorical variables and means with standard deviations for continuous variables, and gender differences are examined using Pearson's chi-square tests for categorical variables or t-tests for continuous variables. Multiple logistic regression (forward and backward model) will be performed using variables found to be significant in univariate comparisons. Performance will be measured by AIC and BIC. For all analysis, $p<0.05$ will be considered statistically significant.

Customized data analysis for specific publications will be done as directed by the WC in conjunction with the Bio-statistician and Data Manager.

Quality Assurance Data Analysis
The Chairman of the QAC will collaborate with the project Bio-statistician and develop QA protocols, including explicitly calculating inter-rater variability and inter-rater agreement from results of the AC. Results of the investigations will be reported to the Chairman of the Steering Committee not less than quarterly, or more frequently as determined by the QAC Chairman.

5.2.1 Central Data Collection

In order to ensure the integrity and security of the data generated by the SUDDEN Project, all project information will be procured, inputted, housed and outputted, by project dedicated personnel, by Central Data Collection located on the 6th floor of the Burnett Womack Building on the UNC Main Campus.

5.2.2 REDCap

Project data is collected and entered into REDCap (Research Electronic Data Capture), which is a secure web application for building and managing online surveys and databases. REDCap enables researchers to create and design projects using 1) the online method from a web browser using the Online Designer; and/or 2) an offline method by constructing a 'data dictionary' template file in Microsoft Excel, which can be later uploaded into REDCap. Both surveys and databases (or a mixture of the two) can be built using these methods. REDCap provides audit trails for tracking data manipulation and user activity, as well as automated export procedures for seamless data downloads to Excel, PDF, and common statistical packages (SPSS, SAS, Stata, R). Also included are a built-in project calendar, a scheduling module, ad hoc reporting tools, and advanced features, such as branching logic, file uploading, and calculated fields.

5.3 HIPAA

UNC policies regarding HIPAA, including staff and administration training, are followed as articulated at the university's HIPAA website: http://www.unc.edu/hipaa/researchers.htm.

5.4 Data Use Policies

By University policy, all project personnel, agents or subcontractors, are required to comply with all applicable federal and state laws and regulations concerning the privacy and confidentiality of Protected Health Information and to use or disclose the data as required by law. Further, all project personnel, agents or subcontractors, agree to use appropriate safeguards to protect the data from misuse and unauthorized access or disclosure, including, maintaining adequate physical controls and password protections for any server or system on which the data may reside; ensuring that data is not stored on any mobile device (e.g. laptop, smartphone) or transmitted electronically unless encrypted and taking any other measures reasonably necessary to prevent any use or disclosure of the data other than as provided by law.

Project personnel, agents or subcontractors, will report any unlawful use or disclosure of the data to the project Data Manager or any member of the SC.

All data access is approved by the WC.

Appendix 1

SUDDEN Manuscript Proposal

1. Full Title:
2. First Author/ Co Authors:
3. First Author Contact Information
4. Main Hypothesis/Study Questions:

5. Design (Brief description of the plan for each section below)

   a. Literature review

   b. Methods

   c. Statistical analysis

   d. Anticipated results

   e. Discussion topics

   f. Limitations

   g. Conclusions

6. Target publication(s)

7. Overlap with other SUDDEN manuscripts (if so, list)

8. Data set needs

WC ACTION: APPROVED _____ *Yes* _____ *No* *DATE;*_____

Tracking

Figures and Tables submitted and approved _____

Outline of paper submitted and approved
_____

Final paper submitted and approved _____

Appendix 2

SUDDEN Data Elements

University of North Carolina – Chapel Hill

Updated 3/17/2015

All data, except where indicated, are plain text fields. Data in spreadsheet format that maps to this listing is important. Please use single header row, without any merged cells.

The preferred format is a comma-delimited text (.csv) or excel file (.xls, .xlsx), with a single work sheet per file. File transmission will vary from daily to a few times per week depending on volume of accidents.

Please include the text description for the data code and not the code for the action/event/process.

Please include all EMS calls where they are dead on scene / non-transported.

NEMSIS code	**Data Description**	**Data Type (if not text)**	**Explanations / Examples**
	Date of the event	Date	
E01_01	Patient Care Report Number		EMS run number or dispatch ID
E06_01	Patient's last name		
E06_02	Patient's first name		
E06_03	Patient's middle name or initial		
E06_16	DOB	Date	7/13/2014
E06_14	Age		18yr 3mos
E06_15	Age units		Not necessary if units included with age
E06_11	Gender		M, Male, F, Female
E06_12	Race		Any common term,
E11_02?	Cardiac Arrest Etiology		Yes, No. Enter Yes, if it is presumed cardiac, used defibrillator, or performed CPR
E11_03	Resuscitation Attempted		Was resuscitation attempted?
E20_01	Transport Destination		Name of the facility where was patient transported
E05_02	Call Received Time	Date/time	911 call received at call center
E05_09	Depart Scene Time	Date/time	EMS departed with patient
E05_10	At Destination Time	Date/time	Time EMS arrived at destination
E08_11	Incident Address1		Street or closest approximate address, or intersection (as called by dispatch)
	Incident Address2		
E08_12	Incident City		Dallas
E08_14	Incident State		NC
E08_15	Incident ZIP Code		27516
E20_10	Patient Disposition or Outcome		Treated Released, ER, Morgue
	CHARTE (Narrative)		CHARTE. Thorough description of EMS situation and response on the scene
E06_04	Patient Home Address 1		123 Main Street
	Patient Home Address 2		Apartment B
	Patient Home Address 3		

E06_05	Patient Home City		Raleigh
E06_06	Patient Home County		Wake
E06_07	Patient Home State		NC
E06_08	Patient Home Zip-Postal Code		27599
	Pt Physician First Name		Yosemite
	Pt Physician Last Name		Sam
	Pt Physician Middle Name		Alan
	Does Pt have Advanced Directive / DNR/MOST form?		Yes, No
	Incident Latitude and Longitude	GPS coordinates	34.7620370,-77.3826610 or 34°45'43.3"N 77°22'57.6"W

Appendix 3

DATA USE AGREEMENT

This data use agreement (the "Agreement"), effective as of the 20th day of May, 2015 (the "Effective Date"), by and between Generic County EMS ("Generic") and The University of North Carolina at Chapel Hill for its Heart and Vascular Center ("Recipient"), establishes the terms and conditions under which Recipient will access and use certain data described below (the "Data"). Generic and Recipient are sometimes referred to in this Agreement singularly as a "Party" and collectively as the "Parties."

WHEREAS, Recipient acknowledges that Generic is a "covered entity," as such term is defined under the Administrative Simplification regulations codified at 45 C.F.R. Parts 160 and 164, promulgated

pursuant to the Health Insurance Portability and Accountability Act of 1996, as amended (collectively, "HIPAA"), and as such, is required to protect the privacy of Protected Health Information, as that term is defined at 45 C.F.R. 160.103, maintained by covered entity;

WHEREAS, pursuant to 45 C.F.R. § 164.512(i), Generic is permitted to disclose Protected Health Information to Recipient for research purposes, where Generic receives documentation that an Institutional Review Board ("IRB") of competent jurisdiction, or other privacy board as defined at 45 C.F.R. § 164.512(i)(1)(i)(B), has approved an alteration to or waiver of the authorization otherwise required by 45 C.F.R. § 164.508; and

WHEREAS, this Agreement is intended to meet the requirements of 45 C.F.R. § 164.512(i) and to otherwise secure adequate assurances from Recipient that Recipient will restrict use or disclosure of the Data received pursuant to this Agreement according to the terms and conditions herein;

NOW THEREFORE, in consideration of the mutual promises and covenants herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. Description of Data. Recipient may obtain from Generic specific clinical data from selected Generic EMS patients. Recipient acknowledges that Generic may provide Data to Recipient pursuant to a waiver of authorization granted by an IRB of competent jurisdiction or by a privacy board as defined at 45 C.F.R. § 164.512(i), in accordance with 45 C.F.R. § 164.512(i) ("Waiver").

2. Recipient's Use of Data. Except as otherwise specified herein, Generic grants Recipient the right to use and disclose the Data solely in fulfillment of its professional obligations for determining cause of sudden unexpected death, provided such use is consistent with the terms, conditions and purposes stated in the relevant Waiver. Recipient acknowledges and agrees that, prior to Generic's release of Data to Recipient, Recipient shall provide evidence of the Waiver and a copy of such Waiver shall be attached to this Agreement as Exhibit A.

3. Restrictions on Recipient's Use of Data.

3.1 Recipient agrees to comply with all applicable federal and state laws and regulations concerning the privacy and confidentiality of Protected Health Information and to use or disclose the Data exclusively for the purposes set forth in **Section 2** above or as required by law. Without limiting the generality of the foregoing, Recipient agrees to use or disclose the Data solely as permitted by the Waiver.

3.2 Recipient agrees to use appropriate safeguards to protect the Data from misuse and unauthorized access or disclosure, including, without limitation, (i) maintaining adequate physical controls and password protections for any server or system on which the Data may reside; (ii) ensuring that Data is not stored on any mobile device (e.g. laptop, smartphone) or transmitted electronically unless encrypted; and (iii) taking any other measures reasonably necessary to prevent any use or disclosure of the Data other than as provided in this Agreement.

3.3 Recipient will report to Generic any use or disclosure of the Data not provided for by this Agreement of which Recipient becomes aware. Such report shall be made to Generic at the address noted in **Section 8** as soon as reasonably possible. Recipient will cooperate with any remediation that Generic reasonably determines is necessary to (i) address any applicable reporting requirements; and (ii) mitigate any effects of such unauthorized use or disclosure of the Data.

3.4 Recipient will ensure that any agents, including subcontractors, to whom it provides the Data agree to the same restrictions and conditions set forth in this Agreement.

4. License to Use Data for Research Purposes. This Agreement and the resulting transfer of Data constitute a license to Recipient to use the Data solely for the research purposes set forth in **Section 2**. Recipient agrees that nothing herein shall be deemed a grant of any intellectual property rights or other rights to use the Data for any products or processes for profit-making or commercial purposes.

5. Term and Termination. This Agreement shall be effective as of the Effective Date and shall remain in effect as long as Recipient retains the Data. Either Party may terminate this Agreement with or without cause upon thirty (30) days' written notice to the other Party.

6. Notice. Notice regarding termination or other matters relating to this Agreement shall be made in writing sent to the following individuals:

If to Generic: [Address and contact info of Generic]

If to Recipient:

Irion W. Pursell, Jr

160 Dental Circle

6024 Burnett-Womack Bldg

Chapel Hill, NC 27599

7. Miscellaneous Provisions.

7.1 Entire Agreement. This Agreement contains all of the terms and conditions agreed upon by the Parties regarding the subject matter of this Agreement and supersedes any prior agreements, oral or written, and all other communications between the Parties relating to such matters.

7.2 Severability. If any provision of this Agreement is determined to be invalid, such determination shall not affect the validity of the remaining provisions.

7.3 Waiver. The waiver by any Party of any provision or breach of this Agreement shall not operate or be construed as a waiver of any other provision of subsequent breach.

7.4 Representation to Others. Recipient has no rights to use the names, trademarks or other symbols of Generic without prior written consent; provided, however, that Recipient may make factual statements regarding its receipt of the Data pursuant to this Agreement.

7.5 Amendments. This Agreement may be amended or modified only with mutual written consent of the Parties.

7.6 Governing Law. This Agreement shall be governed by the laws of the State of North Carolina.

7.7 Change in Law. The Parties agree to negotiate in good faith to amend this Agreement to comport with changes in law that materially alter either or both Parties' obligations under this Agreement, provided however, that if the Parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may immediately terminate this Agreement.

7.8 Relationship of the Parties. Nothing in this Agreement shall be construed to create a partnership, joint venture, agency, employment or other joint business relationship between the Parties or any of their affiliates.

7.9 No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the Parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

7.10 Assignment. This Agreement is non-assignable and non-transferrable by Recipient without the prior written consent of Generic. Assignments made in violation of this provision are null and void. Recipient acknowledges and agrees that Generic retains the right to assign or delegate any of its rights or obligations hereunder to any of its affiliates or subsidiaries.

7.11 Authority. Each Party, and the person signing on its behalf, represents that it is authorized to enter into this Agreement and the Party is capable of performing its obligations under this Agreement.

7.12 Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing this Agreement.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the day and year set forth below.

GENERIC EMS	**THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL**
By: _____	By: _____
Name (printed): _____	Name (printed): _____

Title: _____

Date: _____

Title: _____

Date: _____

Address: _____ Address: _____

_____ _____

Appendix 4

Copy of Waiver

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

OFFICE OF HUMAN RESEARCH ETHICS

Medical School Building 52 Mason Farm Road

CB #7097

Chapel Hill, NC 27599-7097 (919) 966-3113

Web site: ohre.unc.edu

Federalwide Assurance (FWA) #4801

To: Ross Simpson, Department of Medicine

From: Biomedical IRB

Approval Date: 11/24/2015

Expiration Date of Approval: 10/26/2016

RE: Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)
Submission Type: Modification

Expedited Category: 5.Existing or non-research data, Minor Change to Previously Approved Research
Study #: 14-2036

Study Title: Sudden Unexpected Death in North Carolina (SUDDEN)

This submission has been approved by the IRB for the period indicated. It has been determined that the risk involved in this modification is no more than minimal. Unless otherwise noted, regulatory and other findings made previously for this study continue to be applicable.

Submission Description:

SUDDEN Comorbidity Case-Control Study: Comorbidities of SUDDEN Subjects

SUDDEN Project Manual and Methodology

compared to REX ED Patients Admitted for Cardiac Complications

- The project aims to compare the comorbidities of SUDDEN subjects who died of cardiac conditions and those of patients transferred to the REX Hospital ED that were treated for cardiac complications
- The comparison may help determine whether there are differences in comorbid conditions between the two populations. These differences could be used to better target individuals at risk for OHSUD
- To obtain comparison data, SUDDEN researchers acquired data from the Carolina Datawarehouse for Health (CDWH)
- The data obtained had MRNs and when filtered based on SUDDEN inclusion criteria, produced roughly 300 cases. Unfortunately the data culled from CDWH resources was unmanageable due to an inability to determine which comorbidities existed at the time of ED admission
- SUDDEN researchers now plan to utilize the MRN provided by CDWH to search EPIC for the ED visit note and determine the comorbidities diagnosed prior to, or during the admission. This should provide data that is the most comparable to the data obtained for SUDDEN subjects.SUDDEN researchers will obtain the ED visit note from EPIC and search for the following comorbidities:
    - BMI
    - Smoking status
    - Whether the patient has a history, or new diagnosis, of the following conditions:
        - Cardiomyopathy
            - Ischemic (ICD-10: 25.5), dilated (ICD-10: I42.0), hypertrophic (ICD-10: I42.2 and I42.1) or restrictive (ICD-10: I42.5)
        - Coronary Artery Disease
        - Hypertension
        - Diabetes
        - Dyslipidemia
        - Left Ventricular Hypertrophy

Investigator's Responsibilities:

If applicable, your approved consent forms and other documents are available online at http://apps.research.unc.edu/irb/index.cfm?event=home.dashboard.irbStudyManagement&irb_id=14-2036

The current data security level determination is Level III. Any changes in data security level need to be discussed with the relevant IT official. If data security level II and III, consult with you IT official to develop a data security plan. Data security is ultimately the responsibility of the Principal Investigator.

This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

CC:
Francis Gilliam, Department of Medicine
Anna Jojic, Heart and Vascular
Paul Mounsey, Department of Medicine
Chip Pursell, Heart and Vascular

Appendix 5

HIPAA Regulation CFR 164.512 "HIPAA Regulations Regarding Public Health Information, Research on decedent's protected health information"

45 CFR 164.512
[HIPAA Regulations Regarding
Public Health Information]

(iii) Research on decedent's information. The covered entity obtains from the researcher:
(A) Representation that the use or disclosure is sought is solely for research on the protected health information of decedents;
(B) Documentation, at the request of the covered entity, of the death of such individuals; and
(C) Representation that the protected health information for which use or disclosure is sought is necessary for the research purposes.
(2) Documentation of waiver approval. For a use or disclosure to be permitted based on documentation of approval of an alteration or waiver, under paragraph (i)(1)(i) of this section, the documentation must include all of the following:
(i) Identification and date of action. A statement identifying the IRB or privacy board and the date on which the alteration or waiver of authorization was approved;
(ii) Waiver criteria. A statement that the IRB or privacy board has determined that the alteration or waiver, in whole or in part, of authorization satisfies the following criteria:
(A) The use or disclosure of protected health information involves no more than minimal risk to the individuals;
(B) The alteration or waiver will not adversely affect the privacy rights and the welfare of the individuals;
(C) The research could not practicably be conducted without the alteration or waiver;
(D) The research could not practicably be conducted without access to and use of the protected health information;
(E) The privacy risks to individuals whose protected health information is to be used or disclosed are reasonable in relation to the anticipated benefits if any to the individuals, and the importance of the knowledge that may reasonably be expected to result from the research;
(F) There is an adequate plan to protect the identifiers from improper use and disclosure;
(G) There is an adequate plan to destroy the identifiers at the earliest opportunity consistent with conduct of the research, unless there is a health or research justification for retaining the identifiers, or such retention is otherwise required by law; and
(H) There are adequate written assurances that the protected health information will not be reused or disclosed to any other person or entity, except as required by law, for authorized oversight of the research project, or for other research for which the use or disclosure of protected health information would be permitted by this subpart.

Appendix 6

DATE

Dr. EXAMPLE

We are requesting the medical records of deceased patients to collect data on sudden unexpected death in order to develop a risk stratification tool to improve the screening process for patients at risk for sudden unexpected death.

In this packet, you will find information concerning the HIPAA regulation that allows researchers conducting this sudden cardiac death study to obtain the medical records of deceased patients. The first document is a letter from the co-investigator Irion Pursell, the second depicts the HIPAA regulation that allows this research, and the third is from the Office of Human Research Ethics at UNC.

The final document included in this packet contains the patient information that qualifies for the study, with specific dates for the medical information we need.

Please send the medical records to

UNC Cardiology
Burnett-Womack BLDG. 6th Floor Attn Chip Pursell
160 Dental Circle, **CB 7075**
Chapel Hill, NC 27599-7075

or by fax at 919-843-0088.

Thank you for your time and if you have any further questions, please contact the SUDDEN interns at:

sudden@med.unc.edu

Phone: 919-843-0088

RE: Sudden Unexplained Death in North Carolina Registry (SUDDEN) IRB # 14-203

With Regard To: 45 CFR 164.512 HIPAA Regulations Regarding Public Health Information, Research on decedent's protected health information (PHI) .

To Whom It May Concern:

We represent the following with regard to disclosure of medical records for the above referenced study:

a. Use or disclosure is sought solely for research on the protected health information of decedents

b. The protected health information for which use or disclosure is sought is necessary for the research purposes.

Attached, please find IRB document dated 10/20/2014, stating that "the IRB has determined that the study-specific rationale provided by the investigator is sufficient to justify the waiver of informed consent for research [45 CFR 46.116(d)] and waiver of HIPAA authorization [45 CFR 164.512(i)(2)(ii)]. "

As required by HIPAA regulation 45 CFR 164.512 we certify the following:

a. The use or disclosure of PHI involves no more than minimal risk to the individuals
b. The research will not adversely affect the privacy rights and the welfare of the individuals
c. The research could not practicably be conducted without access to and use of the PHI
d. The privacy risks to individuals whose protected health information is to be used or disclosed are reasonable in relation to the anticipated benefits, if any, to the individuals, and the importance of the knowledge that may reasonably be expected to result from the research;
e. There is an adequate plan to protect the identifiers from improper use and disclosure;
f. There is an adequate plan to destroy the identifiers at the earliest opportunity consistent with conduct of the research, unless there is a health or research justification for retaining the identifiers, or such retention is otherwise required by law
g. There are adequate written assurances that the protected health information will not be reused or disclosed to any other person or entity, except as required by law, for authorized oversight of the research project, or for other research for which the use or disclosure of protected health information would be permitted.

_____

Irion W Pursell, Jr., RN, BSN, SA-C
Co Investigator

Appendix 7

SUDDEN Death ID	Last Name	First Name	DOB	Date of Death	Street Address	City	State	Zip Code	Request To
3254	EXAMPLE	Johnny	02-03-1956	12-11-2014	123 Street Rd	Raleigh	NC	27608	Wake Med Hospital

** Please send MR from up to two years before the subject's date of death

Appendix 8

SUDDEN Comorbidity Screen Protocol and Definitions

SUDDEN completes a core comorbidity screen for all of the cases included in the SUDDEN cohort. Comorbidity information is abstracted from medical records and medical examiner reports. Medical records consist of hospital and clinical medical records. Any source autopsy, (*either clinical, hospital, or from the Office of the Chief Medical Examiner*) are considered and screened as autopsy reports. Medical examiner reports include external exams and full autopsy reports, but ***NOT TOXICOLOGY REPORTS.***

Comorbidities are only considered present if there is a provider or medical examiner report of the comorbidity. Within medical records, provider reports of comorbidities are only taken from the following sections: problem lists, discharge summaries, patient history, chief complaint, history of presenting illness (HPI), problems, past medical history (PMH), past surgical history (PSH), social history, assessment, plan, diagnosis, and physical exam/objective to find BMI. ***"Review of Systems" (ROS) and "Family History"*** are not used to abstract comorbidity information. From the medical examiner reports, comorbidities are only taken from the following sections: the ***"Medical History"*** section of the external exam, and the ***"Cause of Death"***, ***"Diagnoses"*** and ***"Summary and Interpretation"*** sections of the full autopsy report.

The medical examiner's exam date is obtained from the ***"View of Body"*** date under the ***'Information about Occurrence'*** section of the external exam.

For the core comorbidities screen, information from the following sources is ***not*** considered: Echos, ECGs, Chest Radiographs (X-Rays), toxicology reports and lab values. However, the presence of an ECG/EKG or an "interpretation" of an ECG/EKG is noted.

If there is a provider or medical examiner report of a comorbidity, as defined by the SUDDEN Core Comorbidity definitions, then that comorbidity is considered ***"Present"***. If there is not a provider or medical examiner report of a comorbidity, then the comorbidity is considered ***"Not Present"***.

In the core comorbidity screen, a subject is identified as having ***"No Records"*** if they do not have any medical records or medical examiner reports available (medical examiner reports include external exams and full autopsies). *Electronic death certificates, paper death certificates and EMS referrals are* ***not*** *considered records for the core comorbidity screen.*

During the screen, screeners should have a copy of the "SUDDEN Core Comorbidity Definitions" in front of them as they move through the subject files. They will screen each file by source in the following order: *external exam, full autopsy, then medical records*. The screener will evaluate each record individually for all of the core comorbidities. Once the screener is done screening one record for all of the comorbidities, they will then move on to the next record in the file and repeat the screening process.

***The SUDDEN Pilot cohort, 408 cases, was closed after a final Quality Assurance Meeting on June 11, 2015 to validate the inclusion/exclusion of each case. This final Quality Assurance Meeting was held approximately 90 days after the official end of the second year cohort, which ended on February 28, 2015. No additional records or information received after this date were used to determine inclusion or exclusion status or to screen for comorbidity information. If additional information was received after the final Quality Assurance meeting, it was kept in the correspondence section of the subject's physical file, separate from other records and not scanned onto the SUDDEN server as part of the electronic file.

SUDDEN Comorbidity Definitions

1) **BMI:** BMI will be taken from the most recent medical record. If a recorded BMI is not available, BMI can also be calculated using the subject's height and weight from the most recent medical record. If calculating BMI use an online BMI calculator or the following equation:
   *Weight (kg)/ [Height (m)]^2; round to three significant figures.

2) **Smoking Status:** ***Current smoking status*** is obtained from the most recent medical record or medical examiner report. The options include, smoker, non-smoker or not present for any mention of tobacco use. 'Not present' means that there is no information regarding the subject's current smoking status in the records.

3) **Heart Failure**: Provider or medical examiner report of heart failure in the medical records or medical examiner report. Heart failure is also often indicated by use of these key word "failure" and "cardiomyopathy" (see below):

   ***The following terms are also considered heart failure: congestive heart failure (CHF), heart failure (HF), biventricular failure, Left ventricular failure, Right ventricular failure, pump failure, failure due to valvular heart disease, Rheumatic heart disease with heart failure, any cardiomyopathy (HCM, RCM, DCM, HOCM).*

4) **Coronary artery disease**: Provider or medical examiner report of coronary artery disease (CAD), atherosclerotic heart disease (ASHD), stent, coronary stent, CABG (coronary artery bypass graft), history of myocardial infarction (MI), coronary re-vascularization of coronary stent, PCI, NSTEMI or STEMI in the medical records or medical examiner reports. *Angina is **not** included in this definition of coronary artery disease.*

5) **History of Hypertension**: Provider or medical examiner report of hypertension (HTN) or high blood pressure in the medical records or medical examiner reports.
   **Do not mark the patient as having hypertension if they are on anti-hypertensive medications but do not have an official diagnosis.*

6) **Diabetes mellitus:** Provider or medical examiner report of diabetes mellitus (DM) or "diabetes" in the medical records or medical examiner report.

   **Do not count "pre-diabetes", "metabolic syndrome" or "diabetes insipidus" if mentioned. Do not mark the patient as having diabetes if they are on diabetic medications but do not have an official diagnosis.*

7) **Dyslipidemia**: Provider or medical examiner report of dyslipidemia in the medical records or medical examiner reports. This includes diagnoses of hypercholesterolemia, hypertriglyceridemia, and hyperlipidemia, familial hypercholesterolemia (FH), high LDL, high cholesterol or "high", "elevated", or "hyper" triglycerides.

8) **Stroke History**: Provider or medical examiner report of a history of stroke or CVA (cerebrovascular accident) in the medical records or medical examiner's reports.
**TIA is not considered a stroke.*

9) **Chronic Kidney Disease (CKD):** Provider or medical examiner report of chronic renal disease, renal failure (RF), renal insufficiency, kidney failure, chronic kidney disease (CKD), end stage renal disease (ESRD), dialysis, glomerular disease, or nephropathy in the medical records or medical examiner reports.

10) **Chronic respiratory disorder:** Provider or medical examiner report of chronic diseases of the airways and other structures of the lung. These includes conditions such as COPD (Chronic Obstructive Pulmonary Disease), asthma, obstructive sleep apnea, restrictive lung disease, pulmonary hypertension, and pulmonary embolism (PE).

11) **ECG/EKG:** Presence of an ECG in the medical records.
*An "Interpretation" of an ECG or EKG report is considered "Present".

SUDDEN Comorbidity Abstraction Tool in REDCap

Confidential

Comorbidities

Death Certificate ID _____

Source of Records

Screener Name
- ◯ Adelekun
- ◯ Chigbu
- ◯ Chen
- ◯ Devlin
- ◯ Joodi
- ◯ O'Bryan
- ◯ Other

Other Screener Name _____
(*Type in your LAST NAME)

Subject Records Available
- ☐ No Records (Subject only has Death Certificate and/or EMS Record)
- ☐ ME External Exam
- ☐ Full Autopsy
- ☐ Medical Records

Date of External Exam _____

Date of Full Autopsy _____

Date of most recent medical record _____

Comorbidities

BMI Available from the Medical Record?
- ◯ Present
- ◯ Not Present

(We are ONLY using the medical records for this field. BMI from the Medical Examiner is captured elsewhere.)

BMI _____
(*Record the most recent available BMI; round to three significant figures)

Smoking Status
- ◯ Smoker
- ◯ Non-Smoker
- ◯ Not Present

(*From the most recent, available record)

Smoking Status Source
- ☐ ME External Exam
- ☐ Full Autopsy
- ☐ Medical Records

Heart Failure
- ◯ Present
- ◯ Not Present

Heart Failure Source
- ☐ ME External Exam
- ☐ Full Autopsy
- ☐ Medical Records

Coronary Artery Disease
- ◯ Present
- ◯ Not Present

Coronary Artery Disease Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
History of Hypertension	◯ Present ◯ Not Present
Hypertension Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
Diabetes Mellitus	◯ Present ◯ Not Present
DM Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
Dyslipidemia	◯ Present ◯ Not Present
Dyslipidemia Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
Stroke History	◯ Present ◯ Not Present
Stroke Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
Chronic Kidney Disease	◯ Present ◯ Not Present
Chronic Kidney Disease Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records
Chronic Respiratory Disorder	◯ Present ◯ Not Present
Chronic Respiratory Disorder Source	☐ ME External Exam ☐ Full Autopsy ☐ Medical Records

Diagnostic Testing

ECG	◯ Present ◯ Not Present