# DISCLOSURE OF RECLASSIFIED VUS RESULTS OF DECEASED PATIENTS TO FAMILY MEMBERS: CURRENT PRACTICES

by

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## ABSTRACT

**Purpose:** This study was designed to obtain current practices and opinions of genetic counselors surrounding the issue of disclosure for reclassified VUS results for a deceased patient to their relatives.

**Methods:** A researcher designed survey was distributed to members of the National Society of Genetic Counselors.

**Results:** Participants reported receiving reclassified VUS results in deceased patients (24%), a majority reported attempting disclosure at least once (93%). Respondents were more likely to disclose if the variant was reclassified as pathogenic (74%) vs. benign (48%). The deceased's right to confidentiality was rated of lowest and the impact of the variant on family members rated highest importance. A legal mechanism to allow disclosure to relatives was favored by 71% and 97% felt the issue important enough to pursue if such a process was in place. A minority of participants felt a legal (10%) and ethical (27%) obligation of consent before disclosure, and a greater proportion were undecided on the legal (43%) and ethical (40%) need for consent.

**Conclusions:** The disclosure of reclassified VUS results for a deceased patient is a complex issue which has little guidance. Results of this study clarify the current state of clinical practice and opinion on this issue and contribute to the understanding of this important public health issue.

**Keywords:** Reclassified, VUS, Disclosure, Deceased, Relatives

## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# PREFACE

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# 1.0 INTRODUCTION

*A thirty-five-year-old woman is seen at a cancer genetics clinic for her recent diagnosis of stage three breast cancer. Her family history is significant for early onset breast cancer in her mother and sister and ovarian cancer in a maternal aunt. She receives genetic counseling and decides to pursue genetic testing. The result reveals a variant of uncertain significance (VUS) in BRCA1. The genetic counselor explains the results to the patient and informs her that she will be contacted if the variant is reclassified. Several years go by, and the Genetic Counselor receives an updated result from the laboratory where this patient was tested. The VUS has been reclassified as a pathogenic variant. The genetic counselor accesses the patient's medical record to recontract her with the updated information and finds that the patient has since passed away.*

The phenomenon where new medical information becomes available after the patient has passed away is unique to genetic VUS results, which can be updated years after the initial result is reported. For the scenario presented here, of a VUS in *BRCA1* being reclassified after the patient has passed away, a case could be made that all relatives of the deceased for whom these results are relevant have a clinical need to know of the updated information. Identification of a *BRCA1* pathogenic variant would have implications for clinical care recommendations that differ from guidelines for the general public and those identified as at increased risk by family history alone.[1] A pathogenic variant in *BRCA1* increases the risk for a woman to develop breast cancer by age 80 from 12% in the general population to 72%.[2] Risks for ovarian cancer also increase, from a risk

of 1.27% in the general population to 44% for women carrying a pathogenic mutation in *BRCA1*.[2] Men are at an increased risk for breast and prostate cancer if they carry a pathogenic mutation in *BRCA1*.[2] Due to these risks, persons with a pathogenic variant in *BRCA1* may consider additional measures to screen for these malignancies or perhaps to reduce the risk of these malignancies through medical and surgical options treatment options. Although family members of the deceased may benefit from understanding genetic risk factors for disease in the decedent, they may not have access to this information. Clinicians have legal obligations to their patients, such as confidentiality. These obligations persist even after death and may hinder a family's access to this information.

Clinicians who find themselves in this situation are faced with some difficult choices. Of primary concern is what to do with the updated information now that the patient is deceased. Some clinicians may file the information away in the patient's old records. However, genetic test results may have implications for family members of the patient. Others may decide to seek out at-risk family members and inform them of the updated result. A dilemma arises when there is no previously obtained directive from the patient on how this information should be handled. Currently, there are no guidelines specifically for the release of genetic information that becomes available after a patient's death to family members, and clinicians must decide between the confidentiality of the deceased patient and the well-being of the at-risk family members. Because genetic conditions may impact medical care at any stage of life, from prenatal care into geriatric care, identifying a genetic risk factor may have implications for many generations of related family members. Some genetic conditions are associated with serious clinical manifestations, which raises questions about a clinician's responsibility to warn family members of the deceased who may be at risk for the same condition. Not all genetic conditions are life threatening, but many

conditions require medical intervention and follow-up to minimize risks and manage symptoms effectively. When there is high risk of severe disease, some clinicians may elect to utilize an acceptable breach of confidentiality in order to warn those at risk, particularly if the disease may affect someone at an early age. However, not all clinical cases present with clear risk to the decedent's family members. Various scenarios may complicate a clinician's desire to disclose a reclassified result including, when the risk of harm is less severe, or unclear.[3,4] In current clinical settings, disclosure of medical information, such as genetic information, to anyone besides the patient themselves is typically only pursued if consent of the patient has been obtained. If consent has not been obtained, the clinician must weigh the benefits of disclosure to family members against the legal implications of disclosure without express consent. A VUS may not be reclassified until after the patient has passed away, when obtaining consent to disclose to family members is no longer possible, making this a concerning issue in a medical system rapidly evolving to incorporate genetic testing. The current study was designed to identify current practices among genetics professionals in these situations. A second goal of this study is to garner opinions as to what should be done about informing family members of the reclassified VUS after the patient has passed away.

# 2.0 LITERATURE REVIEW

## 2.1 BACKGROUND

### 2.1.1 ETHICS

Ethical considerations in clinical care center on the four core ethical principles of beneficence, nonmaleficence, patient autonomy, and justice for patients. Ethics surrounding the disclosure of genetic information to family members has been debated for some time.[5–7] Previous studies have generally focused on the issues of patient confidentiality vs. a duty to warn at risk family members in situations where the patient is still living. They describe how clinicians might feel a responsibility to the family members of a patient they know to carry a genetic condition, particularly if available surveillance or treatments would mitigate the risks associated with the condition.[8,9] However, breaching doctor-patient confidentiality to convey clinically relevant information to at risk family members is problematic. Ambiguity in resolving legal obligations to the patient[10] and ethical conflicts such as a clinician's responsibility to their patient[11] vs. those they know to be at risk[12] makes clinical practices inconsistent. Research on the ethical conflicts of clinicians has been focused primarily on this scenario where patients either refuse, or otherwise fail to communicate the information to their family members, but are still living.[5] Studies have found that the majority of patients intend to communicate their genetic test results to their family members, but a small percentage either refuse or fail to inform family members.[5] While some professional organizations agree a breach of confidentiality may be warranted in cases of extreme risk or severe harm[11,13], there is no consensus on what those terms mean and how they should be

interpreted clinically. The present study focuses on the situation where the patient has passed away before the information was clarified to the point where it became clinically relevant to their family members.

#### 2.1.1.1 PATIENT PERSPECTIVE

Most patients wish to keep their family members informed of their genetic status.[8,14] One study, involving patients being evaluated for Hereditary Non-Polyposis Colorectal Cancer Syndrome (HNPCC or Lynch Syndrome), found that 92% of the 78 participants elected to identify a person to disclose their whole exome results to in the event of their death.[14] Of the 8% who declined, the reasons included not having biological relatives who could benefit from the results, not having a relationship with biological relatives, not wanting to decide on disclosure until after results were received, and concerns about burdening family members with the information. This study suggests that most patients want their family members to be informed of their genetic status, whether they were found to carry a genetic condition or not. Studies such as this suggest that most patients wish for their family members to be informed about genetic risks even if the information is elucidated after their passing.

A survey done in Ontario asked patients questions about their understanding of the implications of genetic conditions for family members and their opinions on the responsibility of physicians and patients in disclosing genetic results to family members.[8] This study found that patients with HNPCC understood the familial implications of a genetic diagnosis (94.3%) and felt a personal responsibility to inform family members of their genetic status (93.3%). The study also asked if participants would have sought genetic counseling if they knew their provider could disclose their results to family members without their permission, 67.0% said they still would have sought genetic counseling. This study demonstrates that genetic counseling was effective in

educating patients on the familial implications of a genetic diagnosis. It also reinforces the notion that patients generally want their family members informed of their genetic status, preferably on their own terms, but a majority also indicated that clinicians could act without their consent to inform family members of a risk for HNPCC syndrome.

#### 2.1.1.2 FAMILY MEMBERS PERSPECTIVE

Another consideration is if family members would want to know they were at risk for a genetic condition. A study surveying the Norwegian and Swedish populations at random asked for their opinions on the subject.[6] The study developed eight scenarios, with varied degrees of disease fatality, treatability, and penetrance between scenarios, and asked participants if they would want their affected relative to inform them of the condition. The authors of the study also asked if they thought patient confidentiality could be breached to inform them of these conditions if relatives refused to convey the information themselves.

Three populations were surveyed in this study, Norwegian citizens, Swedish citizens, and Norwegian university students.[6] The study found that the majority of participants, between 52% and 83% depending on the characteristics of the disease, wanted to be informed of these conditions by their relative. Participants were less supportive of breaching confidentiality to inform them of these conditions, from 18% to 54%, indicated that a breach of confidentiality would be considered acceptable by some, depending on the disease characteristics. Participants reported a greater desire to know of a genetic risk if the condition was treatable vs. not treatable and fatal vs. not fatal. Penetrance of the disease did not significantly influence whether participants preferred to be informed by the family member or against their wishes.

It is worth noting that Norwegian participants in this study were less likely to condone a breach of confidentiality than Swedish participants. The authors suspected this was due to

legislation forbidding breach of confidentiality in Norway, where Sweden does not have such laws in place.[6] From this study, it also seems that most people would want to be informed of a genetic risk in the family, preferably by their family member. If that were not possible, the majority of participants were amenable to a breach confidentiality to warn family members when the disease was "probable, serious, and preventable."[6]

#### 2.1.1.3 CLINICIAN PERSPECTIVE

Current common practices encourage clinicians to inform patients about the familial nature of genetic information and the potential impact their genetic test results may have on their biological relatives.[15] Beyond that responsibility, there is little guidance for clinicians regarding their role in the distribution of genetic information to family members of a patient, particularly after the patient has passed away. Two studies have looked at clinical perceptions of the responsibility to family members of patients with genetic disease and identified an overall clinical feeling of responsibility towards at-risk relatives.[9,16] However, the conflict between legal and ethical obligations in clinical care often inhibit disclosure where prior consent of the patient was not obtained.

A survey of medical geneticists in the United States described clinical geneticist's desire to warn at-risk family members, even when doing so would be in direct opposition of the patient's wishes.[16] This study found that only a small percentage of participants broke confidentiality to disclose to the decedent's family members, but a majority considered it. Those who did break confidentiality cited consideration of disease characteristics and clinical options for screening and treatment similar to those identified in previous studies.[6,16] Another study of genetic counselors reported similar feelings of responsibility for the decedent's family members, and identified similar factors that were taken into consideration.[9]

These studies demonstrate the overall feeling of responsibility for at-risk relatives held by clinical genetics professionals. Due to the familial nature of genetic information, it could be expected that clinical genetics professionals would experience some amount of responsibility towards the family members of their patients. In complex situations, clinicians often refer to their respective professional organizations for guidance.

The American Medical Association (AMA) put forth a revision of the code of medical ethics in 2016. These ethical guidelines are not laws, but "standards of conduct that define the essentials of honorable behavior for the physician."[11] While the AMA recognizes the complications inherent to the familial nature of genetic information, the Code of Medical Ethics does not provide guidance for handling a VUS reclassification after the death of the patient. Another section allows physicians to make a judgement call to break confidentiality if doing so will either prevent harm or benefit someone who is identifiable.[11] However this guideline has not often been leveraged by clinical geneticists in these situations.[16]

The National Society of Genetic Counselors (NSGC) also has a code of ethics to guide genetic counselors.[13] This document states that genetic counselors are to maintain privacy of confidential information, unless released by the client, or required by law. The NSGC does recognize the complexity of clinical practice and recognizes genetic counselors may need to make judgements based in individual circumstances, but no guidance is expressly given for the situation described here.

These guidelines allow clinicians to breach confidentiality but are not clear on when it is acceptable to do so. Determining when disclosure is necessary, in accordance with these guidelines still places the clinician in a defensive position, and subject to others' interpretation. The legal liability in these situations, along with concerns for the patient's confidentiality and

family dynamics impacted by disclosure without the patient's consent usually inhibits such disclosure.[9,16]

### 2.1.2 LEGAL

The AMA and NSGC statements can be broadly interpreted, and so have come under legal scrutiny. Two cases bear relevance in the debate between patient confidentiality and the duty to warn at-risk family members in a genetics context. One, from the Superior Court of New Jersey was filed on behalf of a patient's daughter who was not warned of her father's multiple polyposis, and filed suit against the doctor that was treating him (*Safer v. Pack)*.[17] The second case, from the Supreme Court of Florida, was filed by the adult daughter of a patient who received treatments for medullary thyroid carcinoma (*Pate v. Threlkel).*[15] The plaintiff claimed the physician treating her mother had a duty to inform her of the risks that hereditary thyroid cancer may pose to her children.[17] The judge in *Safer v. Pack* reasoned that a relationship must exist before a duty to warn can be imposed, and the case was initially dismissed on those grounds.[17] However, *Pate v. Threlkel* reasoned that an absence of relationship did not eliminate liability.[15,17] The dismissal of *Safer v. Pack* was also overruled on appeal using the ruling on *Pate v. Threlkel*. These cases deal with the clinician's responsibility to the family members of their patients, and the disclosure of genetic information to those family members. However, they do not address the issue of VUS reclassification or the diagnosis of a genetic condition after death. Furthermore, the resolutions to these cases are not sufficient to establish a legal precedence for disclosing genetic information to the at-risk family members of a deceased patient.

### 2.1.2.1 PREVIOUS COURT CASES

#### *SAFER V. ESTATE OF PACK*

Legally, the issue of hereditary conditions and disclosure to family members has been active in the courts since the mid 1990's.[17] In a landmark legal case from New Jersey, the plaintiff filed legal action against her father's physician from nearly 30 years earlier. The plaintiff filed suit because the doctor failed to inform the family that his patient, the plaintiff's father, was treated for a hereditary cancer, "multiple polyposis." The plaintiff's father had passed away in the early 1960's. The plaintiff herself was diagnosed with multiple polyposis in 1990. The plaintiff claimed the physician had a duty to warn his patients family of the hereditary nature of multiple polyposis. The motion judge reasoned that for a duty to warn to exist, there must be a patient-physician relationship. Since the physician in this case had no relationship with the then ten-year-old plaintiff, there was no duty to warn. Further, the motion judge stated that genetically transmissible diseases differ from infectious disease because the harm in genetic diseases is already present, where an infectious disease could be acquired from a patient who was not warned of the risk of infecting others.[17]

This case demonstrates the legal perspective on a physician's duty to warn family members. In this case, the information was known while the patient was still living, so it is not a direct correlate to our scenario of a woman with a *BRCA1* VUS that was reclassified after death. The information available in this case did not change after the patient's death, and the patient may have been informed of the hereditary nature of his condition and chose not to disclose this to his family. However, the principle question of a physician's responsibility for the health of a patient's family members still applies. In this case, the court considered the genetic condition unavoidable and already present, and so nothing the physician could have done would have changed the

outcome. This position has been criticized for minimizing the impact of medical interventions for genetic disorders, and on appeal the dismissal was repealed on the basis that no significant difference existed between the threat of genetic disease and that of contagious disease.[17]

### *PATE V. THRELKEL*

In Florida, also in the mid-1990s, another case dealt with these issues.[15] *Pate v. Threlkel* was very similar to *Safer v. Pack*, but in this case the patient had medullary thyroid carcinoma, a cancer diagnosis that has a high probability of being associated with a specific cancer predisposition syndrome. Pate's mother developed and was treated for medullary thyroid carcinoma in the late 80s, and Pate herself was diagnosed with it a few years later, in 1990. Pate contended that her mother was not notified of the likelihood of her condition being genetically based. Had she been warned, Pate claimed, her mother would have warned and tested her daughters for the disease and been able to help them avoid the disease. Pate claimed the negligence of the physician, Threlkel, as the direct cause of her medullary thyroid carcinoma. This case was also dismissed initially, and upon subsequent appeals, the courts ruled that physicians have a duty to inform a patient if the disease for which they are being treated is heritable. Also, the court decided that the lack of a physician-patient relationship does not necessarily remove a duty of care, or liability for failing to provide care. However, the court warned that this should not be taken to mean a physician should be required to warn family members of hereditary disease. The court made clear that physicians are often barred from disclosing such information without consent of the patient and that the requirement to locate and contact relatives of each patient with a hereditary condition would be too burdensome on physicians. It would be reasonable, the court decided, to warn the patient about the risks of hereditary diseases and expect that they will pass on that information themselves.

### 2.1.2.2 GENETIC INFORMATION AS MEDICAL INFORMATION

In the United States, genetic information generally falls under the legal umbrella of medical information and is subject to the same state and federal regulations restricting disclosure of protected health information. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) states that if the patient is deceased, his or her protected medical information may be disclosed to family members involved in the patient's care or payment for care, if the information is relevant to that involvement, not if it is relevant to that person's own medical care.[10] Further regulation on how and when this information is disseminated is determined at the state level. Many state laws do not address genetic information specifically, however some do.

### 2.1.2.3 GENETICS SPECIFIC STATE LAWS

State laws regarding genetic information disclosure vary widely.[18] If consent for disclosure is not obtained prior to death, some states only allow the executor of the decedent's estate access to medical records.[19] In other states, the law strictly prohibits genetic testing, disclosure, or retention of DNA samples without informed written consent of the patient, separate from that obtained for general release of medical records or medical information.[20] The NIH has a summary of protections and issues addressed in state legislature at https://www.genome.gov/27552194/.[21] The NIH also maintains a database of state statutes and bills, which is searchable, updated monthly, and includes measures which were not voted into law but were proposed and failed, https://www.genome.gov/policyethics/legdatabase/pubsearch.cfm.[22]

State laws in the NIH database have focused on the protection of genetic information from being used to discriminate in employment or insurance purposes.[22] Some states have also addressed the acquisition, retention, and use of genetic samples for research.[22] These laws follow closely along the lines of the federal Genetic Information Non-discrimination Act of 2008 (GINA)

which blocked insurance providers and employers from accessing an individual's genetic information to determine eligibility for employment or insurance.[23]

#### 2.1.2.4 INTERNATIONAL LAW

In the United States, patient confidentiality is of primary concern, even after death. There are no laws which explicitly condone breaches of confidentiality. Some countries have legislation which promotes patient confidentiality, but recognizes physicians can bypass patient consent to notify family members of a genetic risk when that risk is severe and/or there may be options available to mitigate the risk associated with disease.[12] However, some countries insist that patient confidentiality take precedence over all other considerations, while the growing trend internationally seems to be one which recognizes the implications a genetic diagnosis has on the entire family.

In the United Kingdom, legal rulings largely protect patient confidentiality, but recent court rulings suggest legal trends may be shifting to a more familial view of genetic information.[24] Recent cases and appeals leave room for some extension of the duty of care to relatives of patients with genetic conditions.[25] The case of *ABC v. St. George's Healthcare NHS Trust* (2015) was filed by a claimant claiming negligence for not being informed of her father's diagnosis of Huntington's Disease, a genetic neurological condition. The case was initially dismissed, stating the clinician held no duty of care to the claimant. However, an appeal of the case, in 2017, found that it may be reasonable to extend a duty of care to relatives of a patient with a genetic disease. The appeals ruling only overturned the original dismissal of the case. A final ruling for the case will be determined in court. *Safer v. Pack* was used as a consideration for the appeals ruling, demonstrating how US and UK laws are progressing in similar directions.

Australian law takes the idea of genetic information being familial in nature one step further. National law identifies the situation in which an organization may disclose the genetic information of a patient.[26] Such disclosure is permitted if the genetic information was obtained through a health service provided to the patient, disclosure is believed necessary to prevent or lessen harm to a genetic relative of the patient, disclosure follows approved guidelines, and is given to a genetic relative of the patient.[26] However, these laws have not gone without criticism, primarily for undermining doctor patient confidentiality and trust.[27]

Under a revision to French legislation in 2011, patients may choose between direct disclosure or indirect disclosure.[28] Direct disclosure is the patient informing their family members directly, where indirect disclosure allows the patient to provide consent to their treating physician to notify the family members. This law revised legislation enacted in 2004, which allowed the French Medical Biology Agency to disclose genetic risks to family members even without consent of the patient.[28] However, this policy was not published and was not utilized, and in 2011 the policy was changed to allow physicians caring for the patient to provide disclosure and added the requirement of consent before disclosing the information to the family of the patient.[28]

The territory of Quebec, Canada, has established a policy that directly addresses the situation where the patient is deceased. The policy allows relatives of the deceased access to the decedent's record to determine the presence of genetic risk factors for disease.[29] Patients can opt-out of the policy by providing written refusal to participate.[29]

As in the United States, the legal landscape worldwide has different opinions on how to handle genetic information. The policies outlined here are only a small sample of the diverse policies worldwide. Australian law explicitly allows for disclosure to family members without consent of the patient, so long as certain criteria are met. France allows no such option, but instead

patients can choose to make the disclosure themselves or allow the physician to do so, but only with the patient's consent. The United Kingdom is similar to the United States in that the courts favor privacy, but not at the exclusion of disclosure for extenuating circumstances. Lastly, Quebec Canada has established policy allowing blood relatives access to hereditary disease information for deceased patients, unless the patient opts-out. Even as the legal footing for disclosure of genetic information develops so does the clinical footing of molecular genetics as more tests are being offered for a broader range of conditions

## 2.2 GENETIC TESTING

Genetic testing is indicated for individuals and families with conditions known or suspected to have a genetic etiology. Hereditary conditions for which genetic testing is available exist in many medical fields including oncology, pediatrics, prenatal care, cardiology, and hematology among others, and can impact patients at any age. Use of genetic testing in clinical practice is more common today than ever before. A genetic testing registry, ClinVar, supported by the National Institutes of Health (NIH), contains listings for 11,257 genetic disorders linked to 5,265 genes which can be evaluated by 54,734 genetic tests that are offered by 507 laboratories.[30] The widespread use of genetic testing in clinical settings can be attributed, in part, to our developing understanding of the human genome. The Human Genome Project set out to sequence each of about 3 billion base pairs which make up the human genome. The project began in 1990, and in 2003 the project was completed.[31] Since then, our understanding of the genetic code has expanded exponentially. We have developed genetic tests for over eleven-thousand conditions, and testing

modalities have expanded far beyond the practices in place when the Human Genome Project began.[30]

## 2.3 CURRENT CLINICAL ENVIRONMENT

### 2.3.1 CLINICAL GENETIC TESTING OPTIONS

Today, clinicians have a range of genetic testing methods available to them. Single site, single gene, gene panel, whole exome, whole genome, SNP microarray, and del/dup studies, to name a few, now allow for a broad range of clinical utility. Single site testing is typically used to evaluate for a specific pathogenic variant which is either known in the family or is suspected based on clinical features of the patient. Molecular testing of a single gene allows the detection of a variation at any point within that gene through sequencing and deletion/duplication studies. Genetic panel testing examines many genes at once, much the same way that single gene testing is often conducted. Whole exome sequencing (WES) is the analysis of all gene exons known to encode proteins. Whole genome sequencing (WGS) sequences almost all of a person's DNA. SNP Microarray can identify small missing or extra pieces of DNA across the genome. Which test is utilized will depend on the phenotype of the patient, the amount of information desired, and the scope of genetic factors involved for the condition of concern.[32] Each testing option can detect genetic variation, but the indications for using each technique are different.

### 2.3.2 VARIANT CLASSIFICATION

The American College of Medical Genetics (ACMG) has put forth guidelines for classifying a variant found on genetic testing as pathogenic, likely pathogenic, of uncertain significance, likely benign, or benign by using published literature, computational predictive programs, family studies, and bioinformatics resources.[32] Information from these sources is used in aggregate to assess the variant's phenotypic impact and determine its classification. If available evidence is insufficient or conflicting and the variant cannot be classified as pathogenic, likely pathogenic, benign or likely benign, ACMG recommends classifying the variant as being of uncertain significance (a VUS) until sufficient evidence becomes available to classify it as pathogenic/likely pathogenic or benign/likely benign.[32] Anyone may use these general guidelines to interpret genetic variants, but the details of the process may vary as the data used in variant classification is often based on data from each laboratory's own testing practice, although programs like ClinGen are trying to change the way this process works.[32–36]

Prior to the ACMG publishing guidelines for variant classification, the process was not consistent between laboratories. One study, published in 2014, noted 53% discordance between two major genetic testing laboratories and cited the differences in classification process as a likely factor.[37] After the ACMG proposed these guidelines, concordance rose to as much as 98.5% when both laboratories are supported by public data sharing.[38] Variant classification is a dynamic process though, and as new information is gathered, variants can be reclassified.

### 2.3.3 VUS RATE

A VUS rate is the rate at which testing of a particular gene will result in a VUS finding. This rate ranges broadly by gene and will also be different for each laboratory, due to the current lab-specific classification system used by most laboratories. The chances of detecting a VUS can be impacted by many factors, two of which are the number of genes to be examined and the current depth of knowledge for the area being tested.

Another factor in VUS rates is the current depth of understanding for the area being tested. In genetics, our understanding grows as we detect and interpret more genetic variants. The more frequently a gene is tested, the more information we can gather about variants within that gene, and the lower the likelihood of detecting a variant we do not understand, or a VUS.[39] Additional information such as predicted effect of the variant on protein function and segregation studies can help determine the pathogenicity of a variant.[34,40,41]

As a general rule-of-thumb, the chance for a VUS result is about 1% per gene tested.[42,43] According to Myriad Genetic Laboratories' website, in 2013 their VUS rate for common breast cancer and Lynch Syndrome genes (*BRCA1, BRCA2, MLH1, MLH2, MSH6,* and *PMS2*) had a combined average of about 1.9% per gene.[44] The website further alludes to a correlation between the number of years a gene has been available for testing and the VUS rate.

### 2.3.4 VUS PREVELENCE IN HIGH/MODERATE RISK CANCER GENES

To determine the potential clinical impact of VUS reclassification, it is useful to understand the current prevalence of variants currently classified as a VUS. Cancer genetics is a widely studied field. Genetic variation in a number of genes has been linked to a predisposition for a wide range

of malignancies. Some genetic cancer syndromes have management guidelines which are different from those without a genetic predisposition to cancer.[1] Breast cancer has been an area of increased interest in recent years due to its prevalence among women and effective treatment options. The genetic underpinnings of breast cancer have been studied for more than 30 years, and a number of genetic risk factors have been implicated in the development of breast cancer. These genes have a range of impact on breast cancer risks, and some of the more commonly associated genes are *ATM, BRCA1, BRCA2, CDH1, CHEK2, PALB2, PTEN,* and *TP53*.

ClinVar is an online database for genetic variations used by genetics professionals to compile information on the clinical impact of specific genetic variants. Their website lists genetic variations reported to it and records how that variation was classified by the submitter and what data were used to support the assertion. Submitters to the website follow the ACMG classification system of pathogenic, likely pathogenic, of uncertain significance, likely benign, and benign as well as additional classifications for other clinical impacts like drug response and protective factor.[45] The ClinVar database contains a wealth of information which can be stratified by a single variant, gene, or condition. By examining the ClinVar data for the eight genes associated with increased risk for breast cancer discussed earlier, we found that between 37% and 59% of the variants which have been reported for these genes are classified as a variant of uncertain significance (Table 11), it should be noted that some variants may have more than one classification. The data described here is not to be construed to say that there is between 37% and 59% chance of detecting a VUS in these genes, but it does mean that there are currently over 12,000 genetic variants listed as having uncertain significance within just these 8 genes. To clinicians, the fact that a significant proportion of identified variants are still classified as VUSs

means there is potential for a significant clinical impact as the ability to interpret variants improves. As each variant is reclassified, clinicians will face the challenge of recontact and disclosure.

**Table 1 VARIANT CLASSIFICATION IS SELECT BREAST CANCER PREDISPOSITION GENES**

| Gene (Total Variants) | Pathogenic Variants | Likely Pathogenic | VUS Variants | Likely Benign | Benign Variants |
|---|---|---|---|---|---|
| **ATM (n = 4,947)** | 651 (13%) | 377 (8%) | 2,753 (56%) | 1,468 (30%) | 169 (3%) |
| **BRCA1 (n = 6,640)** | 2,551 (38%) | 250 (4%) | 2,458 (37%) | 1,330 (20%) | 780 (12%) |
| **BRCA2 (n = 9,209)** | 2,943 (32%) | 296 (3%) | 4,231 (46%) | 2,050 (22%) | 947 (10%) |
| **CDH1 (n = 1,448)** | 141 (10%) | 46 (3%) | 818 (56%) | 524 (36%) | 71 (5%) |
| **CHEK2 (n = 1,281)** | 167 (13%) | 115 (9%) | 751 (59%) | 325 (25%) | 25 (2%) |
| **PALB2 (n = 1,989)** | 361 (18%) | 146 (7%) | 1,052 (53%) | 574 (29%) | 66 (3%) |
| **PTEN (n = 1,317)** | 332 (25%) | 108 (8%) | 631 (48%) | 283 (21%) | 45 (3%) |
| **TP53 (n = 1,247)** | 215 (17%) | 322 (26%) | 533 (43%) | 357 (29%) | 49 (4%) |

* Rows do not add up to 100% as some variants have more than one classification in Clinvar. Data accessed 3/27/2018.

### 2.3.5 VARIANT RECLASSIFICATION

Laboratories which perform genetic testing have additional resources useful for variant reclassification, such as results from patients being tested at that lab, which may not be readily available to others. Some laboratories will also offer free testing of relevant family members to gain more information about a specific variant.[46,47] As the laboratory gathers additional information, they may be able to reclassify a variant of uncertain significance result to benign or

pathogenic. VUS reclassification occurs regularly at most laboratories but the process varies from one laboratory to another.

When a VUS result is reclassified by a laboratory, many will send out an updated report with relevant information about the variant to the ordering physician.[46] However, the reclassification process may take years, and some patients will have passed away before the reclassification of the VUS they were identified with occurs. Even after the patient has passed away, the reclassified results may still be of clinical value to their relatives.

Reclassification can be done from any classification to another. A VUS may be reclassified as any one of the other options: benign, pathogenic, likely benign, or likely pathogenic. Reclassification of a VUS to a pathogenic variant indicates that biological relatives of the deceased patient who carry the same variant would be at increased risk for the symptoms associated with that specific gene. Conversely, reclassification of a VUS to a benign variant can help eliminate the anxiety associated with an uncertain result. [35] In the scenario described here, of a *BRCA1* VUS reclassified after the patient's death, the family members may be able to benefit from screening and prevention strategies available for patients with a pathogenic mutation in *BRCA1*. These family members may wish to undergo genetic testing to determine their genetic status, which has the potential to alter their medical care.

### 2.3.6 INHERITANCE

Biological relatives of a deceased patient have a certain probability of having the same variant as the patient, depending on the degree of relatedness.[48] As described in Table 22, a child shares about one half of their genetic material with each of their parents and siblings, also called first-

degree relatives. If a patient carries a pathogenic variant for a genetic condition, there is a 50% chance that first-degree relatives will carry the same variant. This probability decreases as the degree of relationship between family members increases. Second degree relatives are people separated by one other person in the family structure. Second degree relatives include grandparents, grandchildren, aunts and uncles, nieces and nephews, who all share 25% of the genetic material. Half-siblings also share 25% of their DNA because they are related to only one parent instead of two. Cousins share about 12.5% of their DNA whereas second cousins share only 3.13%. The chance for biological relatives to carry the same genetic variant is the same as the amount of DNA they share. So, if the second cousin of a patient has a pathogenic mutation in BRCA1, the patient would have about 3% chance of carrying that same pathogenic variant. Even distant genetic relatives have a finite chance to share a genetic variant.

**Table 2 SHARED DNA BY DEGREE OF RELATION**

| Relationship | Examples | Percent of shared DNA |
|---|---|---|
| **Identical Twins** | Monozygotic Twins | 100% |
| **First degree** | Child, Parent, Sibling | 50% |
| **Second Degree** | Aunt, Uncle, Grandparent, Grandchildren | 25% |
| **Third Degree** | Great Aunt, Great Uncle, First Cousin | 12.5% |

## 2.4 SUMMARY OF THE PROBLEM

There are currently no guidelines in place on if or when clinicians should contact the relatives of a deceased patient to inform them of a reclassified VUS result when a revised report is received. However, this issue is becoming increasingly important as clinical genetic testing becomes more common.[49] The likelihood of getting a VUS result increases with the scale of the test and changes in clinical practice, from single gene tests to broader tests. At the same time, our understanding of human genetics is progressing rapidly and as it does, a growing number of already identified VUS results will be reclassified accordingly, leading to a greater need for an effective system to handle reclassified results both during life and after death. Current policies which do address the issue of genetic information disclosure after the death of the patient typically treat genetic information as medical information. In Pennsylvania, this means that only the executor of the estate has access to the information once the patient has passed away.[19] However, unlike genetic test results in the case of variant reclassification, a patient's medical information does not change after the patient has passed away. Thus, special considerations should be made for the handling of genetic information.[12,24] Clinicians who receive a VUS reclassification for a deceased patient may struggle to identify the individual with legal authority to receive the information and who also has the means and desire to utilize it.[7] Guidance on this issue is minimal, and clinicians may use a wide variety of methods to identify the most appropriate person to whom the reclassified result is disclosed. When genetic information is updated for a deceased patient, the clinician is placed in the uncomfortable position of deciding whose rights are more important. Ethical concerns for the health and safety of the patient's family members, who could benefit from the information the clinician now holds are pitted against a legal responsibility for maintaining the long tradition of privacy with regard to sensitive medical information. Both arguments are valid, persuasive, and

relevant to the situation, and reconciling the two must be done based on each clinician's understanding of the condition in question, current practices which provide legal footing for action, and ethical values. The strength of both arguments means that clinical practice likely varies greatly from one clinician to another. Clinicians may reach out to the last known contacts for the deceased, the spouse of the deceased, the hospital's medical records department, etc. in order to identify the relative to whom the revised results can be disclosed.[7] The practice of disclosing updated results to relatives when they become available after the patient's death is likely inconsistent. Clinicians who receive a reclassified VUS result from a laboratory use their discretion as to when contacting relatives is warranted.[50,51] Because of the lack of guidance and the growing relevance to clinical genetics, it is becoming increasingly important to establish guidelines which best serve the patients, their families, and the clinicians involved in this process.

Policy guiding the distribution of reclassified VUS results after a patient's death would provide grounding for clinicians to base their decisions. Reassurance that the course of action is supported by clinicians and professional organizations alike provides footing for clinicians who may have previously done nothing with reclassified results to now follow prescribed guidelines, providing family members of the deceased with vital information to use in their own healthcare.

## 2.5 PURPOSE OF THIS STUDY

The purpose of this study is to identify current clinical practices and opinions regarding the disclosure of reclassified variant of uncertain significance (VUS) results of a deceased patient to family members for which those results are relevant. In addition, we hope to better understand

genetics providers' opinions regarding the salient issues to consider in developing practice guidelines and policy regarding this issue.

## 2.6 SPECIFIC AIMS

To achieve these goals the current study contains two specific aims. Aim 1 is to examine the current practices of Genetic Counselors regarding the disclosure of updated genetic test results of a deceased patient to family members for which those results are relevant. Aim 2 is to identify legal and ethical principles that will help guide the development of clinical practice guidelines regarding the disclosure of updated genetic test results of a deceased patient to family members for which those results are relevant.

# 3.0 MANUSCRIPT

## 3.1 INTRODUCTION

Genetic testing is clinically available for many hereditary syndromes. Identification of individuals with a genetic syndrome will help assess the risk for developing syndrome-related diseases. When a genetic test is performed, possible outcomes include identifying variants that can be classified as pathogenic, likely pathogenic, of uncertain significance, likely benign, or benign according to the information available about the variant and the patient's phenotype.[32] A Patient's clinical care may be impacted by results classified as benign/likely benign (no effect on gene function or clinical management) or pathogenic/likely pathogenic (gene function is/likely is impacted and may impact clinical management), but a variant of uncertain significance (VUS) requires additional information before its clinical significance can be determined. When a VUS is reclassified by the laboratory who performed the test, some will send a reclassification notice to the ordering physician who must then decide how, and if, the information will be handled. Ideally, the patient can be notified of the updated information directly. However, reclassification can take years, and some patient's will pass away before their VUS can be reclassified. When a VUS is reclassified after the patient's death, there may be no documentation of whom the patient would like to be notified of the updated information, or such documentation may no longer be valid. Without the patient's wishes to guide them, clinicians must weigh many factors to determine the best course of action. There is limited data available on clinical practice when a VUS is reclassified after the patient's death. Research has shown that most patients want their family informed of their genetic

status after their death and most family members would want to know if a genetic risk was present in a relative.[6,8]

Legal precedence on the issue of family access to genetic information is not conclusive. The cases of *Pate v. Threlkel* and *Safer v. the Estate of Pack* are often used to represent the clinician's duty to warn family members of a genetic risk for disease.[12,15,17] Initially both cases were dismissed as neither plaintiff had established a duty of care with the physician, but these dismissals were overturned on appeal. In overturning the dismissal of *Safer v. Pack*, the courts established a responsibility of a physician to notify their patient if the disease they are being treated for is heritable.[17] In overturning *Pate v. Threlkel* the court established that physicians may be liable for failing to notify their patient of the risks associated with heritable disease. The ruling which overturned *Pate v. Threlkel* also recognized that a duty to warn may be extended to the patient's family members in some cases.[15] However, these rulings are not sufficient to establish a legal precedence for disclosing genetic information to the decedent's at-risk family members in all cases. These cases were filed on physician's failings while their patients were living and the risks for genetic disease involved were understood at the time. They do not address the issues around VUS reclassification or disclosure after the patient's death. When a VUS is reclassified after the patient's death, the clinical significance of the variant is not clarified until after the patient has passed away, when disclosure to the patient and obtaining the patient's consent to disclose to family members is no longer possible. This creates a critical break in the information chain commonly used in clinical practice where the clinician informs the patient who then informs their family members.

The phenomenon where medical information is updated after the patient has passed away is unique to genetic VUS results. The chance to identify a VUS is inherent in any genetic test, at

about 1% per gene tested,[42,43] and guidelines for the classification of VUS results have been proposed by the American College of Medical Genetics (ACMG).[32] Once classified as a VUS, the process to reclassify the variant may take years and, unfortunately, some patients will not survive to see the VUS reclassified. VUS results and reclassification cannot be avoided, because we do not know everything about the human genome, but what we do know can be very useful to our patients. Genetic testing is becoming widely used as an effective clinical tool in many medical specialties. The use of genetic panel testing is also becoming more common in clinical practice, because these tests help evaluate many genes at once, with a greater potential to determine a diagnosis than single gene testing.[37,52] As utilization of these tests increases though, more VUS results will be reported.

Years of genetic testing has already identified a backlog of VUS results that await reclassification. Publicly available variant data for eight genes commonly associated with increased breast cancer risks (*ATM, BRCA1, BRCA2, CDH1, CHEK2, PALB2, PTEN,* and *TP53*) identified more than thirteen thousand total VUS variants for just these eight genes. The proportion of VUS results for these genes averaged 49.75% of all reported variants across all eight genes.[53] It can be expected that some of the patient's identified with those variants may have since passed away and as they are reclassified, clinicians will face the clinical challenge of determining whom to disclose the reclassification to.

The familial nature of genetics is well established, and the importance of genetic information for family members is generally accepted. Reclassification of a VUS may be clinically relevant for family members of the deceased, but current policy and legal precedence is not sufficient to guide clinicians in deciding when and to whom this information should be disclosed. Further guidance on this issue is needed.

The purpose of this study is to identify current clinical practices and opinions regarding the disclosure of reclassified VUS results of a deceased patient to family members for which those results are relevant. In addition, we hope to better understand genetics providers' opinions regarding the salient issues to consider in developing practice guidelines and policy regarding this issue.

## 3.2 MATERIALS AND METHODS

### 3.2.1 RESPONDENTS

This study received approval from the University of Pittsburgh Institutional Review Board (IRB), approval form attached in Appendix A. Respondents were recruited from the over 3,000 members of the National Society of Genetic Counselors (NSGC). The NSGC is the national organization which provides a network with which genetic counselors can communicate and promote their interests. This organization was chosen as a representative population for clinical genetics practitioners who may have experience with the situation of interest because its membership includes most practicing genetic counselors in the United States. The NSGC distributed letters inviting members to participate in the study (Appendix C and D) to its membership via email on four total occasions during the months of February and March 2018. After the initial recruitment letter, three reminders were sent at one-week intervals.

### 3.2.2 INSTRUMENTS AND PROCEDURES

Potential respondents were sent a survey through the Qualtrics Survey Systems (2017-2018) and responses were collected anonymously. The survey consisted of 35 questions which were designed to elicit current clinical practices for the release of reclassified VUS for deceased patients to family members and to obtain opinions of respondents on the salient issues when considering disclosure to family members of the deceased. Skip patterns allowed respondents with experience receiving a VUS in a deceased patient to answer questions designed to gather additional information about those experiences, such as disclosure practices. Opinions on the importance of various factors when considering disclosure in these situations as well as opinions on situations which may warrant disclosure were collected from all respondents. Demographic information was also collected and included respondent's practice setting, type of practice, years of practice, and state of practice (Appendix A). The instrument development process included two pilot studies conducted with local genetics professionals in June and July 2017.

### 3.2.3 DATA ANALYSIS

Descriptive analysis was used to summarize the responses. Aggregate data on current practices and opinions regarding the disclosure of reclassified VUS results of deceased patients to their relatives are reported by the demographics collected. Chi-square was used to compare the differences in responses by clinician and practice characteristics. Text entry fields were examined to identify common themes. Data from partially completed questionnaires was included in the analysis. All analysis was performed using Qualtrics software, Version (2017-2018) of Qualtrics.

## 3.3 RESULTS

### 3.3.1 RESPONDENTS

Invitations to participate were sent to more than 3,061 members of NSGC on four total occasions in one-week intervals with an average open rate of 27%. An additional 669 NSGC members were sent the initial invitation to participate but not the reminder emails due to their membership lapsing after the initial invitation was distributed. Each reminder was sent to all active members of the NSGC because those who had already participated could not be excluded from reminders as the data was collected anonymously. Of those who viewed the invitations, 204 began the survey (6%, 204/3061) and 154 completed the survey (75%, 154/204). Response rates to individual questions fluctuated as respondents were able to skip questions. The majority of respondents were genetic counselors (94%, 144/154). Cancer was the most reported subspecialty (55%, 82/149) and 45% (69/153) of respondents reported having between one and five years of clinical practice experience. Thirty-two US states were represented by respondents, and an additional 7 respondents represented Canadian provinces (Table 3).

**Table 3 SUMMARY OF RESPONDENT'S CHARICTERISTICES**

| | Number (%) |
|---|---|
| **Primary Role (n=153)** | |
| Genetic Counselor | 144 (94%) |
| Student | 7 (5%) |
| Other | 2 (1%) |
| **Type of Practice* (n=149)** | |
| Pediatric | 35 (17%) |
| Cancer | 82 (40%) |
| Prenatal | 22 (11%) |
| General Medicine | 11 (5%) |
| Clinical Laboratory | 13 (6%) |
| Research Setting | 9 (4%) |
| Specialty Clinic | 33 (16%) |
| **Years of Clinical Genetics Practice (n=153)** | |
| Less Than 1 Year | 34 (22%) |
| 1 – 5 Years | 69 (45%) |
| 6 – 10 Years | 18 (12%) |
| 11 – 20 Years | 21 (14%) |
| Over 20 Years | 11 (7%) |
| **Genetic tests ordered or coordinated per week (n=152)** | |
| None | 22 (14%) |
| Less than 1 per week | 6 (4%) |
| 1 – 10 per week | 87 (57%) |
| 11 – 15 per week | 28 (18%) |
| 16 – 30 per week | 7 (4%) |
| Over 30 per week | 2 (1%) |
| **NSGC Region** Representation (n=143)** | |
| Region 1 (CT, MA, ME, NH, RI, VT, CN, Maritime Provinces) | 13 (9%) |
| Region 2 (DC, DE, MD, NJ, NY, PA, VA, WV, PR, VI, Quebec) | 30 (21%) |
| Region 3 (AL, FL, GA, KY, LA, MS, NC, SC, TN) | 16 (11%) |
| Region 4 (AR, IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, OK, SD, WI, Ontario) | 38 (27%) |
| Region 5 (AZ, CO, MT, NM, TX, UT, WY, Alberta, Manitoba, Saks) | 17 (12%) |
| Region 6 (AK, CA, HI, ID, NV, OR, WA, British Columbia) | 24 (17%) |

* This question allowed multiple responses to allow for counselors serving multiple clinical roles, percentages represent the percentage of choices made in total.

** NSGC Regions defined in 2016 Professional Status Survey, 5 responses were not classifiable

### 3.3.2 CURRENT CLINICAL PRACTICES

A minority of total respondents reported having received a reclassified VUS result for a deceased patient (24%, 45/191). With more years of clinical practice, the incidence increased to more than 40% of respondents with over 10 years of service. Most respondents who reported receiving a reclassified VUS for a deceased patient also reported working in a cancer clinic (32/37, $p < 0.01$) and were more likely to have an organizational policy in place (15/37, $p < 0.01$). All other subspecialties (pediatric, prenatal, general medicine, clinical and research laboratories, and specialty clinics) also reported some experience with this situation. It could not be determined if the experiences reported by those who had received a reclassified VUS for a deceased patient were in their current clinical setting or a previous position. Receiving a VUS reclassification for a deceased patient did not seem significantly associated with the number of tests ordered per week ($p = 0.14$) or clinical setting such as university hospital, private hospital, or public hospital ($p = 0.83$). Respondents who had received a VUS reclassification for a deceased patient were then asked how they handled the situation. Forty-two respondents provided information on their past practice. A majority (55%, 23/42) reported that they always attempted to contact the decedent's relatives to disclose the VUS reclassification regardless of how the variant was reclassified and more respondents reported they always attempted contact if the VUS was reclassified as pathogenic (74%, 31/42) than benign (64%, 27/42). Table 4 shows respondents who have received a reclassified VUS for a deceased patient and their disclosure practices when the VUS was reclassified as benign and pathogenic. Those who would always attempt contact for a benign reclassification were more likely to do so for a pathogenic reclassification (100%, 18/18) whereas respondents were less likely to disclose a benign reclassification if they reported always attempting to contact when the VUS was reclassified as pathogenic (67%, 18/27). A majority of respondents

who reported always attempting to contact relatives to disclose a reclassified VUS were not aware of state or local policies guiding the disclosure of reclassified VUS results for deceased patients (90%, 18/20). Of respondents who reported always attempting disclosure, 43% indicated there was an institutional policy in place (9/21) and 57% (12/21) reported no organizational policy was in place. Overall, more respondents who had received a VUS reclassification for a deceased patient were aware of these policies (Table 5). However, few respondents overall reported awareness of these policies, and data were insufficient to make accurate comparisons.

**Table 4 DISCLOSURE PRATICE BY VARIANT RECLASSIFICATION**

| | VUS reclassified to | |
|---|---|---|
| Contact Attempted | Benign (n=42) | Pathogenic (n = 42) |
| Always/Usually | 64% (27) | 74% (31) |
| Usually Not | 12% (5) | 2% (1) |
| Never | 12% (5) | 7% (3) |
| Never received this reclassification | 12% (5) | 14% (6) |

**Table 5 RESPONDENT'S AWARENESS OF CURRENT POLICIES**

| | | Have received a VUS reclassification after death | | | |
|---|---|---|---|---|---|
| | | Yes (%) | No/ Unsure (%) | Total (%) | p value |
| **Aware of process to identify executor of the estate** | Yes | 15 (41%) | 20 (17%) | 35 (23%) | p < 0.01 |
| | No | 22 (59%) | 97 (83%) | 119 (77%) | |
| **Is there an organizational policy where you practice** | Yes | 15 (41%) | 4 (3%) | 19 (12%) | p < 0.01 |
| | No | 17 (46%) | 43 (37%) | 60 (39%) | |
| | Unsure | 5 (14%) | 70 (60%) | 75 (49%) | |
| **Aware of State or local policy** | Yes | 4 (11%) | 3 (3%) | 7 (5%) | p = 0.03 |
| | No | 32 (89%) | 114 (97%) | 146 (95%) | |

### 3.3.3 OPINIONS

All respondents were asked for their opinions on the disclosure of reclassified VUS results for a deceased patient to family members. Respondents rated six factors related to the disclosure of reclassified VUS results to family members (Figure 1). The three factors indicated as being least important were the severity of the condition, effectiveness of available treatments, and the deceased's right to confidentiality. Respondents were also asked to consider scenarios in which they would be willing to disclose a reclassified VUS result to family members of the deceased. Overall, respondents were more likely to consider disclosure for a reclassification to pathogenic than to benign. A majority of respondents would consider disclosure in all the scenarios given, except for when the patient's aversion to disclosure had been expressed and the VUS had been reclassified as benign, 20% (31/154).

Opinions on the need for and support of policy development on this issue were also collected. Most respondents supported the development of legal policy to guide the disclosure in these situations (71%, 109/154), and a greater majority indicated that the issue of disclosure to family members when the patient is deceased is important enough to pursue if legal policies were in place to allow it (97%, 150/154). The survey also explored a legal and ethical requirement for consent of the deceased in order to disclose a reclassified VUS result to their family members. Overall, a minority of respondents felt it should be ethically required to have consent of the deceased patient to release their reclassified VUS information to relatives (26%, 41/154) and fewer felt consent should be legally required (10%, 15/154). Most respondents reported being unsure if consent of the deceased should be ethically (40%, n = 61) or legally (48%, n = 74) required. When asked when a conversation should be had with a patient regarding the release of a reclassified VUS after their death, respondents felt the best time to have this discussion was when a VUS was

identified in a patient who was not expected to live more  than a few years (40%, n = 55), followed by when the patient consents to genetic testing (31%, n = 43), and when a VUS was identified in any patient (27%, n = 38).  Only 3 respondents (2%) felt the discussion should be had at all initial consultations.

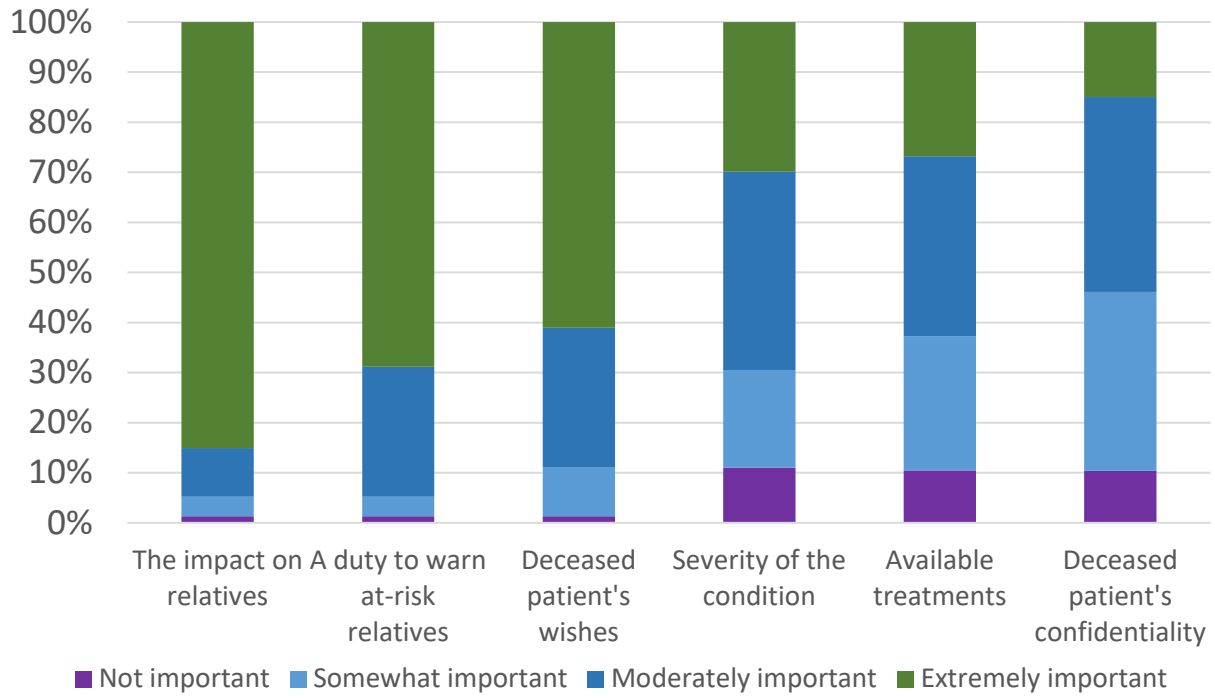



**Figure 1 IMPORTANCE OF FACTORS TO CONSIDER IN DISCLOSURE TO FAMILY MEMBERS**

## 3.4 DISCUSSION

### 3.4.1 CURRENT PRACTICES

One goal of the current study was to elicit clinical practices when a reclassified VUS has been received for a deceased patient.  Based on a lack of practice guidelines and legal policy on the

issue, it was thought that the practice of disclosure to family members would be inconsistent among clinical genetic providers. Comparing the current study results to those of Dugan et al. (2003),[9] the proportion of genetic counselors willing to disclose appears greater in the current study. This may be attributable to the differences in the situation examined in these studies. Most notably, the patients in the current study are deceased, while Dugan et al. examined the situation where the patient was still living but refused to inform family members. This key difference draws attention to the importance of family dynamics in these situations. When the patient is living, genetic counselors rarely disclosed to family members against the patient's wishes, citing concerns for the patient's reaction and potential impact on family dynamics.[9] When the patient is deceased, as in the current study, the concern for the relatives of the deceased was greater than concerns related to the deceased patient.

While a minority of respondents (24%) reported having experience with receiving a reclassified VUS after the patient is deceased, the majority of them reported either always or usually attempting to contact family members of the deceased when they had encountered this situation despite a deficit of guidance. Very few respondents reported being aware of any state or local policy regarding how to handle reclassified results received for deceased patients, especially in those who have not received such results. A significant attempt at disclosure in an ambiguous legal and ethical setting suggests a high amount of importance being placed on the family members of the deceased. This suggestion was supported by rankings in Image 1 as well. There was an association between experience with a reclassified VUS result in a deceased patient and three other factors in this study; awareness of state or local policy, knowledge of an organizational policy, and awareness of a process to identify the person with legal authority to receive genetic information of the deceased where those who had received a reclassified VUS result were more likely to report

awareness of these policies. Researchers hypothesize that the experience of receiving a reclassified VUS for a deceased patient likely spurs investigation by the genetic counselor and leads to increased awareness of the other factors identified here. Researchers also suspect that state or local laws are not in place in most locations, as indicated by the low proportion of respondents aware of them in this study, even among those who have received a reclassified VUS for a deceased patient. However, awareness of these policies may also be low if respondents had simply not expressly looked for them before.

### 3.4.2 OPINIONS

The second goal of the current study was to describe clinical opinions on disclosure of reclassified VUS results of deceased patients to family members. Overall respondents placed more importance on factors related to the needs of family members than factors related to the deceased, however the wishes of the deceased still ranked in the top three most important factors, indicating a desire to follow the patient's wishes when they are known. The willingness to break confidentiality described in the current study is notably different from research conducted while the patient is still living, in which the importance of maintaining family dynamics and concern for the patient's reaction to disclosure against their wishes were prioritized.[9,16] The shift in perspective after the patient's death, from the perspective of the patient and their rights to that of surviving family members, may demonstrate the clinical recognition of genetic information as being familial, and not purely focused on the individual in some cases. Further demonstrating this shift in perspective is that most respondents were willing to disclose a pathogenic reclassification to family members regardless of the decedent's wishes (55%, 86/156), and a smaller proportion were willing to disclose a benign reclassification against the patient's wishes as well (20%, 31/156). The overall

willingness to disclose to family members after the patient's death suggests that when repercussions from violating the patient's wishes is not a concern, because the patient has passed away, care for family members may be the driving factor for clinical decision making.

Opinions around the development of policy on this issue were also obtained. Respondents were closely split on the need for a separate legal classification for genetic information , indicating this as an area which still needs discussion and research to clarify directions for future policy. Respondents strongly support development of a legal mechanism to allow family members access to reclassified VUS results for a deceased patient. The desire for guidance expressed by respondents may be driven by respondents who were unaware of state, local, or institutional policies. There was also a notable proportion of respondents who felt a separate legal classification for genetic information may not be needed (29%). One respondent commented in a written portion of the survey that he or she felt treating genetic information as being special would demonstrate that genetic information is more "real" than other medical information and called the precedence of "genetic exceptionalism" dangerous. While these comments likely do not explain why nearly 30% of respondents were against separate legal classification of genetic information, it brings up an idea which should be considered. There are a host of ideals which may oppose the development of policy on this issue. For example, the current system affords clinicians a great deal of freedom in clinical decision making, which may be restricted if policies were developed.

### 3.4.3 FUTURE DIRECTIONS

As this is the first study, to our knowledge, to describe clinical practices in the disclosure of a reclassified VUS in a deceased patient to family members, there are many directions for future research to pursue. Replication of this study with other clinical groups would add additional

information on clinical practices absent from the current study. Public opinion should also be obtained to aid in policy development and general understanding of the situation from all angles. Clarification studies which identify more granular frequency of VUS reclassification in deceased patients could also be of use to assess the impact of this issue in coming years. More detailed assessment of contact attempt frequency, modality, and success in these situations can help define the usefulness of contacting family members after the patient's death and which processes may be useful to pursue in future policy development. A comprehensive policy analysis of US and Canadian law to determine if respondents in this survey who were unaware of state, local, and organizational laws did or did not work in areas where such laws exist could help determine the effectiveness of these policies. The need for guidance identified in this study may be partially addressed by development of consent forms for clinical use with patients to facilitate disclose of reclassified VUS results after the patient's death. Educational initiatives may help develop an understanding of existing policies and improve their utilization in a clinical setting.

### 3.4.4 STUDY LIMITATIONS

The response rate for this study was low, thus limits the ability to generalize the practices among all clinical genetics providers. Subsequent studies are needed to gain a more robust understanding of the issues presented here and their overall impact on the field of clinical genetics. There is a possibility of selection bias based on respondents' personal experience or views on the issues discussed here. Recall bias may also exist because the study asked respondents to recall specific activities in the past, respondents may have inadvertently misreported their past experiences and practices. The proportion of respondents who reported experience with a reclassified VUS for a deceased patient was not sufficient to establish significant associations of practice with

demographic and opinion components of the current study. Replication studies, with more respondents, are needed to gather more data on the issue of reclassified VUS results for deceased patients and disclosure of those results to family members of the deceased. Data gathered also identified areas of the survey instrument which could be improved upon. Questions asking respondents if they currently discuss the post-mortem release of reclassified VUS results with their living patients were not available to those who had never received a reclassified VUS for a deceased patient. The survey did not identify how many times respondent had received a VUS reclassification for a deceased patient. The current study only describes the frequency of disclosure to family members in these situations. The methodology, success rate, and impacts of disclosure are not described here, but should be considered for further study.

There were some strengths in the current study as well. To the best of our knowledge, the present study is the first to describe clinical practices when a VUS is reclassified after the patient's death, establishing that contact attempts are common, but not consistent. Respondents identified some gaps in, and possibly misunderstanding of, existing policy. Policy development was strongly supported by respondents as well. Lastly, the study used a survey development process which included feedback from practicing genetic counselors as well as other clinical genetics professionals and addressed an appropriate audience for the situation of concern.

## 3.5 CONCLUSION

The current study suggests a significant proportion of respondents do attempt to contact the family members of a deceased patient when triggered by a VUS reclassification. Respondents also indicated a deficit of guidance in these situations and identified that factors related to the protection

of family members were most important to them when considering the option of disclosure to family members after the patient's death. Respondents in the current study also strongly supported the idea of legal policies to allow the family members of a deceased patient access to reclassified VUS results. As genetic testing becomes more common in clinical practice (gene panels, whole exome, whole genome), the frequency of VUS results per patient will increase and reclassification may occur with increased regularity due to the increase in data availability. The variation in the reported importance of factors considered when deciding if clinicians would disclose to family members shows uncertainty in the current clinical practice as does the inconsistent rate of contact attempts. For these reasons, policy development can serve an important role by standardizing the indications for disclosure to family members of a deceased patient as well as the process for doing so.

# 4.0 RESEARCH SIGNIFICANCE TO GENECTIC COUNSELING AND PUBLIC HEALTH

The goals of any public health initiative aims to fulfill one or more of the three core functions of public health; assessment, assurance, and policy development. The core function of assessment is to gather information and determine areas of need.[54] Policy development uses the information obtained through assessment to consult with stakeholders and determine interventions which best meet the public need.[54] The core function of assurance closes the loop by connecting the public to services and assuring they quality and relevance.[54] By seeking information on current practices and opinions of clinicians, the current study seeks to fulfill the role of assessment.

The current study suggests a significant proportion of genetic counselors do attempt to contact the family members of a deceased patient when triggered by a VUS reclassification. Respondents also indicated a deficit of guidance in these situations and identified the factors related to the protection of family members were most important to them when considering the option of disclosure to family members after the patient's death. Respondents in the current study also strongly supported the idea of legal policies to allow the family members of a deceased patient access to reclassified VUS results. Increased clinical use of genetic testing (gene panels, whole exomes, whole genomes) will likely increase the frequency VUS results are identified per patient. A significant backlog of VUS results currently await reclassification. Advancing technologies and greater usage of genetic evaluation in clinical practice suggest reclassification may occur with increased regularity in the coming years due to the increase in data availability.

Cascade screening, or genetic testing of relatives of a patient identified with a genetic condition, has been shown cost effective and clinically effective at identifying patient's with

genetic conditions.[55,56] Some barriers to cascade screening include family dynamics, geographical dispersion of family members, health care literacy of family members, access to care, and privacy concerns.[56] A lack of guidance on how to handle the genetic information of deceased patients may also inhibit cascade screening. In light of the current clinical practice of disclosure, the strong support for policy development to guide clinicians in these efforts, and the expansion of genetic testing as an important clinical tool, policy makers are urged to consider this an important issue.

The information gathered here may be useful when developing policies regarding the disclosure of genetic information to family members of a deceased patient, when that patient has passed away before the information was available or well understood. The current body of knowledge on this subject is not expansive, and the current study seeks to provide information important for future policy development.

# 5.0 PUBLIC HEALTH ESSAY

## 5.1 INTRODUCTION

The goal of public health is a simple one, to protect and preserve the health of the public. To fulfill this goal, public health officials employ three core functions of public health, Assessment, Policy Development, and Assurance.[54,57,58] The current study fulfills the role of assessment, by examining the problem of disclosure of reclassified VUS results for deceased patients to their family members. The following document addresses policy development by examining some possible paths to consider in developing policy to address the policy gaps identified in the present study. The formulation of regulations takes many paths. The origin of laws generally stems from an interest of lawmakers or the public, and successful development and implementation of these regulations often requires the collective action of the community and regulators.[54,57,58] A critical first step in policy development is clarification of the problem. The present study clarified a gap in policy which makes it difficult for biological relatives to gain access to the genetic status information of a deceased family member when that information becomes available after the patient's death. This study fulfills an assessment role, one of the 3 core functions of public health, and demonstrates a need for unified guidance on the disclosure of genetic information after a patient's death. The following provides background for this issue and proposed solutions.

## 5.2 BACKGROUND

Restrictions by current regulations including HIPAA and varied state laws on clinician disclosure of genetic information to a patient's relatives limits the clinical role in family notification. A clinician will often promote the importance of communicating genetic risk to family members while the patient is still living, in the hopes that the patient accepts the responsibility of informing their own family members.[5] While most patients are successful in their efforts, as many as 28% of those who wish to inform their relatives may be unable to do so[8] and a small percentage will outright refuse to disclose the information.[5] Reasons for non-disclosure, either overt or unintended, can include but are not limited to having no known biological relatives, a desire for privacy, not wanting to burden the family with the information, a misunderstanding of the implications of or responsibility for communicating the information, and concern for family dynamics.[8,14,59] While some of these issues may be resolved by genetic counseling, others cannot. When the patient fails to inform at-risk family members of a genetic factor in disease development, the clinician may feel a desire to protect those family members from harm, but will often be conflicted by opposing legal obligations to patients, even after death.[9,16,50,60]

Existing public policy in the United States expressly limits the disclosure of protected health information to extreme circumstances.[10] Professional groups take patient autonomy and confidentiality as the default position as well, allowing breaches of confidentiality only in extreme circumstances.[11,13] While "extreme circumstances" have been loosely defined as situations in which the disclosure will either benefit or prevent harm to an identifiable individual or the community, there is little concordance in how to interpret that in clinical genetics.[11] The clinical application of this discretionary ability varies by clinician, and many are conflicted by the ethical duty to protect their patient's confidentiality and their sense of moral justice for at-risk family

members.[5,59,61] Clinical judgements on these issues is often guided by court law where public policy and professional guidance is lacking. However, court law is also unclear. Two cases, *Safer v. Estate of Pack*[17] and *Pate v. Threlkel*[15] dealt with a plaintiff who felt the clinician should have given warning of the genetic condition their family members were being cared for.[15,17] The ruling on *Pate v. Threlkel* and on appeal of *Safer v. Pack* indicate that a clinician may have some measure of responsibility to the at-risk family members of their patients with genetic conditions, however the scope of this responsibility is unclear, especially if that information became available after the patient has passed away.

Costs may be incurred as a result of inconsistent access to the genetic information of relatives. A fundamental cause for the financial and personal burdens of genetic disease is a lack of knowledge. Several studies have been done on the financial gains attained by early detection of genetic conditions like Cystic Fibrosis on newborn screening and Hereditary Breast and Ovarian Cancer Syndrome.[62,63] However, for these savings to be utilized one must be aware of the genetic risks associated with these conditions. The diagnostic odyssey also weighs heavily on patients and their families.[64] While VUS reclassification will not address everyone who experiences these problems, a strong case can be made that informing family members when a genetic risk for disease exists can help numerous family members avoid the personal and financial costs of obtaining an independent diagnosis. Public health officials must then consider the role public health can play in alleviating these costs.

The familial nature of genetic information does not come to an end with the death of a patient. This phenomenon, where the medical information of a patient retains relevance to family members after the patient's death, is unique to genetic information. Not only does the genetic status of a patient have clinical implications for biological relatives, but the interpretation of a

genetic result may change after the patient's passing. As a result, a risk for genetic disease may not be appreciated until after the patient's death, when consent for disclosure to family members can no longer be obtained. While some avenues exist, which can allow family members to gain information about a deceased patient's genetic status, these pathways are insufficient to meet the needs of the public. For example, in PA, the executor of the deceased's estate is designated to receive medical records of the deceased.[19] However, if this person does not wish to learn of a genetic risk, or refuses to notify anyone else, the rest of the family would be blocked from learning of their own genetic risks for disease. Even with these complex issues at play, the issue is largely un-addressed by recognized organizational guidelines or public policy. Development of a unifying policy surrounding this issue will need to consider the interaction of a number of factors. To understand these issues, one should consider the current potential for VUS reclassification, clinical perspectives on best practices, patient opinions on disclosure after their passing, US legal precedence set by court rulings in similar situations, international approaches to the same problem, and the proposed solution's ability to solve the problem.

### 5.2.1 VUS PREVALENCE AND RECLASSIFICATION POTENTIAL

Of primary concern for the establishment of clinical guidelines is the need for such guidelines. The reclassification of a VUS after the patient has passed away is not something that occurs regularly in most genetic practices, however it may happen more often than initially realized. This study revealed that 24% of respondents reported receiving a VUS reclassification notice after the patient had passed away. This issue is expected to compound as genetic testing in clinical practice becomes standard of care in more medical specialties. Already, such testing is used regularly in oncology, obstetrics, pediatrics, cardiology, neurology, and many other fields.

The advent of whole exome and whole genome sequencing vastly increases the number of VUS results identified in a patient. These broad testing modalities examine either the entire genome or the entire exome for genetic abnormalities in an effort to diagnose a cause for the patient's phenotype. The large amount of DNA analyzed by these studies results in the high probability of a VUS finding. As a general rule-of-thumb, the chance of identifying a VUS result is about 1% per gene tested.[42,43]

Two genes known to be associated with hereditary breast and ovarian cancer syndrome are BRCA1 and BRCA2. These genes are well characterized genetically and have been studied extensively over many years. Review of the data publicly available in Clinvar (accessed 2/28/18) outlined in Table 1, revealed that 42% (6689/15849) of the variants reported to Clinvar for these two genes were classified as a VUS, BRCA2 had a VUS burden of 46% (4231/9209) of reported variants. Another gene with a long testing history is TP53, arguably one of the most studied genes in clinical oncology, which still has a VUS burden of 43% (533/1247).[65] The numbers from these select genes in just one specialty area that uses genetic testing demonstrates the potential clinical impact reclassification of already identified variants of uncertain significance will have in the future. As genetic testing is utilized clinically with increasing regularity, not only will the existing VUS burden increase, but we may also see the ability to reclassify them improve. In genetics, information is obtained in numbers, and with more tests being run, we will be able to identify more of these VUS results in more patients, eventually leading to reclassification. VUS reclassification can take many years though and many people with genetic conditions are quite ill. Some patients will not survive long enough to see the variant they were identified with get reclassified. Without appropriate guidelines, the process of disseminating reclassified VUS results to family members of deceased patients remains arbitrary, arduous, and contentious.

### 5.2.2 CURRENT CLINICAL PRACTICES

This study asked members of the National Society of Genetic Counselors for their opinions on the need for, and expected utilization of, guidance for the release of reclassified VUS results to the family members of a deceased patient. While 24% (45/191) indicated they have received reclassification notifications in the past, the practice of disclosing to family members of the deceased was inconsistent. Respondents reported on how often they attempted contact, 55% (23/42) indicated they always attempt to contact the family members of a deceased patient when they receive a reclassified VUS notice for a deceased patient, 31% (13/42) reported usually attempting contact, 7% (3/42) usually did not attempt contact, and 7% (3/42) never attempted to contact family members. There was further variation based on the reclassification of the VUS. In the current study, disclosure of a VUS reclassified to benign was less supported, but still always attempted by 48% (20/42) of respondents. These numbers show support for and varied practice of disclosing reclassified VUS results to relatives.

The understanding of current guidance was assessed as part of this study as well. When asked if they knew of a policy within their current organization regarding the release of reclassified VUS results to family members of a deceased patient, 49% (75/154) did not know if one existed or not and 39% (60/154) reported no organizational policy in place. Of respondents, 95% (146/154) reported no knowledge of state or local laws guiding the postmortem disclosure of reclassified VUS results to family members. Of those who were aware of state or local laws on this subject, 57% (4/7) were “somewhat confident” in their ability to apply the law in practice. The majority of respondents (71%, 109/154) indicated they were in favor of a legal mechanism to allow the release of reclassified VUS results to family members of the deceased patient, and 97% (150/154) indicated the release of this information was important enough to pursue if legal

pathways were in place to allow it. The support shown for unifying policy around this issue is significant, among genetic counselors who responded to this survey.

There is an ethical question about the disclosure of sensitive information, such as genetic information, without consent. The current study asked respondents about these concerns. Of the recorded responses (n=154), 34% indicated they felt no ethical need for consent of the patient in order to disclose their genetic information to relatives who may be impacted by the results. 48% (74/154) do not believe there should be a legal requirement for consent of these deceased patients for disclosure to family members. While this study was the first to ask specifically about the situation of VUS reclassification after the patient's death, other studies have assessed opinions on familial genetic disclosure in genetic counselors,[9] medical geneticists,[16] and research settings.[66]

### 5.2.3 PATIENT PERSPECTIVE

A study done in Seattle surveyed patients being evaluated for hereditary colorectal cancer or polyps to describe their opinions on who, if anyone, should receive their exome results after their death.[14] This study showed support for familial disclosure after death. A substantial majority (92%) of respondents designated a person to receive their genomic results in the event of their death. Researchers also noted that most participants were able to make their decision without hesitation; however, some participants struggled with who should be designated. These participants reported difficulty with issues such as if the designee was at risk for the same condition and if they would be likely to share the results with the rest of the family. Of those who designated someone, 65% designated a spouse, while the remaining 35% designated a blood relative, and none of the participants designated someone outside the family. These findings give public validity to the familial nature of genetic information and highlight the importance of communicating these risks

among family members. The family members in this study recognized the implications of their genetic information for their family members and, overwhelmingly, were willing to take steps to ensure the information would be passed on in the event of their death.

As a matter of policy development, we must also consider the reasoning for those who refused to designate someone to receive their genetic results in the event of their death. The most common reason for not designating a recipient for genetic testing was that they had no relationships such as spouses, children, or living parents.[14] Though less common, some participants did decline to disclose results to living relatives. These findings point to an underlying lack of relevant connections at the time of decision making for the majority of those who declined disclosure. While these patients may have understood the importance of genetic information in family settings, they lacked the immediate relationships which would make genetic information relevant at that time. Outright refusals such as these though, were rare.[8]

### 5.2.4 INTERNATIONAL APPROACHES

A policy which allows family members of a deceased patient access to their genetic information after death has important legal implications. Few governments have directly addressed the familial nature of genetic information, fewer still have grappled with its disclosure after the patient's death. Australian national law identifies the situation in which an organization may disclose the genetic information of a patient.[26] Such disclosure is permitted if the genetic information was obtained through a health service provided to the patient, disclosure is believed necessary to prevent or lessen harm to a genetic relative of the patient, and disclosure follows approved guidelines and is given to a genetic relative of the patient.[26] However, these laws have not gone without criticism, primarily for undermining doctor-patient confidentiality and trust.[27]

In the United Kingdom, no unifying law was found, but legal rulings largely protect patient confidentiality.[24,51] Recent court rulings suggest legal trends may be shifting to a more familial view of genetic information.[24] Recent cases and appeals leave room for some extension of the duty of care to relatives of patients with genetic conditions.[25] The case of *ABC v. St. George's Healthcare NHS Trust* (2015) was filed claiming negligence for the physician's failure to inform the claimant of her father's diagnosis of Huntington's Disease, a genetic neurological condition. The case was initially dismissed, stating the clinician held no duty of care to the claimant. However, an appeal of the case, in 2017, found that it may be reasonable to extend a duty of care to relatives of a patient with a genetic disease. The appeals ruling meant that the case could be argued in court, where a final ruling will be determined. This case follows legal views in the US, and *Safer v. Pack* was used as a consideration for the appeals ruling, demonstrating how US and UK laws are progressing in similar directions.

French law employed a third-party disclosure system in 2004 which allowed the French Medical Biology Agency to disclose genetic risks to family members even without the consent of the patient.[28] The policy was not published though and was not utilized. In 2011 the law was revised and gave patients a choice between direct and indirect disclosure. Under the new law patients have three options, they can choose to inform family members themselves, allow a physician to do it for them, or refuse to disclose their genetic status to their family members. The 2011 revision removes the third-party involvement, which proved cumbersome for physicians and patients to manage and adds the third option of non-disclosure. This law is similar to current practices in the US where patients have these options, and some genetic counselors will provide family letters to inform relatives of the patient's condition. Many of these international practices stem from the same principles applied in slightly different ways.

The main consideration in these international laws is the familial nature of genetic conditions, and the risk to family members when a genetic disease is identified in the family. In the U.S., the Health Insurance Portability and Accountability Act (HIPAA) protects the private medical information of patients seen by healthcare providers. However, there are limits to this protection, and if the purpose of disclosure is to prevent serious and imminent threat to health or safety, disclosure without consent may be permitted.[10] Additionally, the official HIPAA website indicates that the law also permits disclosure between physicians, even for the care of a family member.[10] These practices are limited though, and most clinicians err on the side of patient confidentiality.[6,9,16]

### 5.2.5 LEGAL PRECIDENCE

In the United States, post mortem access to genetic information has not been dealt with directly, instead the access to medical records has taken its place in most legal considerations. However, the familial nature of genetic risk has reached the courts. Two cases are primary in the debate of a physician's responsibilities to family members of patients with genetic disease. The case of *Safer v. Pack* was filed against a doctor who failed to notify his patient's family members of the hereditary colon cancer he was being treated for.[17] This case was initially dismissed, as the court ruled the doctor had no working relationship with the plaintiff, and thus no obligation to notify them of the genetic nature of the disease. However, on appeal the ruling was overturned on the grounds that the harm caused by such genetic conditions may be avoided with proper screening and/or treatment options available to persons with genetic conditions.[17] The appeals ruling only overturned the dismissal of the case, and judgement of fault for Dr. Pack was not addressed in the appeals ruling.

Also cited in the appeal ruling of *Safer v. Pack* was the similar case of *Pate v. Threlkel*, which was filed in Florida (1995) the year before *Safer v. Pack* filed in New Jersey (1996). Heidi Pate filed a complaint against her mother's physician, Dr. Threlkel. Pate was recently diagnosed with medullary thyroid cancer, an affliction which her mother was treated for a few years earlier. Pate claimed that Dr. Threlkel failed to warn her mother that medullary thyroid cancer may be passed on genetically, and her children were at risk. Pate claimed that her disease was a direct result of this failure. Similar to *Safer v. Pack*, the case was dismissed on the grounds that medical malpractice cannot be claimed without the existence of a patient-physician relationship between Dr. Threlkel and Pate. On appeal of the dismissal, the Florida Supreme Court found that a duty to warn could be extended to identifiable parties, but disclosure to these parties by the physician was not required and a physician's duty could be fulfilled by informing the patient of the implications of genetic disease to family members.[15] These cases demonstrate the shifting legal recognition of genetic implications for family members of those with genetic disease.

### 5.2.6 ETHICAL ISSUES

Ethics surrounding the disclosure of genetic information to family members has been discussed for some time.[5–7] Previous studies have debated a clinician's duty to warn at-risk family members and detailed the conflict between this perceived moral obligation and current clinical practices which promote patient confidentiality even in death.[8,9] The ethical considerations of public policy and public health think of these issues in a different context.

A paper published by Thomas, Sage, Dillenberg, and Guillory proposed twelve principles of the ethical practice of public health.[67] These principles promote the development of public policy, which addresses the fundamental cause of threats to public health in an informed and conscientious way and protects the cultural, spiritual, and personal beliefs of the public.[67] The problem of inconsistent disclosure of reclassified VUS results of deceased patients to family members is a problem fitting with these principles, and worthy of resolution. Of particular interest in this issue are two principles proposed by Thomas et al. that the current study applies to. First is the call for Public health to seek information needed to implement effective policies. The current study seeks to understand the situation of disclosure of reclassified VUS results of a deceased patient to inform policy development. The second is the principle calling for collaboration to improve effectiveness. The current study is a collaboration of public health and clinical genetics to work collectively to understand and address the issue of disclosure of reclassified VUS results for a deceased patient to family members.

There are also two principals which might conflict with the aims of this study. First is the principle calling for policy which respects the rights of individuals in the community. While the aims of this study do not directly conflict with this principle, the execution of policy may circumvent the patient's right to confidentiality, even in death. The second principle which might conflict with this study's aims emphasizes the protection of individuals confidentiality of information which may cause harm if made public may also conflict with the current study. If genetic information is made public, there may be repercussions.[10] However, the patient's genetic information may not need to be made "public" in the broad sense, but disclosed to select individuals as needed for their own medical care. Additionally, the principle recognizes that there may be exceptions to maintaining

confidentiality if there is a high possibility of others being harmed by not disclosing information.

Current policy may often lead to a conflict between a clinician's duty to protect the confidentiality of their patient and moral desire to prevent harm to family members who may benefit from information about genetic risks for disease. Furthermore, policies can differ by state, leading to disparate access to this important information. While some policies may allow the genetic information of a patient to inform the care of a relative[10], these policies are widely unutilized, and require a conscientious and well informed family member with knowledge of genetic information in the deceased patient and an understanding of the ability to request it be sent to their own physician or themselves if they have legal authority to receive it. Public health officials have the ability to create unifying policy which would allow this information to be shared among family members for the benefit of their own health and simultaneously prevent undue financial and personal burdens on the public. By establishing policy, public health officials can reconcile the legal and ethical conflicts in current practices, streamlining the dissemination of genetic information to family members who desire it so that they are able to manage their own healthcare. This speaks to a core goal of public health, to develop policy which supports individual and communal health.

## 5.3 POSSIBLE SOLUTIONS

Solutions to the dilemma of genetic information disclosure for deceased patients have been proposed. The active and passive models for postmortem disclosure of genetic information to biological relatives of the deceased are the primary models used in available literature.[61] Active

disclosure places the clinician in a position to seek out and notify relatives of the deceased about genetic risk factors for disease. A passive system of disclosure would allow clinicians to disclose genetic information for their deceased patient to a biological relative who is requesting it explicitly. These solutions offer a system that would allow the biological relatives of a deceased patient a method for obtaining information about their own genetic risks. The following will analyze the feasibility of the active and passive models in comparison with no action. Each option will be compared by the five steps to public health policy evaluation as described by Lawrence Gostin (2000). Gostin describes five key steps, outlined in table 4, which must be demonstrated by health authorities to establish a need for public health policy. Step one, establishing a risk is simply described as an inconsistent access to information, in this case reclassified VUS for a deceased patient, is suspected to lead to an unnecessary diagnostic odyssey and stress for family members. Steps two through five, will be applied to each intervention option in turn as follows.

**Table 6 FIVE KEY STEPS TO PUBLIC HEALTH REGULATION EVALUATION**

| | Key Step | Description |
|---|---|---|
| **1** | **Determine Risk** | Define the type of risk, onset and duration, likelihood of harm, and severity of harm |
| **2** | **Effectiveness of the Intervention or Policy** | Assess the ability of the intervention to address the risk of harm |
| **3** | **Economic Cost** | Determine the estimated economic burden of implementation, regulation, and maintenance of the intervention |
| **4** | **Personal Burden** | Analyze the duration, frequency, and scope of the intervention |
| **5** | **Fairness** | Ensure benefits of the intervention attained based on need, and costs/burdens based on risk |

**Adapted from Gostin (2000)**

### 5.3.1 ACTIVE DISCLOSURE

The active disclosure system is one which uses clinicians to notify at-risk family members. For example, should the clinician receive a VUS reclassification notice for a deceased patient, they would then be responsible to directly contact family members of the deceased who would benefit clinically from knowledge of the reclassified VUS information. In this survey of genetic counselors, 39 of 42 respondents (93%) reported attempting to contact the family members of a patient when a VUS reclassification notice was received for a deceased patient at least once.

#### 5.3.1.1 EFFECTIVNESS OF THE INTERVENTION

Because the active disclosure approach would entail direct clinician-family member communication to alert the family members of genetic risks identified in the family, this option is best suited to ensure the information is communicated to at-risk family members. The active disclosure system would allow clinicians to actively seek biological relatives of the deceased patient and explore the potential risks with each family member. There are limitations to this system in this regard. The thorough notification of family members would depend on the clinician's ability to identify them. Such identification may be arduous, unless contact information is directly provided by the patient. Additionally, many aspects of this process would need to be clarified.

The issues which must be taken under consideration in a system that would ask for an active involvement of clinicians are extensive. Because clinicians would be the responsible party, there must be clear instructions on various practical matters surrounding an active disclosure system. The scope of family members to be notified is one such issue. Due to the nature of an

active system, one may conclude clinicians would be responsible for all family notifications, a task which is quite daunting, but would need clear boundaries on the degree of relationship that warranted disclosure, as well as the semantics of the contact itself. Specifications on when, how often, and in what manner each family member is to be contacted must be determined, as well as when it could be determined a family member is unreachable, and attempts can be ceased. All of this is secondary to the identification of the family members. From a clinical perspective, the identification of family members can be quite simple in some cases. At times family members may accompany their relative to appointments and be known to the clinician. However, most relatives will not be known to the clinician in this way. The identification of additional family members would depend greatly on the information available to clinicians, additional systems may be required to ensure clinicians are able to identify and contact as many family members as possible. The time and resources it would take for clinicians to identify a patient's living relatives without their assistance would likely be prohibitive, but another option may reduce this burden. An active system in which clinicians are responsible for notifying only one relative of the deceased may also be considered. This would have the benefit of an active disclosure system, without placing as much of a burden on clinicians. In this system, clinicians need only contact one living relative of the deceased to convey the information, and that family member would then be charged with notify the rest of the family. The identification of this individual may be integrated into current medical records systems. For example, the patient, while still alive, may be able to identify their emergency contact, next of kin, or spouse as the person to receive this information. Such individuals may already be documented in the patient's record, making their identification after the patient's death easier.

#### 5.3.1.2 ECONOMIC COSTS

Economic costs of this plan could be impacted by a number of factors. Costs may be incurred to modify the electronic medical record system to allow for the identification of family members of a patient, and track disclosures. More diffuse costs may be incurred by the displacement of patient care as clinicians would be required to spend more time identifying and contacting relatives of a deceased patient. It is unclear how great this time requirement would be, but it has been postulated that it may interfere with clinician's primary function, to see patients clinically.[61] Even if these tasks are not handled directly by clinicians, and instead use clerical staff, the cost of such staff may be passed on to patients. Clinicians would also be open to additional liability as part of the responsibility to contact family members and disclose risks. Should they fail to reach or identify a relative of the deceased, they may be subject to legal action for failing to fulfill their assigned duty to warn these family members of the potential risk for disease. Cost to patients themselves would be non-existent as they are deceased. Costs to the family members may be incurred as the knowledge of a family member's genetic disease may spur action in the family member to determine their own risks through clinical or genetic evaluation.

#### 5.3.1.3 PERSONAL BURDEN

Personal burdens related to an active disclosure system would impact a number of stakeholders. Clinicians will be impacted with additional responsibilities, which may detract from their primary role of patient care. Patients may suffer infringements on personal liberties, if disclosure is made without explicit consent. Since the interpretation of genetic information may change over time, and an understanding of a genetic risk for disease may not be known until after the patient has passed away, there may be no documentation of the patient's wishes regarding disclosure, either affirmative or negative. In the absence of clear patient

wishes, clinicians may err on the side of disclosure if such responsibility is placed on them. If the patient passes away without expressly communicating their desire for disclosure or non-disclosure to their clinician, the provider can only make the decision based on their own understanding of the situation, which may oppose an unexpressed opinion of the patient.

Lastly, family members will not be able to exercise their right not to know. The very act of contacting a family member and posing the question of their desire to know if a genetic risk exists would inform them that such a risk does exist, which required the question to be posed. Family members would thus have no way to avoid knowing of a genetic risk to their health even if they would have preferred to remain un-informed.[6]

#### 5.3.1.4 COST/BENEFIT DISTRIBUTION

It is essential that any public health intervention seeks to fairly distribute costs and benefits. To this end, the active disclosure system has some challenges. The burden of contacting family members would impact clinicians directly. However, this impact may be felt by those served by clinicians as well. A cascade effect could result as clinicians are asked to spend more of their time identifying and contacting these at-risk family members. This activity displaces clinical patients. Taking clinicians away from clinic time would exacerbate this problem, resulting in longer wait times for clinical visits. Clinical visit fees may also increase. Clinicians cannot currently bill for time spent contacting family members and may need to adjust their fees to compensate for this unbilled work. Additionally, if clerical staff was used to locate the family members of deceased patients, these duties would likely still impact clinical care as either additional costs associated with staffing these positions, or clerical resources being diverted

from clinical patients. These changes to clinical care would place burden on the general public, where ideally those directly impacted would bear the burden of cost instead.

It is also important to consider the personal benefits and costs of an intervention. In the case of active disclosure, one can determine the benefit to be notification of an at-risk relative in whom the information will alter medical care based on known genetic risk factors in the family. This goal can be broken down on a few points to determine the fair application of benefits. First, an active disclosure system holds the potential to notify those who will use the information, but it may also inform those with no desire to be informed. Inadvertent disclosure is unavoidable in an active disclosure system where prior consent to inform was not obtained. As discussed earlier, the very act of questioning a family member's desire for information on genetic risks for disease indicates a genetic risk exists and cannot be avoided unless discussed well in advance of the triggering event, VUS reclassification. In this scenario, the burden of information is un-fairly distributed to all family members, not just those with a desire for it. A second personal burden to consider is that of the patient. Postmortem disclosure may conflict with the patient's wishes for privacy. If a genetic risk is deemed important enough to disclose post-mortem, it may also be important enough to disclose without explicit consent of the patient. While this issue is one that would need to be addressed in policy setting discussions, it is important to consider.

### 5.3.2 PASSIVE DISCLOSURE

A passive disclosure system puts the onus of contact on the family members of the deceased.[61] Under this type of policy, a family member would need to know of a genetic risk factor and know the clinician who cared for their relative in order to contact them and request information about any genetic risk factors that may have been elucidated during that

provider-patient relationship. This system has some advantages over an active system, but also some disadvantages.

#### 5.3.2.1 EFFECTIVNESS OF THE INTERVENTION

Of primary concern in a passive disclosure system is the ability to notify relatives of the deceased who may find genetic information useful and desirable. The effectiveness of this strategy depends on the existing communication networks in the patient's family. A family with good communication may have no problem disseminating the physician's contact information to anyone who needs it, allowing for those with a desire to learn about familial genetic information the ability to do so. However, families that are not in regular contact would lack the communication infrastructure to make this information available. Furthermore, the reclassified VUS information may never be learned by the family unless someone within the family is regularly checking in to determine the status of a VUS because reclassification can sometimes take years to occur.

#### 5.3.2.2 ECONOMIC COSTS

Due to the passive nature of this system, the economic impact would be minimal. There may still be costs incurred for modification of the EMR to facilitate the process, and clinicians will be required to discuss the information with family members who actively seek it. However, the overall impact of these factors is expected to be lower than that of the active system. Unaware family members may incur costs as they pursue their own diagnostic journey to ultimately identify a genetic disease which would have been easily identified had they known the disease was previously identified in a family member.

#### 5.3.2.3 PERSONAL BURDEN

Personal liberties would remain largely intact under a passive disclosure system. The family member's right not to know would remain intact if they did not actively seek the information from a clinician. The possibility for inadvertent disclosure would still exist within a family, from one family member to another, but this is the same in an active disclosure system and in the current system. The privacy of the patient may still be violated in this system, as the information may still be disclosed without or against the patient's wishes, but this too is the same as in an active system except that the extent of disclosure, defined as the number of people informed, may be lower in a passive system. The burden on clinicians may be reduced under a passive system because clinicians and/or their clerical staff would not have to invest time in identifying and contacting relatives of the deceased patient. This study found 24% of participants who had encountered this situation (23/42) attempted actively contacting family members, but under a passive system these clinicians would not have done so.

#### 5.3.2.4 COST/BENEFIT DISTRIBUTION

Distribution of the burdens of a passive system may be more appropriate than an active system. Under a passive disclosure system, a clinician would still be responsible for discussing genetic information with family members of the deceased patient, however this would be done as requested only, and the time burden would not be to the extent of an active system. The burden of information is also appropriately distributed. Under a passive system, only the family members with a desire to know would receive the information. There is a discrepancy where family members with a desire to know may not be aware the information exists or who to contact to receive it, and this is a primary drawback to the passive system.

### 5.3.3 NO POLICY MODIFICATION

A final option is to continue without modification of public policy. Currently, there is little guidance for clinicians to follow when considering the postmortem disclosure of a reclassified VUS result in a deceased patient. The result is inconsistent practices of disclosure, as indicated by this study, and incongruent levels of public health service in this area.

#### 5.3.3.1 EFFECTIVNESS OF THE INTERVENTION

Under HIPPA law, clinicians are able to disclose the private medical information of a deceased patient, including genetic information, in three scenarios: by breaching HIPAA when risks to identifiable individuals may be prevented by disclosure, when requested by the person with legal authority to receive protected health information of the deceased, or when a surviving relative requests the decedent's physician send relevant results to the relative's physician. The present study identified an inconsistency in this potentially important clinical information reaching those with a clinical need to know. In the data collected, 74% of participants reported always attempting to contact a family member when the VUS was reclassified to a pathogenic status, but only 48% reported attempting contact when the VUS was reclassified to a benign variant. This shows that in this population there is a difference in recontacting based solely on the new classification status, where both classifications are clinically relevant. A majority of participants (77%) reported they were not aware of a way to identify the person with legal authority to receive the reclassified information in the current system. This lack of understanding leads to a large number of practicing clinicians without the ability to identify those who may have the legal ability to receive the genetic information of a deceased patient.

#### 5.3.3.2 ECONOMIC COSTS

The economic burden of the status quo is hard to assess. When a VUS is reclassified to a pathogenic variant, there may be options available to those who carry it. Identification of a pathogenic variant that predisposes to cancer may result in changes to cancer screening modalities and frequency, treatment options, and surgical interventions. Without knowledge of that genetic predisposition, the costs incurred may be measured in lives lost due to misdiagnosis or undiagnosed disease, dollars spent on treatment of avoidable symptoms, and unnecessary diagnostic testing which could have been avoided with knowledge of a familial genetic factor. It is important to note that these costs would exist in any patient who remains unaware of familial genetic risk factors. However, the percentage of these individuals is considered greater under the current practices when compared to both the active and passive disclosure models.

#### 5.3.3.3 PRESONAL BURDEN

Personal liberties under the current system are the least impacted. Under the current system, clinicians may decide to notify at risk family members if a genetic risk for disease exists. However, clinicians attempt to honor the patient's wishes in most cases where they have been expressed.[11,13] Likewise, a family member's right not to know is also intact because very little information is communicated to families unless done so by the patient directly or at their request during life. The current study found that 54% of genetic counselors who received a reclassified VUS result for a deceased patient consistently sought relatives of the deceased to notify.

#### 5.3.3.4 COST/BENEFIT DISTRIBUTION

The burden of information currently rests with clinicians who receive these VUS reclassifications for a deceased patient. Under the current system, clinicians may release this information in limited

circumstances. Some states allow the person responsible for the estate of the deceased to receive medical information,[19] other states may not have this provision, and clinicians are left to decide if the risk to health warrants a breaching HIPAA confidentiality and risking legal exposure. While genetic information is largely considered familial in nature, it is often treated as medical information, which is governed by federal and state laws that greatly restrict those with access to it.[10] It has been well established that many clinicians feel a desire to inform at-risk family members of a genetic risk to health, but these clinicians feel restrained by privacy laws restricting access to protected health information.[5,8,9] An injustice for the uninformed family members of a deceased patient also exists. These family members may be at risk for genetic disease, which may be mitigated by taking steps to modify medical care as indicated by a genetic predisposition. Family members can also benefit from the reclassification of a VUS to benign as well, since some people find an unknown result to be stressful, and reclassification has the potential to alleviate that stress if the variant is found to be benign in nature.[68]

### 5.3.4 SUMMARY OF OPTIONS

The options presented here represent some core ideas for addressing the need for a unified policy to guide disclosure of genetic information to relevant family members of deceased patients. An active disclosure system has the potential to notify the largest number of at risk relatives but may do so at great expense to personal liberties and economic impact. Considerations for the scope of family members to be notified in this system would be critical to its viability. The degree of relation that would warrant active disclosure would determine the extent to which clinicians would need to identify family members. The ability of clinicians to contact a familial “point-person” in

leu of individual contact may also impact this system but may share some of the limitations of current policies.

A passive system would reach fewer at risk family members, but at a much lower personal and economic burden. Since a passive system places the responsibility of contact on family members, the success of this system would rely on education initiatives to ensure families are aware of the option to request genetic information of a deceased patient. However, even with aggressive public education of policy options, family members may remain unaware of any genetic testing conducted within the family, which makes this option ultimately less effective than an active system.

The current system is not capable of adequately reaching at risk family members and the personal and economic burden then rests with these uninformed relatives of the deceased. Further consideration should also be given to the scope of genetic information to be disclosed, the extent of genetic relation which would qualify for disclosure, and the system surrounding disclosure, though these issues are outside the scope of this analysis. Effectiveness of these strategies would depend on the current practices and policies in each state and/or institution. Determining if a strategy is an improvement over current practices would need to be done on multiple levels and policy development by federal, state, and professional organizations carry implications which must be considered.

Many organizations hold the power to establish policy, and each one can address this issue. However, some policy makers may be more suited to initiate policy on this issue than others. Federal lawmakers can initiate policy which would have good legal backing for clinicians and family members. A policy established at the federal level would be supported nationwide, reducing the opportunity to question its interpretation from one state to another. However, federal

law takes time to enact and to modify, and this limitation makes a federal policy inefficient as a forum to introduce policy on this rapidly evolving issue. However, it should be noted that federal laws can be modified by more restrictive state laws, which may enable a federal policy to remain flexible.

State law allows more localized control of the details of the law, at the expense of inconsistent nationwide policy. State policy, like federal policy, can take time to enact and modify but this limitation is not as significant as a federal policy. State policy would provide legal backing for clinicians as well. However, because each state would be able to establish their own policy, or none at all, the legality of practices based on a state policy may be more subject to legal challenges than in a federal policy. This national variability would also make access to the results dependent on the state where the deceased resided, potentially causing confusion if the family member resides in a state with different policy limitations.

Lastly, a practice guideline from professional organizations related to clinical genetics would provide guidance for providers, as well as some legal footing. However, while professional guidelines are considered in court rulings, they are often more vague and susceptible to interpretation than federal or state policies. A benefit of a practice guideline is that it may be adaptable to changing information and consensus opinions. This adaptability, and the fact that practice guidelines are not as concrete as laws but may spur the development of state and federal laws, make a practice guideline an ideal way to introduce new policy to support the disclosure of reclassified VUS results to family members for which they are clinically relevant.

## 5.4 CONCLUSION

An issue exists which has not been adequately addressed in existing policy. Genetic information is familial in nature, and yet is legally guarded from those with a clinical need to know after a patient has passed away. Genetic information is also constantly changing, and new information may become available many years after a genetic test is completed. These two aspects make genetic information fundamentally different from most medical information contained in patient medical records, and these characteristics need to be considered when developing policy around disclosure of genetic information to family members after a patient's death. This analysis has presented three possible strategies to address this gap in policy. The active and passive disclosure systems each have potential when compared to maintaining the current policies addressing this issue. However, a one-sided approach is not likely to fully meet the public need. Policy makers are urged to consider the many complexities outlined here and elsewhere. In order to allow family members access to genetic information of biological relatives to aid in their own medical care, a careful balance of the interests described here must be struck. The attached documents are designed to be a concise overview of the information presented and an assessment of possible solutions. Appendix F is a policy flyer which may be useful for educational initiatives. Appendix G is a policy brief designed to be a concise summary of the issues discussed here and potential steps that policy makers may take to address some of these issues. Both documents can be used by individuals interested in moving policy forward in this area as a starting point for quickly understanding the issues involved and developing appropriate talking points for discussion of this issue with policy makers at any level.

# APPENDIX A: UNIVERSITY OF PITTSBURGH IRB APPROVAL LETTER



**University of Pittsburgh**
***Institutional Review Board***

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu

**Memorandum**

To: Phuong Mai
From: IRB Office
Date: 10/26/2017
IRB#: PRO17050518
Subject: Disclosure of Reclassified VUS Results in Deceased Patients: Current Practices

---

The above-referenced project has been reviewed by the Institutional Review Board. Based on the information provided, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section

45 CFR 46.101(b)(2)

Please note the following information:

- Investigators should consult with the IRB whenever questions arise about whether planned changes to an exempt study might alter the exempt status. Use the "**Send Comments to IRB Staff**" link displayed on study workspace to request a review to ensure it continues to meet the exempt category.
- It is important to close your study when finished by using the "**Study Completed**" link displayed on the study workspace.
- Exempt studies will be archived after 3 years unless you choose to extend the study. If your study is archived, you can continue conducting research activities as the IRB has made the determination that your project met one of the required exempt categories. The only caveat is that no changes can be made to the application. If a change is needed, you will need to submit a NEW Exempt application.

**Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.**

## APPENDIX B: DISCLOSURE OF VUS RECLASSIFICATION IN DECEASED PATIENTS

Start of Block: Consent

Q1

**The purpose of this study is to identify current clinical practices and opinions regarding the disclosure of reclassified variant of uncertain significance (VUS) results to family members of a deceased patient for whom those results are relevant. In addition, we hope to better understand genetics providers' opinions regarding the salient issues to consider during policy development surrounding this issue.**

End of Block: Consent

Start of Block: Current Practice

Q2 **For the purposes of this study please consider all "pathogenic" variants to be actionable and relevant to the clinical management for relatives of the deceased.**

Q3 Are you currently responsible for receiving VUS reclassification notices?

O Yes (1)

O No (2)

O I'm not sure (3)

---

Q4 Have you ever received a VUS reclassification for a deceased patient?

O Yes (1)

O No (2)

O I'm not sure (3)

*Skip To: End of Block If Have you ever received a VUS reclassification for a deceased patient? = No*

*Skip To: End of Block If Have you ever received a VUS reclassification for a deceased patient? = I'm not sure*

---

Q5 In your practice, when you previously received a VUS reclassification for a deceased patient, how often did you attempt to notify surviving relatives of the update regardless of how it is reclassified?

- O Always Attempt (1)
- O Usually Attempt (2)
- O Usually Not Attempt (3)
- O Never Attempt (4)

---

Q6 In your practice, when you previously received a VUS reclassification for a deceased patient, how often did you attempt to notify surviving relatives of the update if the VUS was reclassified as **benign**?

- O Always Attempt (1)
- O Usually Attempt (2)
- O Usually Not Attempt (3)
- O Never Attempt (4)
- O I have not received a VUS reclassified as benign in a deceased patient (5)

---

Q7 In your practice, when you previously received a VUS reclassification for a deceased patient, how often did you attempt to notify surviving relatives of the update if the VUS is reclassified as **pathogenic**?

- O Always Attempt (1)
- O Usually Attempt (2)
- O Usually Not Attempt (3)
- O Never Attempt (4)
- O I have not received a VUS reclassified as pathogenic in a deceased patient (5)

---

Q8 Do you currently ask your patients if they want their relatives to be notified if a VUS reclassification occurs after they have passed away?

- O Yes (1)
- O No (2)
- O Sometimes (3)

---

*Display This Question:*

*If Do you currently ask your patients if they want their relatives to be notified if a VUS reclassif... = Sometimes*

Q10 Which of the following situations best describes when you currently discuss the release of VUS reclassification information with a patient in the event of their passing?

O When a VUS is identified in a patient who is not expected to live more than a few years (1)

O When a VUS is identified in any patient (3)

O When the patient consents to undergo genetic testing (4)

O At all initial visits (2)

O Other: (6) _____

End of Block: Current Practice

Start of Block: Opinion

*Display This Question:*

*If Have you ever received a VUS reclassification for a deceased patient? = Yes*

Q11 **The following questions ask about factors you take into consideration when deciding to release the VUS reclassification information of a deceased patient to his/her relatives in your current practice.**

*Display This Question:*

*If Have you ever received a VUS reclassification for a deceased patient? = No*

Q12 **The following questions ask about factors you would take into consideration when deciding to release the VUS reclassification information of a deceased patient to his/her relatives in theory.**

---

*Display This Question:*

*If Have you ever received a VUS reclassification for a deceased patient? = I'm not sure*

Q13 **The following questions ask about factors you would take into consideration when deciding to release the VUS reclassification information of a deceased patient to his/her relatives in theory.**

---

Q14 Please indicate the importance of each factor when considering the release of a deceased patient's VUS reclassification information to relatives.

| | Not important (1) | Somewhat important (2) | Moderately important (3) | Extremely important (4) |
|---|---|---|---|---|
| The impact VUS reclassification will have on relatives of the deceased (1) | O | O | O | O |
| Deceased patient's right to confidentiality (2) | O | O | O | O |
| Deceased patient's wishes, when known (3) | O | O | O | O |
| Your duty to warn at-risk relatives (5) | O | O | O | O |
| Effectiveness of available treatments (6) | O | O | O | O |
| Severity of the condition (7) | O | O | O | O |
| Other: (8) | O | O | O | O |

Q15 In which of the following scenarios would you consider contacting relatives of a deceased patient to disclose VUS reclassification results. **(Check all that apply)**

| | VUS Reclassified as Benign (1) | VUS Reclassified as Pathogenic (2) |
|---|---|---|
| When the patient's aversion to disclosure has been expressed (1) | ☐ | ☐ |
| When the patient's desire to disclose has been expressed (2) | ☐ | ☐ |
| When the patient's preference has not been expressed (3) | ☐ | ☐ |

Q16 Are you aware of any processes that allow you to identify the executor of a deceased patient's estate or person with legal authority to receive genetic records for the deceased.

O Yes (1)

O No (2)

---

Q17 In the organization where you practice, is there a policy in place regarding the release of VUS reclassification information to the relatives of a deceased patient?

O Yes (1)

O No (2)

O I don't know (3)

---

Q18 **These next questions ask about your opinions on the disclosure of VUS reclassification information of deceased patients to his/her relatives.**

---

Q19 In Pennsylvania, genetic information is classified as medical information in regard to who has access to it after the patient has passed away. In your opinion, does genetic information warrant separate legal classification from medical information in this context?

- O Definitely Does (1)
- O Probably Does (2)
- O Probably Does Not (4)
- O Definitely Does Not (5)

---

Q20 Should there be a legal mechanism to allow the release of VUS reclassification information of a deceased patient to his/her relatives which is independent of current medical information policies.

- O Definitely yes (1)
- O Probably yes (2)
- O Probably not (4)
- O Definitely not (5)

---

Q21 In your opinion, is the release of VUS reclassification information to relatives of the deceased patient important enough to pursue if legal policies were in place which made it possible?

O Definitely is (1)

O Probably is (2)

O Probably is not (4)

O Definitely is not (5)

---

Q22 In which of the following specialties do you feel it would be useful to have a conversation with the patient about the release of their VUS reclassification information in the event of their passing **(check all that apply)**.

☐ Cancer (1)

☐ Specialty Clinics (ex. cardiac, skeletal dysplasia, connective tissue, etc.) (4)

☐ Neurogenetics (5)

☐ Adult Clinics (6)

☐ Other genetic specialties that do not fit into any of the above: (8)
_____

---

Q23 Are you aware of any state or local laws guiding the disclosure of VUS reclassification information for a deceased patient?

O Yes (1)

O No (2)

---

*Display This Question:*

*If Are you aware of any state or local laws guiding the disclosure of VUS reclassification informati... = Yes*

Q24 How confident are you with your ability to interpret that law and apply it to your practice?

O Very confident (1)

O Moderately confident (2)

O Somewhat confident (3)

O Not at all confident (4)

---

Q25 In your opinion, should it be ethically required to have the consent of a deceased patient in order to share their VUS reclassification information with relatives who may be impacted by those results?

- O Yes (1)
- O No (2)
- O Maybe (3)

---

Q26 In your opinion, should be legally required to have the consent of a deceased patient in order to share their VUS reclassification information with relatives who may be impacted by those results?

- O Yes (1)
- O No (2)
- O Maybe (3)

---

*Display This Question:*

*If Do you currently ask your patients if they want their relatives to be notified if a VUS reclassif... = No*

Q63 Which of the following situations best describes when you think a conversation should be had with a patient about the release of VUS reclassification information in the event of their passing?

- O When a VUS is identified in a patient who is not expected to live more than a few years (1)
- O When a VUS is identified in any patient (3)
- O When the patient consents to undergo genetic testing (4)
- O At all initial counseling visits (2)

---

*Display This Question:*

*If Have you ever received a VUS reclassification for a deceased patient? = No*

Q64 Which of the following situations best describes when you think a conversation should be had with a patient about the release of VUS reclassification information in the event of their passing?

- O When a VUS is identified in a patient who is not expected to live more than a few years (1)
- O When a VUS is identified in any patient (3)
- O When the patient consents to undergo genetic testing (4)
- O At all initial counseling visits (2)

**End of Block: Opinion**

---

Start of Block: Demographics

Q28 **Please tell us some basic information about you and your practice setting.**

---

Q29 Please select your primary role, select only one.

- O Genetic Counselor (1)
- O MD (2)
- O PhD (3)
- O Registered Nurse (4)
- O Physician's Assistant (5)
- O Student (7)
- O Professor (8)
- O Other: (6) _____

---

Q30 Please select the type of practice you are involved with **(check all that apply)**.

- [ ] Pediatric (1)
- [ ] Cancer (2)
- [ ] Prenatal (3)
- [ ] General Medicine (4)
- [ ] Clinical Laboratory (5)
- [ ] Research setting (6)
- [ ] Specialty Clinics that do not fit above (ex. cardio, psychogenetics etc.) (8)

---

Q31 Please select the primary setting in which you currently practice.

O Private Practice (1)

O University Medical Center (2)

O Clinical Laboratory (3)

O Research Laboratory (4)

O Industrial Laboratory (8)

O Private Hospital (5)

O Public Hospital (6)

O Other: (7) _____

---

Q32 What state do you primarily practice in, please enter only one (i.e. PA):

_____

---

Q33 How many years have you been practicing genetics clinically:

O Less than 1 year (1)

O 1 - 5 years (2)

O 6 - 10 years (3)

O 11 - 20 years (4)

O Over 20 years (5)

---

Q34 How many clinical genetic tests do you directly order or coordinate in your current position where you also have contact with the patient?

O I do not directly order or coordinate clinical genetic testing (6)

O Rarely, or less than 1 per week (1)

O 1 - 10 weekly (2)

O 11 - 15 weekly (3)

O 16 - 30 weekly (4)

O More than 30 per week (5)

---

Q35 Please feel free to add any further comments you have below.

_____

End of Block: Demographics

# APPENDIX C: INITIAL EMAIL DISTRIBUTION LETTER

Dear NSGC member,

You have been invited to participate in a research study to identify current clinical practices and opinions regarding the disclosure of reclassified variant of uncertain significance (VUS) results of a deceased patient to his or her relatives. If you agree to participate, you will be asked to complete a brief online survey. Completion of the survey should take approximately 15 minutes and all data are collected anonymously. The survey will remain open for participation until March 23rd, 2018. If you are interested in participating, please review the details of the study below:

You were asked to participate because you are a current member of NSGC.

This study is being conducted by Seth Lascurain, a genetic counseling student at the University of Pittsburgh as his required thesis project for the Genetic Counseling Program under the direction of Darcy Thull, MS, CGC and Phuong L. Mai, MD, MS. The study was approved by the University of Pittsburgh IRB.

The primary purpose of this study is to identify current clinical practices and opinions regarding the disclosure of reclassified variant of uncertain significance (VUS) results for a deceased patient to his or her relatives. In addition, we hope to better understand genetics providers' opinions regarding the salient issues to consider in establishing practice guideline and policy regarding this issue.

Your participation is voluntary, you will not receive any direct benefit or compensation from your participation, and you may choose to exit the survey at any point.

Please click this link to take the survey:
https://pitt.co1.qualtrics.com/jfe/form/SV_6P65jMu7S4bmBr7

Responses are kindly requested by March 23rd, 2018.
Please feel free to contact us with any questions or concerns.

Thank you for your time,

Seth Lascurain
sel99@pitt.edu

Darcy Thull, MS, LCGC
thuldl@mail.magee.edu

Phuong L. Mai, MD, MS
maip@mail.magee.edu

## APPENDIX D: REMINDER EMAIL DISTRIBUTION LETTER

Dear NSGC member,

You were previously sent an invitation to participate in research regarding disclosure of reclassified variant of uncertain significance (VUS) results of a deceased patient to his or her relatives. If you have already completed this survey, thank you, and please disregard this email.

If you have not already done so, please consider participating in this project. If you agree to participate, you will be asked to complete a brief online survey. Completion of the survey should take approximately 15 minutes and all data are collected anonymously. The survey will remain open for participation until March 23rd, 2018. If you are interested in participating, please review the details of the study below:

You were asked to participate because you are a current member of the NSGC.

This study is being conducted by Seth Lascurain, a genetic counseling student at the University of Pittsburgh as his required thesis project for the Genetic Counseling Program under the direction of Darcy Thull, MS, CGC and Phuong L. Mai, MD, MS. The study was approved by the University of Pittsburgh IRB.

The primary purpose of this study is to identify current clinical practices and opinions regarding the disclosure of reclassified variant of uncertain significance (VUS) results for a deceased patient to his or her relatives. In addition, we hope to better understand genetics providers' opinions regarding the salient issues to consider in establishing practice guideline and policy regarding this issue.

Your participation is voluntary, you will not receive any direct benefit or compensation from your participation, and you may choose to exit the survey at any point.

Please click this link to take the survey:
https://pitt.co1.qualtrics.com/jfe/form/SV_6P65jMu7S4bmBr7

Responses are kindly requested by March 23rd, 2018.
Please feel free to contact us with any questions or concerns.

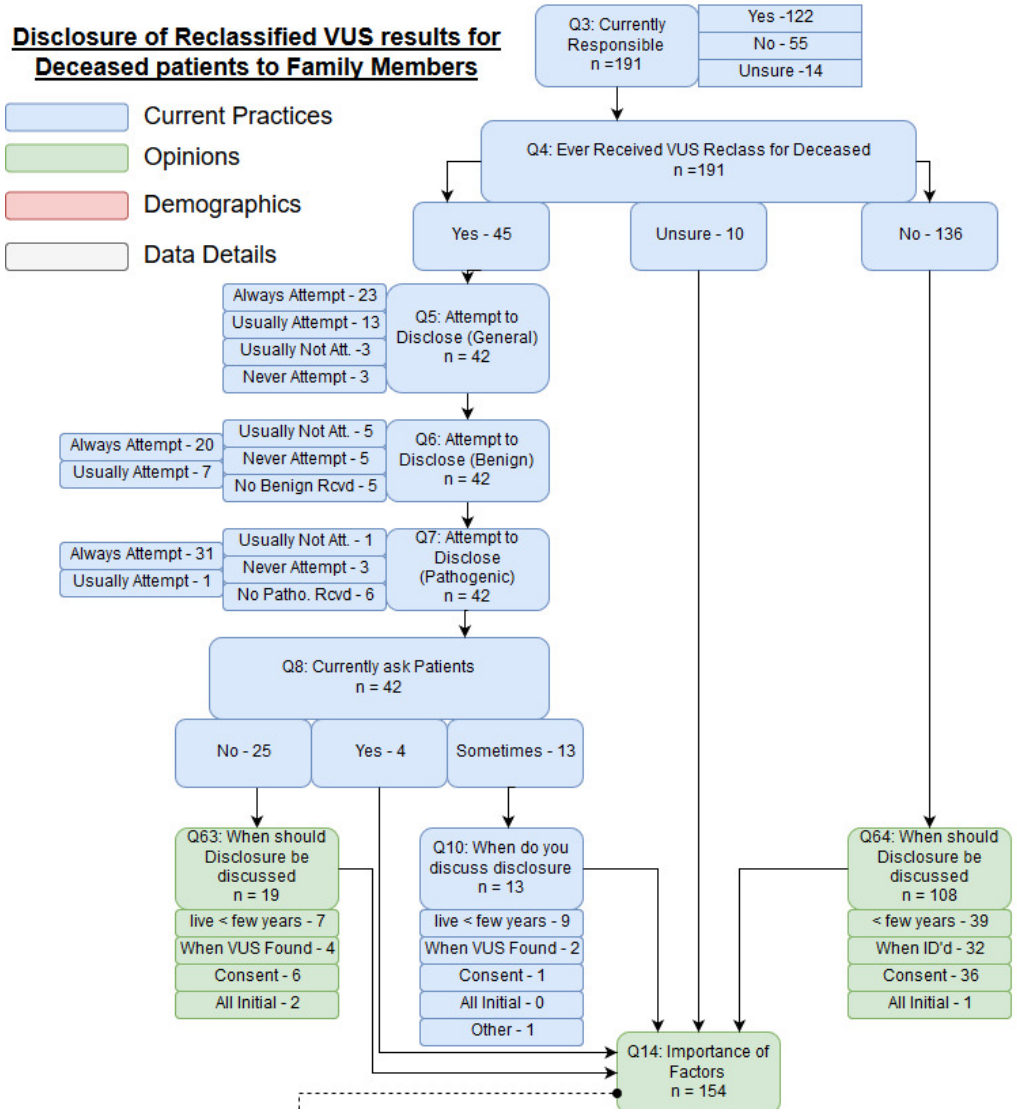
Thank you for your time,

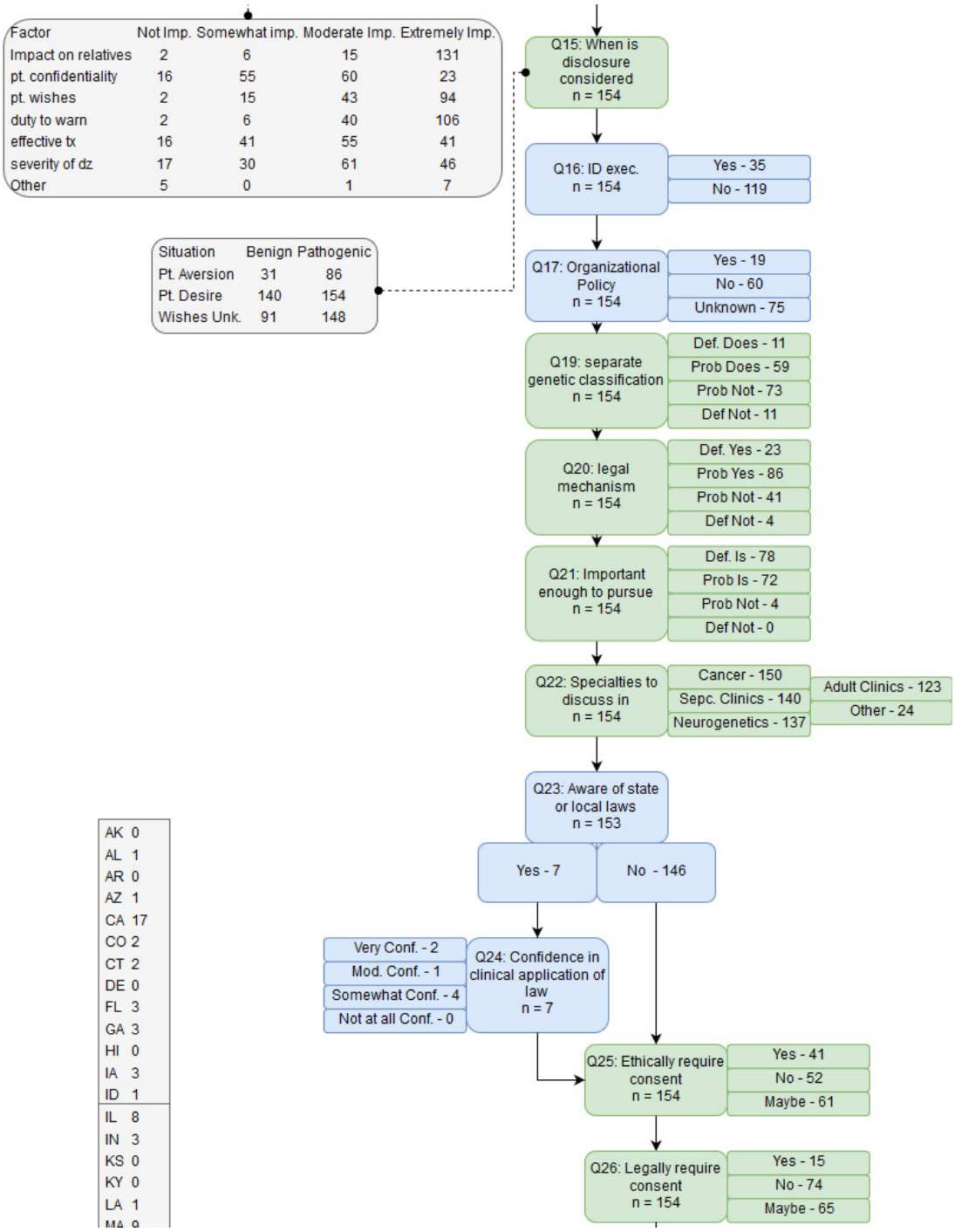
Seth Lascurain
sel99@pitt.edu

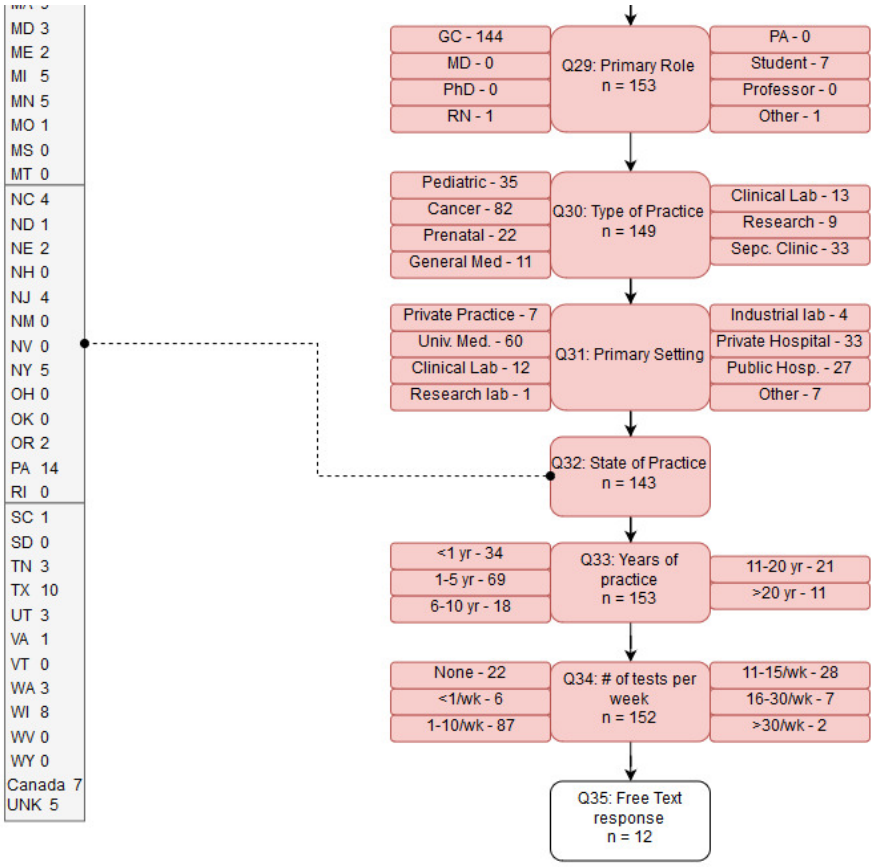
Darcy Thull, MS, LCGC
thuldl@mail.magee.edu

Phuong L. Mai, MD, MS
maip@mail.magee.edu

# APPENDIX E: SUPPLEMENTAL DATA




Factor | Not Imp. | Somewhat imp. | Moderate Imp. | Extremely Imp.
Impact on relatives 2 6 15 131
pt. confidentiality 16 55 60 23
pt. wishes 2 15 43 94
duty to warn 2 6 40 106
effective tx 16 41 55 41
severity of dz 17 30 61 46
Other 5 0 1 7
Situation | Benign | Pathogenic
Pt. Aversion 31 86
Pt. Desire 140 154
Wishes Unk. 91 148
Q15: When is disclosure considered n = 154
Q16: ID exec. n = 154
Yes - 35
No - 119
Q17: Organizational Policy n = 154
Yes - 19
No - 60
Unknown - 75
Q19: separate genetic classification n = 154
Def. Does - 11
Prob Does - 59
Prob Not - 73
Def Not - 11
Q20: legal mechanism n = 154
Def. Yes - 23
Prob Yes - 86
Prob Not - 41
Def Not - 4
Q21: Important enough to pursue n = 154
Def. Is - 78
Prob Is - 72
Prob Not - 4
Def Not - 0
Q22: Specialties to discuss in n = 154
Cancer - 150
Sepc. Clinics - 140
Neurogenetics - 137
Adult Clinics - 123
Other - 24
Q23: Aware of state or local laws n = 153
Yes - 7
No - 146
Very Conf. - 2
Mod. Conf. - 1
Somewhat Conf. - 4
Not at all Conf. - 0
Q24: Confidence in clinical application of law n = 7
Q25: Ethically require consent n = 154
Yes - 41
No - 52
Maybe - 61
Q26: Legally require consent n = 154
Yes - 15
No - 74
Maybe - 65
AK 0
AL 1
AR 0
AZ 1
CA 17
CO 2
CT 2
DE 0
FL 3
GA 3
HI 0
IA 3
ID 1
IL 8
IN 3
KS 0
KY 0
LA 1




## Written Responses

Q10 - Which of the following situations best describes when you currently discuss the release of VUS reclassification information with a patient in the event of their passing?

Other:

- At all visits, patients sign a form that tells us which family members we can discuss genetic test results with. We do not claim that we will reach out to those family members if a VUS gets reclassified (because what if we can't find the relatives) but this gives us permission to share the revised results with the relative if we know how to contact them.

Q14 - Please indicate the importance of each factor when considering the release of a deceased patient's VUS reclassification information to relatives.

Other:

- If I counselled a relative in the past (rated as extremely important)
- Family member(s) is/are aware that the deceased had genetic testing performed (rated as extremely important)
- As I am primarily a pediatric counselor, rather than personal condifentiality of the patient, guardianship is an important factor in determining who and can be informed of this information. (rated as extremely important)
- Whether or not there is a clearly designated relative to release results to (rated as extremely important)
- HIPAA (rated as extremely important)
- Institution policy (rated as extremely important)
- Evidence used to reclassify VUS (rated as extremely important)
- Classification of the variant (up or downgraded). (rated as extremely important)
- policy to contact relatives with any reclassification (rated as extremely important)

Q 22 - In which of the following specialties do you feel it would be useful to have a conversation with the patient about the release of their VUS reclassification information in the event of their passing.

Other:

- Mitochondrial diseases
- Pediatrics
- But i would think of this as a front desk task,not for GCs
- Cardiology
- all
- Pediatric (metabolic, mitochondrial, etc)
- Cardiology
- Research, any clinic!
- Cardiovascular genetics
- Infantile-lethal condition with VUS(s)identified in proband, family concerned about recurrnece risk
- psych genetics, heme genetics
- cardiogenetics

Q 29 - Please select your primary role, select only one..

Other:

- APRN-CNS

Q 29 - Please select the primary setting in which you currently practice.

Other:

- Private Cancer Center
- Hospital based outpatient clinic
- Biotech
- University
- Nonprofit telehealth
- HMO
- Student

Q 35 - Please feel free to add any other comments you have below

- I want to clarify that I think next of kin sharing of medical information should be applied and acceptable for sharing genetic information with relatives. We work with referring providers to gain next of kin information if we did not have it initially to find who to notify.So I think that is ethically and legally sound. Sharing with relatives not next of kin may be where the patient needs to list who they are OK sharing records with.
- Our province has a law, which allows relatives of a deceased patient access to medical information for a genetic evaluation if they can prove biological relationship, regardless of the wishes of patient when they were alive.
- I am a genetic counseling student.
- As the healthcare system in Quebec and elsewhere in Canada is public, I probably feel a stronger belief that a deceased person's info should be used to assure the health of family members, even if disclosure was refused in life. I believe that there may have been medico-legal precedents in this vein ?for hereditary colon cancer
- Genetic information shouldn't be treated any differently than any other information - this whole idea of "genetic exceptionalism" where genetic information should be treated differently than other medical information. This idea sets a dangerous precedent that genetic information is more "real" than other information, and should be treated that way because it's deterministic - that it is the end all be all of all healthcare. And we all know it to be true that it's not. Treating it as so in the eyes of practitioners or even worse, in the eyes of lawmakers, can lead to false beliefs on the power of genetics and genomics. Additionally, even ignoring all of that, this is a huge public health burden! Family members may get unnecessary genetic testing for a benign variant, or even worse, not get genetic testing, thinking that they're at population risk, when there is a familial mutation. Either way, it'll be a waste of healthcare dollars and an unnecessary strain on the already strained payer system that we have in America. This is why we have power of attorney laws: for someone to carry out the wishes of the deceased or incapacitated when they cannot. There is no need to add on additional laws or policies differentiating genetic information, as it makes it more complicated for no good reason.
- I currently work for a lab but saw patients in the past for over 6 years.
- Our clinic asked patients to sign a form allowing us to share their information with any family members who come to see us as patients. Very few people decline to give us permission to share their information.
- This is an interesting topic. My main issue with much of medical privacy laws is that they really do not take into account genetics and how truly our patient isn't just the person sitting in front of us, it is really the whole family.
- I believe that if a VUS is reclassified, you have the obligation to attempt to report this to the next of kin (spouse,child, parent, etc.) or to the person who attended the genetic counseling session with the patient. If the number is no longer in service at the time of the reclassification and the NOK has moved, it would be upon the next of kin to contact Genetics to review the variant reclassification unless another law or standard is set into place.
- My responses are reflecting my experiences in a clinical setting (where I practiced for >10 years). I've been in my current(laboratory) position for about 2 years at this point.
- This is obviously something that comes up muchmore frequently in the realm of adult genetic testing (as pediatric testing isalmost always automatically shared with the parents, rather than theproband-only) but it is still something the field of pediatrics which needsstandardization.

## APPENDIX F: POLICY FLYER

# *Disclosure of Reclassified genetic information after death: what would you want to know?*

**The problem:** Current policy does not provide clear guidance for the dissemination of genetic information to the family members of a deceased patient. This information may be critical to the health of these family members, but application of current policies is not uniform, and public health is being unduly impacted.

## Background

**Genetic testing is used in many medical fields**

- There are over 54,000 genetic tests available today
- Over 11,000 genetic disorders can be tested for.

**Genetic disease affects the whole family**

- An immediate family member has a 50% chance to carry the same genetic risk for disease as the patient

**VUS Results**

- More clinics are using broad genetic tests to effectively diagnose genetic diseases quickly, but these broad tests have a higher chance of returning a VUS result
- Any genetic sequencing analysis may result in a VUS finding

## Current Policy

**Family member access to medical records of the deceased**

- Medical information can be shared between physicians for the care of a family member (HIPAA)
- Person responsible for the deceased estate may be eligible to receive genetic information, but often only upon request

**Physicians can breach confidentiality to warn of extreme risks (AMA, NSGC, HIPAA)**

- Underutilized because the definition of "extreme risk" is subjective and opens the clinician to legal action.

**Current policies conflict with ethical principles**

- Clinicians simultaneously have a duty to protect the confidentiality of their patients, even after death, and also have a moral obligation to warn persons at risk of harm

**Recent findings:**

A survey of Genetic Counselors through the NSGC found:

- 24% of genetic counselors have received a reclassified VUS result for a deceased patient
  - This increased to more than 43% of genetic counselors with over ten years of service
- Less than 5% reported knowledge of state or local laws guiding disclosure in these situations
  - 12% reported an organizational policy on this issue
- 71% supported a legal mechanism to allow the released of reclassified VUS results of a deceased patient to their family members.
- 97% felt the release of this information was important enough to pursue if a legal mechanism was in place to allow it.

AMA – American Medical Association: https://www.ama-assn.org/

NSGC – National Society of Genetic Counselors: https://www.nsgc.org/

HIPAA – Health Insurance Portability and Accountability Act: https://www.hhs.gov/hipaa/index.html

**The solutions:** Two solutions are compared to the current standard. An active disclosure system, which would allow clinicians to seek and contact family members directly. A passive disclosure system would allow patients to contact clinicians to request genetic information of a biological relative.

The following table describes these approaches and compares them qualitatively against Gostin's five essential steps in public health policy development (Gostin, 2000).

| | Active Disclosure | Passive Disclosure | No Policy Modification |
|---|---|---|---|
| **Step 1: Demonstrate Risk** | Reclassified VUS results for a deceased patient are not consistently available to their family members. This lack of knowledge may result in unnecessary heightened screening and stress for the at risk family members. | | |
| **Step 2: Effectiveness of the Intervention** | **Most Effective**<br>• Clinician responsible for contacting family members | Moderately Effective<br>• Family member responsible for contacting clinician | Least Effective<br>• Limited disclosure without express consent |
| **Step 3: Economic Costs** | Most Costly<br>• Clinician time<br>• EMR modifications | **Least Costly**<br>• EMR modifications optional | Moderately Costly<br>• Clinical care for uninformed family members is increased due to low frequency of notification |
| **Step 4: Individual Burden** | Most Burden<br>• Violated privacy<br>• Violated right not-to-know | **Least Burden**<br>• Violated privacy<br>• Burden of vigilance on family members | Moderate Burden<br>• Burden of information on clinician<br>• Burden of access to family members (no access) |
| **Step 5: Fairness** | Moderately Fair<br>• Costs placed on clinicians, their patients, and family members<br>• Benefits to family members | **Most Fair**<br>• Costs and benefits reserved primarily for those who seek the information | Least Fair<br>• Costs to those unaware of genetic risk<br>• No benefits |

## APPENDIX G: POLICY BRIEF

### POLICY BRIEF: GENETIC INFORMATION SHARING WITH BIOLOGICAL RELATIVES AFTER DEATH

**The Issue:**

Genetic testing is fast becoming standard of care in many different medical fields.[4,32] Genetic testing can diagnose a disease, provide information for risks of complications or secondary disease, and provide peace-of-mind for those who may not carry genetic variants known to cause disease.[4] Sometimes a genetic variant is discovered which has not been seen before, we call these variants of uncertain significance (VUS).[32] It may take years for a VUS to be understood, and reclassified. If the patient should pass away before the variant is reclassified, their family members may still benefit from the information about that genetic variant, regardless of if it is found to cause disease or not. For this reason, some laboratories will send notification to the ordering physician to inform them the VUS has been reclassified. Upon discovering the patient has passed away, they must make a decision to notify the decedent's family members of the genetic information, or not.

**The Background:**

Research has shown that clinicians in these situations feel a strong responsibility to warn at-risk family members,[69] and concern for legal liability should they decide to disclose the information without written consent, which is no longer possible.[9,16] Past legal cases have recognized the familial nature of genetic information, [15] and that a physician's duty to warn may extend to family members of the patient they are treating,[17] but leave much to interpretation.

Professional organizations like the American Medical Association (AMA) and National Society of Genetic Counselors (NSGC) and National Policy, Health Insurance Privacy and Accountability Act (HIPAA), recognize the familial nature of genetic information and allow for case-by-case decision making on disclosure, but do not provide clear criteria for when disclosure is permissable.[10,11,13] The conflicting motivations of concern for at-risk family members and concern for legal liability lead to inconsistent disclosure practices,[69] and an unequal access to information among an unaware public.

National and International laws provide some guidance for possible solutions to the unequal access to relevant genetic information of a deceased family member. In the US, HIPAA allows clinicians to share information, without the patient's consent, if doing so is deemed necessary for the care of another patient, such as with genetic risks for disease.[10] However, this policy requires that clinicians know whom to contact to share the information. In the scenario presented here, the clinician does not know who the relatives of the patient may be, much less their physician's identity, making this option impractical in these situations. Internationally, some policies have adopted a system allowing the decedents' relatives access to important genetic information. In France, patients can permit the French Medical Biology Agency to disclose their genetic information to family members for them.[28] In Quebec Canada, the law permits biological relatives access to the decedent's record in order to determine the presence of genetic risk factors.[29] Australian law permits the disclosure of genetic information to a genetic relative if such disclosure is deemed necessary to prevent or lessen harm to a genetic relative.[70] These policies set the stage for reform here in the US and demonstrate the importance of genetic information to family members. It is time for the US to update its policies to properly address this important factor in public health.

**The Proposal:**

PA Code § 115.29. Patient access identifies the designated executor of the decedent's estate, or next of kin responsible for disposal of the remains, as the only person with access to the decedent's medical information. You are urged to consider revision of the law, to allow the family members of a deceased patient the ability to determine the presence or absence of a genetic risk factor in the decadent. These modifications are not new, and models exist in the province of Quebec Canada, Australia, and France, just to name a few. Language which explicitly permits genetic relatives access to this information will provide clinicians with sufficient legal backing to consistently disclose reclassified VUS results to family members. This language would also permit the biological relatives of the deceased to request such information directly, when other means of access have failed them.

**Next steps:**

As a public official with an interest in the public health, please consider introducing these suggestions to the Senate and develop modifications to current policy which permit and facilitate the sharing of genetic information for a deceased patient to family members. These modifications will greatly improve the ability of clinicians to meet the needs of their patients, and their patient's families in a medical system quickly adapting to the use of genetics in medicine.

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