

EDUCATING HEALTH CARE PROFESSIONALS IN THE
THREAT OF BIOLOGICAL ATTACKS:
A DIGITAL GUIDE TO SMALLPOX

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DEDICATION

Dedicated to my loving husband and parents as their support made this thesis project and the completion of my graduate degree possible.

I would also like to acknowledge my instructors, Lewis Calver and Kim Krumwiede, for their expertise and insight. In addition, I would like to express my gratitude to Dr. Kathleen Delaney for her expertise, enthusiasm and continued support throughout this project.

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A DIGITAL GUIDE TO SMALLPOX

by

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THESIS

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A DIGITAL GUIDE TO SMALLPOX

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Following the terrorist attacks on September 11, 2001, and the Anthrax letters that followed shortly thereafter, the American government and public have had growing concerns over the possibility of biological and chemical attacks in the United States. Review of our public health system has shown a need to better educate some of our medical professionals and first responders on smallpox, one of the more deadly biological agents that could be used in a terrorist attack. A great number of people, both professionals within the medical community and those who support them, are unfamiliar with the symptoms and effects of many of the diseases that could be used in a biological attack. This disturbing fact was supported by a study conducted by the National Immunization Program at the CDC. The findings of this study showed that “Physicians, overall, exhibited a limited knowledge of smallpox disease and had many misperceptions about its natural course and modes of transmission. There were

some physicians who were unaware that smallpox has been eradicated” (Smallpox: Disease, Prevention and Intervention, 2003). The purpose of this project was to develop an educational resource that would assist medical professionals in preparing for and responding to a smallpox event. The guide contains detailed didactic material with supportive artwork and photographs, geared towards an educated audience. The guide is delivered in a HTML based format as an interactive CD-ROM, both Mac and PC compatible. The guide is designed to allow the users to cater the learning experience to suit their individual educational needs so that they can concentrate on those areas in which they need most, and by-pass those areas in which they are already familiar.

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LIST OF DEFINITIONS

Smallpox – an acute contagious febrile disease characterized by skin eruption with pustules, sloughing, and scar formation and caused by a poxvirus (genus *Orthopoxvirus*) that is believed to exist now only in lab cultures.

Virion – complete virus particle that consists of an RNA or DNA core with a protein coat sometimes with external envelopes and that is the extracellular infective form of a virus.

CHAPTER ONE

INTRODUCTION

Research Question

Can an interactive resource on smallpox be created for medical professionals, namely; general physicians, medical students, residents, nurses, emergency medical technicians, military medical personnel, and hospital administrators, that would assist them in preparing for and responding to a biological attack involving smallpox?

Goal and Objectives

The goal of this thesis was to develop an electronic guide on a CD-ROM that will be a resource for medical professionals on smallpox so that they could be better prepared to respond to a biological attack using that agent. The target audiences for the electronic guide are general physicians, medical students, residents, nurses (& nurse practitioners), physician's assistants, emergency medical technicians, military medical personnel, and hospital administrators. The objectives of the project are to cover identifying factors, modes of transmission, treatment, medical protocols, disease pathogenesis and other pertinent information in a single resource that is easy to navigate, has supportive visual aids, and has a broad availability. Ultimately, this resource should provide the users with enough

information so that they could be prepared to quickly identify and respond to a smallpox case. Lastly, the resource should allow the users to cater the learning experience to suit their individual educational needs so that they can concentrate on those areas in which they need most, and by-pass those areas in which they are already familiar.

Background

The tragic events of September 11, 2001 brought home the devastating effects of terrorism to all Americans. Once thought to be more of a foreign threat, terrorism is now a daily concern for many Americans in both their personal and professional lives. Following the 9-11 attacks, and the Anthrax letters that followed shortly thereafter, the American government and public have had growing concerns over the possibility of biological and chemical attacks in the United States. Review of our public health system has shown a need to better educate some of our medical professionals and first responders on the biological agents that could be used in a terrorist attack. A great number of people, both professionals within the medical community and those who support them, are unfamiliar with the symptoms and effects of many of the diseases that could be used in a biological attack. This disturbing fact was supported by a study conducted by the National Immunization Program at the CDC. The findings of this study showed that “Physicians, overall, exhibited a limited knowledge of smallpox disease and had many misperceptions about its natural course and modes of transmission. There were some physicians who were unaware that smallpox has been eradicated”(Smallpox: Disease, Prevention and Intervention, 2003). These diseases may have

been briefly covered during the course of their education, but that would be the extent of many professionals' experience. These medical professionals, including medical residents, general physicians, nurses and emergency medical technicians (EMTs), would be the type of professionals the general populous would rely on for medical assistance during the initial stages of a biological attack. In the event of a biological attack using smallpox, the degree of preparedness by our health professionals directly relates to how successful the response will be.

The Centers for Disease Control and Prevention (CDC) has categorized a number of biological agents into three different categories (A, B and C), based on their effectiveness as a weapon.

Agents in Category A have the greatest potential for adverse public health preparedness efforts (e.g., improved surveillance and laboratory diagnosis and stockpiling of specific medications). Category A agents also have a moderate to high potential for large-scale dissemination or a heightened general public awareness that could cause mass public fear and civil disruption (Rotz et al., 2002).

Most of these agents are unseen in western societies; so many of our medical professionals have had little if any experience with these diseases. The six Category A agents are: Anthrax (*Bacillus anthracis*), Smallpox (*variola major*), Botulism (*Clostridium botulinum toxin*), Plague (*Yersinia pestis*), Tularemia (*Francisella tularensis*) and Viral hemorrhagic fevers (e.g., *Ebola virus*, *Lassa virus*).

“Of a long list of potential pathogens, only a handful are reasonably easy to prepare and disperse and can inflict sufficiently severe disease to paralyze a city and perhaps a nation. In April 1994, Anatoliy Vorobyov, a Russian bioweapons expert, presented to a working group of the National Academy of Sciences the conclusions of Russian experts as to the agents most likely to be used. Smallpox headed the list followed closely by anthrax and plague” (Henderson et al., 1999).

Significance

“The scenario of a terrorist group either obtaining or manufacturing and using a weapon of mass destruction is no longer the stuff of science fiction or even adventure movies.”(Miller et al., 2002). The twentieth century’s technological advances have made biological weapons an easy choice for many governments and groups. While usage of these types of weapons is considered morally reprehensible by most societies, biological weapons have the advantage of being relatively easy to manufacture and store, inexpensive, easily available and easy to conceal in their manufacturing, storage and deployment. Information on developing biological weapons is available on the Internet. “Cultures of virulent biological agents can be easily obtained from environmental sources, biological supply houses (e.g., the American Type Culture Collection), university or hospital laboratories and clinical specimens” (UTSW

Medical Center faculty, 2001). This point was substantiated by the ‘success’ of the CIA’s secret program called Bacchus.

The Bacchus program was one in which a group of researchers with the Science Applications International Corporation (SAIC), working at the U.S. Army’s Dugway Proving Ground in Utah, built a miniature anthrax bioproduction plant using inexpensive, off-the-shelf equipment. The idea of the experiment was to see if it would be possible for terrorists to buy ordinary equipment, make anthrax with it, and not be noticed. In January and February 2001, [...] the Bacchus team succeeded in making a powdered anthrax surrogate, BT, but it was crude (Preston, 2002, p. 200).

Law enforcement officials and other government agencies failed to notice the Bacchus program.

“While anthrax is relatively accessible to terrorists, anthrax isn’t contagious - smallpox is. There’s some evidence that smallpox may already have been transported out of Russia to the Middle East, possibly to Iran or Iraq, and maybe even North Korea. If smallpox was released by these or any other countries, we’d be looking at a global catastrophe”(Simons, 2002, p. 20).

Smallpox represents a serious threat to civilian populations because of its case-fatality rate of 30% or more among unvaccinated persons and the absence of specific therapy. Although smallpox has long been feared as the most devastating of all infectious diseases, its potential for devastation today is far greater than any

previous time. Routine vaccination throughout the United States ceased more than twenty-five years ago. In a now highly susceptible, mobile population smallpox would be able to spread widely and rapidly throughout this country and the world (Henderson et al., 1999).

“Enhancing the public health infrastructure will improve U.S. ability to respond to any infectious disease outbreak and provide added value in the event of a bioterrorist event” (McDade and Franz). A key element in enhancing our public health infrastructure is education. Educating our medical professionals on smallpox and other Category A agents better prepares them for a potential biological attack. Armed with the knowledge of identifying factors, modes of transmission, treatment, medical protocols and disease pathogenesis, they might be able to more quickly identify a potential epidemic and contain the spread of the disease, thus limiting the effect of the attack. Well-prepared first-responders will reduce the amount of casualties and the economic impact of a biological attack. With the threat of bioterrorism being a very real possibility, and the fact that medical professionals would likely be the first to encounter infected people, it stands to reason that part of their professional education should include information on agents which would likely be used in an attack.

There is currently a void within the available educational materials for medical professionals that covers identifying factors, modes of transmission, treatment, medical protocols, disease pathogenesis and other pertinent information in a single resource that is easy to navigate, has

supportive visual aides, and has a broad availability. Like most other professionals, time is a scarce resource for those in the medical fields, most not having the time to sort through the plethora of information scattered across the internet, in journals and in books to find the information that would help them in identifying and responding to a biological attack. By providing medical professionals with a single resource, which is easily accessed, has visual aides and is easy to sort through the material, would be an invaluable tool in our national goal to better prepare and respond to a biological attack.

Thesis Organization

The thesis is organized with the first chapter being a general introduction, stating the goal and objectives, the audience, its significance, what the central idea is of this approach and the organization of the thesis. Chapter two is a review of existing literature on smallpox, including general conclusions about the current resources available to meet the need of medical professionals in identifying and responding to smallpox. Chapter three covers the methodology. The software used and the development of the project is detailed in this chapter. Chapter four is an analysis of the data. Survey results on the effectiveness of the project are reviewed in chapter four. Chapter five, the final chapter, contains a general conclusion and recommendations for further study.

CHAPTER TWO

REVIEW OF EXISTING LITERATURE

Available Material

There is a vast amount of material on smallpox available on the Internet and in books.

Richard Preston's book, *The Demon in the Freezer* (2002), is a captivating account of the history of smallpox, its eradication by The World Health Organization, and the testing and development of it as a biological weapon by the former Soviet Union during the cold war. Preston has interviewed some of the top experts in the field, including; William C. Patrick III, former chief of product development for the Army's biowarfare program before it was shut down in 1969, D.A. Henderson, MD, who lead the WHO's (World Health Organization) effort to eradicate smallpox in the 1970s and Ken Alibek, a Soviet defector who was first deputy chief of research and production at Biopreparat, the division of the Soviet military that studied and developed agents into biological weapons. While Preston's book is excellently written his audience and information is more general, and therefore not a good stand-alone resource on smallpox for those in medical fields.

The Internet has a variety of sources of information on smallpox, ranging from individual's home remedies to in-depth information available on the CDC's website

[<http://www.cdc.gov/>]. In addition to the CDC website, the websites for The National

Institute of Health [<http://www.nih.gov/>] and The National Institute of Allergy and Infectious Diseases [<http://www.niad.nih.gov/>] are excellent resources for information on smallpox. There are a number of on-line journals that have information on smallpox geared towards medical professionals: The Journal of the American Medical Association [<http://jama.ama-assn.org/>], Emerging Infectious Diseases [<http://www.cdc.gov/ncidod/EID/>], and The Morbidity and Mortality Weekly Report [<http://www.cdc.gov/mmwr/>]. Most of the information provided from these sites and on-line journals requires in-depth research and does not contain a comprehensive review of the many aspects of the disease that medical professional would require to prepare them for identification and response.

Smallpox Realities

Smallpox was very much a reality for most of mankind's history. Thought to have emerged in human populations around ten thousand years B.C.E., mankind has had to contend with this virus until its eradication in 1979. "Doctors generally consider smallpox to be the worst human disease. It is thought to have killed more people than any other infectious pathogen, including the Black Death of the Middle Ages. Epidemiologists think that smallpox killed roughly one billion people during the last hundred years of activity on earth." (Preston, p. 18). Despite its eradication, the reality of smallpox still looms, as the possibility of its reintroduction as a biological weapon is a modern concern.

One of the top and foremost objectives of the United States Homeland Security Department is to have first responders prepared for terrorist attacks, including those attacks utilizing biological agents. The President's 2003 Budget proposal to spend \$3.5 billion on enhancing the homeland security response capabilities of the United States' first responders demonstrates that this is a priority for the US government. There is a great need to include smallpox education in the preparation of first responders. A study was conducted by the National Immunization Program (at the CDC) to ascertain what physicians and members of the public know about smallpox. The results of the study showed that physicians, overall, exhibited a limited knowledge of smallpox and had many misperceptions about its natural course and modes of transmission. There were some physicians who were unaware that smallpox has been eradicated ("Smallpox: Disease, Prevention and Intervention," 2003). The results of the National Immunization Program study reinforce the need to educate our medical professionals (who would also be some of our first responders in an attack) on smallpox in order to limit the effects of an attack using it as a weapon.

Teaching Materials

Teaching material on smallpox is limited. The majority of printed teaching material is a composite of information derived from a variety of sources and put together for a specific lesson plan by a physician or teacher who is covering smallpox for a class. The material is usually derived, or taken directly from on-line sources such as the Center for Disease Control and Prevention (CDC) [<http://www.cdc.gov/>]. While the information is often accurate, it

covers only a narrow aspect of smallpox and does not encompass all of the smallpox topics that a medical professional would require in order to prepare for a smallpox case.

Teaching material available on-line ranges in complexity, target audiences and quality. There are numerous lesson plans developed by a number of professors/MDs, which cover the disease, identification and diagnosis on more of a superficial level. Like much of the printed teaching material, the content in these types of lessons tend to have been acquired from a variety of Internet sources.

One of the best smallpox educational resources is the CDC's course: "*Smallpox: Disease, Prevention and Intervention*" (2003). This course offers a thorough look at smallpox and the type of information that would be required to prepare first responders. The format in which the material is presented is either a series of Adobe® Acrobat PDF files (*refer to Figure 2-1*) with imbedded photos or as a Microsoft® Power Point presentation (with the same photos). While both formats provide a suitable way of presenting the material to a group, there are limitations in the navigation, in the formats themselves and in design.

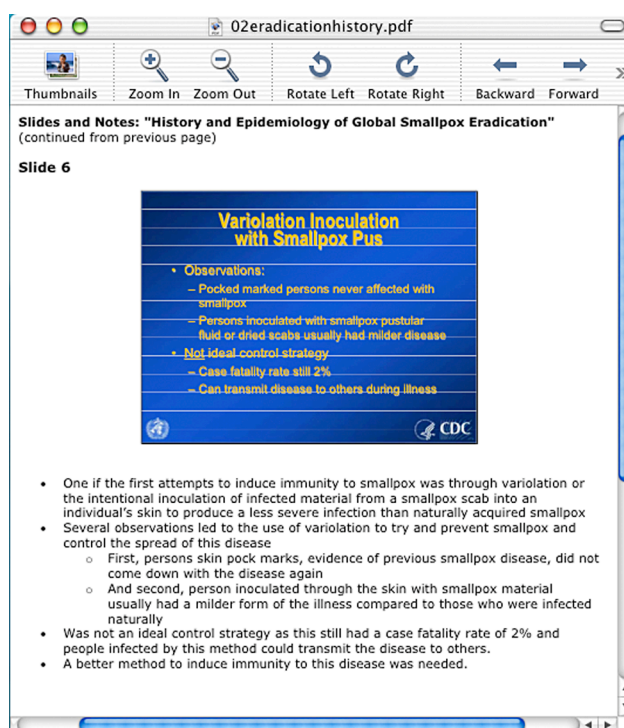


Figure 2-1

Screen capture of CDC course: "Smallpox: Disease, Prevention and Intervention" in Adobe Acrobat® format.

Navigation is a critical element in developing a resource that has broad availability and usage. Time is a limited commodity for most professionals and most do not have the free time to search through materials to find information that applies to their profession. By offering a resource that is easy to navigate through the users can model their learning experience to suit their individual educational needs. The CDC course has no built in navigational elements such as hyperlinks or a content outline that would allow a user to jump from one subject area to another. A user would have to go through the entire course in order to gather the information that would be the most critical to that user. This is an unrealistic option, as it would take a number of hours to go through the entire CDC Smallpox course.

The two formats in which the CDC course is presented also pose some problems. Both formats require that the users download multiple files to their local computer. Some of the files are quite large, the largest PDF file (Adobe Acrobat native file) being 13.81 MB and the largest Power Point file being 26.6 MB. Download times could vary greatly depending on the users connection speed. Presenting the material on the CDC website also requires that the user has an Internet connection in order to download the documents. While Adobe Acrobat Reader software is freeware and available for download from the Adobe website [<http://www.adobe.com/products/acrobat/main.html>], Power Point is not and a user would have to have a licensed copy of Power Point in order to view the Power Point version. The design of the CDC course is more utilitarian than aesthetically pleasing. The design could certainly be improved upon and be utilized to strengthen important information.

Information on Smallpox

The amount of information available on smallpox is quite extensive, some of which is very informative and scientifically accurate while other available information is of questionable sources. The amount of printed material on smallpox is not quite as extensive as the material available on-line, but what is available is very informative.

Considered the definitive source for information on smallpox by many smallpox experts is a book entitled: *Smallpox and Its Eradication* (1988). Poxvirus experts often referred to it as the Big Red Book. The authors of the Big Red Book, Frank Fenner, Donald A. Henderson, Isao Arita, Zdenek Jezek, Ivan D. Ladnyi, were some of the same people who had led the World Health Organization (WHO) smallpox eradication campaign in the late 1960's and early 1970's. The book covers some background information on smallpox such as clinical features, orthopoxviruses, pathogenesis, epidemiology and history, but primarily it goes into great detail on the Eradication Program, it's development, it's intensification, countries and regions targeted and the geographical and socio-cultural considerations.

Other valuable literature on smallpox and bioterrorism is also available. *The Demon in the Freezer* (2002), by Richard Preston, is a well-written historical account of smallpox, which brings the reader up to the present with the looming potential reality of smallpox being used as a biological weapon and bioengineering the virus for such an attack. Preston interviewed some of the most knowledgeable experts in the field who had hands on experience with smallpox. Some of the leading smallpox experts like D.A. Henderson, who led the WHO Eradication program and Ken Alibek, who was deputy chief of research of Biopreparat, the Soviet large-scale, secret program which was devoted to research, development and production of biological weapons, were both featured prominently in the book. *Biological Weapons and America's Secret War: Germs* (2002), by Judith Miller, Stephen Engleberg and William Broad, is another valuable source for the historical significance of biological warfare and the development of smallpox as a weapon. The shortcomings of books and lengthy

articles are that they are not easy to navigate through if you are looking for specific information. Literature presented this way must be gone through in its entirety in order to pull particular facts, which can be a cumbersome, time-consuming process. So although the three books mentioned are informative, well written and interesting, they would not serve well as reference material for most audiences wanting to familiarize themselves with certain aspects of the disease.

The bulk of available information on smallpox is available on-line through a variety of sources ranging from The Centers for Disease Control and Prevention (CDC) [<http://www.cdc.gov/>] to personal sites suggesting homeopathic remedies for the disease [<http://medicinegarden.com/Library/Smallpox.html>]. While a great deal of the information found on-line is from reliable sources, the information is spread all over the internet, and there was only one source, the CDC's course: "*Smallpox: Disease, Prevention and Intervention*," that provided a comprehensive overview of topics exclusively on smallpox and directed towards medical professionals. Some of the more informative sites were The CDC [<http://www.cdc.gov/>], The Journal of the American Medical Association (JAMA) [<http://jama.ama-assn.org/>] and National Institutes of Health (NIH) [<http://www.nih.gov/>]. Much of the information on smallpox on these sites is presented as on-line articles dealing with specific information relating to smallpox. The article written by D.A. Henderson for Vaccines on-line journal entitled: *Smallpox and Vaccinia* (1999) is a typical example of how much of the on-line smallpox information is presented

[<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowSection&rid=vacc.chapter.3>].

The CDC site was particularly valuable as it has up to date information on current protocols for treatment, specimen handling, and other important information for physicians and other first responders. Even with the most current information on smallpox, sites like the CDC website don't serve well as a quick resource as they have their smallpox information in a variety of places on their website and while the information may all be there, finding it may take more time than the average medical professional has time for.

CHAPTER THREE

CONCEPTUAL FRAMEWORK AND METHODOLOGY

Instructional Design

An instructional design process composed of five major steps, analysis, design, development, implementation and evaluation, was utilized for the development of the interactive Digital Smallpox Guide. The outcome of each step provided the foundation for subsequent steps. This five-step instructional design model is more commonly known as the ADDIE model and is one of many different models of instructional design. It was chosen based the past success of students from the UTSW Biomedical Communications program using this same model.

In the analysis stage the problem was identified, the goal and objectives were established and the target audience was defined. I developed a thorough understanding of the audience's current knowledge and skills through research and communications with professionals representing the fields I was targeting for the guide. With the knowledge of my audience's current level of understanding of smallpox, I was able to determine what must be achieved in order to reach the desired skill level and knowledge. The second step of the ADDIE model of instructional design, the design phase, was where the method and mode of instruction was conceived and planned, research was conducted, and the content was defined. In the development phase, materials were constructed according to the decisions made during the

design phase. The implementation stage consisted of evaluating the materials through testing with a select group, the full production and distribution of the materials and training necessary on using the instructional materials. The effectiveness of instructional materials was determined during the final evaluation phase.

Project Conception

The Digital Smallpox Guide was conceived as a solution to the problem of medical professionals not being sufficiently informed on smallpox. Prior to the terrorist attacks on the World Trade Center in New York, on September 11, 2001, numerous experts in the field of infectious diseases had expressed concerns over the frightening realities of a biological terrorist attack using smallpox (Henderson, 1998) and stressed the need for education and training in bioterrorism (McDade, 1998). After 9-11, the media reinforced those concerns by reporting on the lack of preparedness medical professionals and other first responders had in regards to smallpox. These reports were confirmed by a study conducted by the National Immunization Program (of the CDC). The study showed that most physicians had limited knowledge regarding the natural course and modes of transmission of smallpox ("Smallpox: Disease, Prevention and Intervention," 2003), both of which are imperative in preparing for and responding to a smallpox event.

Smallpox disease was selected for a number of reasons. It is one of the few diseases listed by the Center for Disease Control and Prevention as a Category A Agent. Category A Agents are those that are most likely to be used as biological weapons. Smallpox is a devastating disease with a 30% mortality rate. Smallpox was officially declared eradicated in 1972, leaving a generation of doctors and other medical professionals who have never even seen an actual case involving smallpox. Another factor in choosing smallpox over other potential diseases was that there are a number of photographs of the disease from the World Eradication effort of the late 1960's and early 1970's.

Project Goal & Objectives

The goal of this thesis was the design of an interactive, electronic guide on a CD-ROM that will be a resource for medical professionals on smallpox so that they are better prepared to respond to a biological attack using that agent. The objectives of the project were to cover identifying factors, modes of transmission, treatment, medical protocols, disease pathogenesis and other pertinent information in a single resource that was easy to navigate through, has supportive visual aids, and has a broad availability. This resource should provide users with enough information so that they are prepared to quickly identify and respond to a smallpox case. Lastly, the resource should allow users to cater the learning experience to suit their individual educational needs.

Evaluating Target Audience's Needs

To establish what specific information on smallpox was needed by the different groups representing the target audience (physicians, nurses, residents, medical students, emergency medical technicians, etc.) I conducted research and consulted my content expert, Dr. Delaney. An initial list of topics was created based on the findings of my research and on Dr. Delaney's suggestions. The smallpox topic list was composed of: general description, history, modes of transmission, precautions to avoid transmission, pathology, symptoms & diagnosis, medical protocol, vaccine and a list of resources. I then contacted a number of professionals representing some of the targeted fields and asked them what types of information on smallpox they needed in order to prepare themselves for a potential case. Responses from a nurse, internal medicine residents and emergency medicine residents along with additional suggestions of my content advisor, Dr. Kathleen Delaney, and the topic headings of the CDC course (*Smallpox: Disease, Prevention and Intervention*, 2003) helped formulate the final main menu topics of the guide. Those topics were: a general description of smallpox, history of the disease, smallpox as a weapon, clinical effects of smallpox: pathophysiology of natural infection, diagnosis of smallpox, diseases that exhibit similar symptoms, modes of transmission, medical protocol, patient treatment, vaccine, smallpox outbreak control activities and strategies, isolation strategies to contain an outbreak, isolation

and quarantine measures in response to a smallpox emergency, communications, and a list of other resources.

After the smallpox topics were established I began gathering information on smallpox and researching the disease. During the course of my research I discovered the CDC course “Smallpox: Disease, Prevention and Intervention.” This course, also intended for medical professionals, covered much of the same information that my project was to cover along with some other pertinent topics such as laboratory support, established safety surveillance for smallpox vaccine, pre-event planning and post-event operational issues. I included these topics to those already established through research and target audience evaluation.

Acquiring and Organizing Content

Organizing and collecting the content for the Digital Smallpox Guide was a vast undertaking. At the project’s conception there were no single resources, written for an audience of medical professionals, on smallpox that contained a variety of information on smallpox-related topics. Teaching materials on smallpox were limited, and overall offered little in terms of developing the content. The one exception was the CDC smallpox course (Smallpox: Disease, Prevention and Intervention, 2003). It contained a great deal of information on all of the smallpox topics that were to be covered by the Digital Smallpox Guide. Unfortunately, it was created late in 2003, at which point much of the content for this project had already been collected from other sources. Internet sources, such as the CDC [<http://www.cdc.gov/>] and

WHO [<http://www.who.int/en/>], were used heavily in compiling information for each of the topics. A few books provided a great deal of valuable data (Fenner, 1988; Preston, 2002; Miller, 2002). Information from them was collected and organized into the topic categories. A number of articles from reputable on-line journals relating to specific smallpox-related topics were used. Emerging Infectious Diseases Journal [<http://www.cdc.gov/ncidod/eid/>] and The Journal of American Medical Association [<http://jama.ama-assn.org/>] are two such on-line journals that feature articles written by leading experts and other reputable sources.

After the content was collected it was organized into an outline format. Each of the nineteen main topics was listed along with their related sub-topics. Sub-topics headings were developed through grouping like information together and through the results of the analysis stage. The nineteen main topics and their sub-topic headings were:

1. General Description: Virus classification, Characteristics of the virion.
2. History of Disease: Origin, Historical smallpox control strategies, Smallpox vaccine, Global eradication of smallpox, Official repositories.
3. Smallpox as a Weapon: Category A agent, Smallpox bioweapon realities, Bioengineering.
4. Clinical Effects of Smallpox - Pathophysiology of Natural Infection: Infection, Incubation period, Prodrome (pre-eruptive state), Infectious stage, Rash/Exantham.

5. Diagnosis of Smallpox: Clinical case definition of smallpox, CDC smallpox diagnostic algorithm, Diagnosis (3 major criteria, 5 minor criteria, laboratory diagnosis), Strain variations of smallpox, laboratory diagnosis of smallpox.
6. Diseases that Exhibit Similar Symptoms: Varicella (chickenpox), Other rashes, Hand, foot and mouth disease, Molluscum contagiosum, Secondary syphilis, Meningococcemia, Bullous pemphigoid.
7. Modes of Transmission: General information on transmission, Transmission factors.
8. Medical Protocol: Intentional release, Immediate action for patients with generalized vesicular or pustular rash illness, Response – high risk case, Response – moderate risk case, Response – low risk case.
9. Patient Treatment: Supportive therapy, Potential treatments.
10. Vaccine: History, Current vaccine, Immunity, Vaccine components, Contraindications, Vaccination, Technique for administering the vaccine, Successful smallpox vaccination, Complications, VIG therapy for complications, Dryvax smallpox vaccine administration schedule.
11. Smallpox Outbreak Control Activities and Strategies: Surveillance & containment (ring vaccination), Epidemiologic investigation, Vaccination strategy, Isolation & quarantine, Decontamination, Burial issues.
12. Laboratory Support: Laboratory methods for confirmation of orthopoxviruses, Laboratory tests to rule out other rash illnesses, Sample requirements for poxvirus DNA identification, Specimen collection.

13. Established Safety Surveillance for Smallpox Vaccine: Objectives for safety monitoring, General steps to establishing vaccine safety surveillance, Smallpox vaccine adverse events monitoring needs.
14. Pre-Event Planning: Principles of smallpox control, Pre-event training, Coordinating resources, Response teams, Isolation, Vaccination strategies, Criteria for implementation of smallpox response plan.
15. Post-Event Operational Issues: Getting started, Post-event response, Smallpox surveillance clinical case definition, Case classification, Laboratory criteria for diagnosis of smallpox, Variola major – clinical types, Smallpox outbreak, Criteria for implementation of a smallpox response plan, Public health response to a confirmed smallpox case, Active smallpox surveillance, Case reporting form, Epidemiologic investigation, Vaccination strategies to contain an outbreak, Contact tracing and follow-up, Conclusions.
16. Isolation Strategies to Contain an Outbreak: Choosing a vaccination strategy, Eradication strategy of the 1970's, Smallpox realities today, Ring vaccination strategy, Vaccination of contacts of contacts, Organizing vaccination operations.
17. Isolation and Quarantine Measures in Response to a Smallpox Emergency: Principles of isolation, Standard precautions, Additional transmission-based precautions, Personal protective equipment, Engineering controls, Isolation strategies, Hospital treatment issues in a smallpox “event,” Decontamination, Infection control in places without infrastructure, Quarantine measures

planning and operational issues, Isolation in practice, Community response, Considerations during a smallpox response, Planning for effective implementation of quarantine measures.

18. Communications: Confirmed case – a brief situation analysis, Communications objectives, Communications preparations, Critical issues and activities, Creating your pre-event communications, Recognize and prepare smallpox communications realities, Five key elements – all smallpox communication plans should address, Use developed resources, Concluding advice.
19. List of Other Resources: CDC smallpox resources, Public law, Vaccination, Websites, Literature, Images.

All of the content was categorized and placed under one of the sub-topics headings. Dr.

Delaney reviewed and edited the outlined content; checking for pertinence, correct category placement and accuracy.

Artwork and photographic images also had to be procured to support the written material.

Some original artwork was created using Adobe Photoshop® 7.0 and 3D Studio Max® by Discreet. For one image, a smallpox virion model (*refer to Figure 3-1*) was built in 3D Studio Max® and then rendered out as a jpg document, which was then imported and modified in Photoshop.

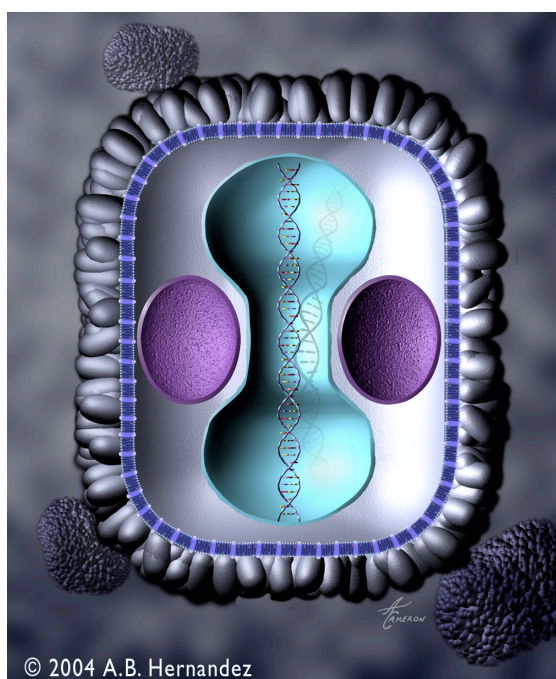


Figure 3-1

Smallpox virion model created using 3D Studio Max® and Adobe Photoshop®.

A more challenging aspect of procuring artwork was finding photographs that did not have copyright restrictions. I found a few websites that had a great number of photographs that were in the public domain, the preeminent one being the CDC's Public Health Image Library [<http://phil.cdc.gov/phil/default.asp>]. The CDC's Public Health Image Library, or PHIL, was a tremendous resource and provided the majority of images that I used in the Smallpox Guide. Each image has detailed information on the subject matter, who took the photograph and when, and most importantly the copyright information. Most of the smallpox images that I selected for use in the guide were in the public domain, so that there was no conflict with using those images. There were some excellent photographs in PHIL that were of vaccine complications that were listed as having copyright restrictions. I contacted the original owner

of these photographs, Dr. Moses Grossman (formerly Professor Emeritus, University of California and San Francisco General Hospital), who graciously allowed me to use the photographs he had taken.

Other websites which offered public domain photographs that I used in the guide are: the US Air Force Link: Photos and Art [<http://www.af.mil/photos/>], National Library of Medicine: Images from the History of Medicine [<http://www.ihm.nlm.nih.gov/>], Picture Collection Online (New York Public Library) [<http://digital.nypl.org/mmpco/>], America From the Great Depression to World War II: FSA/OWI 1935-1945 [<http://memory.loc.gov/ammem/fsowhome.html>] and The World Health Organization: Mediacentre [<http://www.who.int/multimedia/>].

Mode of Instruction – CD-ROMs in Medical Education

The decision over what type of media format would best serve the goal and objectives of the project was one of the most significant decisions in the planning process. An Internet Website, DVD-ROM and CD-ROM were initially the three primary modes that were considered. DVD-ROMs were excluded as a possible mode of presenting the smallpox guide, as there is a greater cost associated with them. Also, DVD players have only recently (the past couple of years) become standard in most personal computers. Concerns over the target audience not having DVD players installed in their personal computers also supported the decision not to use DVD-ROMs. The website was eliminated shortly thereafter because of

it's reliance on an Internet connection and also because of the sensitive material (not appropriate for all audiences) that would be included in the guide. Due to the broad range of individuals in the target audience and their individual computer setups (modems, connection speed, locations, etc.) it was determined that a CD-ROM would be a more reliable and portable type of media for the guide.

CD-ROMs have become a widely accepted media vehicle for education, from software education to medical education. The advantages of using this type of media are that costs for CDs are low, reproduction is inexpensive, they are easily portable, and while they don't last indefinitely, they should reliably last for a number of years.

In 1997, 66 percent of American households whose reference person had attended graduate school reported owning a computer, compared with less than 12 percent of those headed by one who did not graduate from high school. College graduates had the largest increase in ownership, more than doubling from 24 percent in 1990 to 56 percent in 1997 (U.S. Department of Labor, 1999).

Most medical professionals have at minimum matriculated through high school, with the majority having college or graduate experience. With this group as a target audience, assumptions could be made that since they are among the more educated part of the populous, a majority of them will have personal computers and be computer literate, thus making a CD-ROM a logical vehicle for the smallpox resource guide.

The World Factbook statistic for U.S. Internet users was 165.75 million in 2002 (U.S. Central Intelligence Agency, 2003). With half of the U.S. population being Internet users (165.75 million of the total population of 290.342 million), it was assumed that the majority of those in the target audience who own a personal computer would also be Internet savvy. An HTML (hypertext markup language) browser-type interface would be a familiar format for most of the targeted audience and would require little if any instructions on how to navigate through the information. The unique aspects of the interface (menu location, menu items, pop-up submenus) would pose no problems for those who are accustomed to viewing websites.

The decision to provide the guide via CD-ROMs was made primarily for their portability, ease of use and low cost. By providing the guide on a CD-ROM, an Internet connection was not a factor, which was important for those who may be in isolated regions or traveling. The CD-ROMs' ease of use and frequent use as an educational tool were also significant factors in creating an easy to use resource.

Design Objectives

During the analysis phase design objectives for the interactive guide were established based on research and meetings with committee members. One of the design objectives was to create an interactive guide that could be run on either a PC or a Macintosh platform (with the

PC being the primary format). Other design objectives that were defined in the analysis phase were: to create a guide that would be easy to navigate through (so that the user can structure their learning experience to suit their individual needs), to include images and artwork that support the text and enhance the user's understanding of the material and to include links to other references and websites.

Development Planning

Two documents, a hierarchy map and a spreadsheet, were created to assist in the development planning. These documents helped to keep the development of the guide organized, structured and in line with the design objectives.

After the main and sub topics were established, a hierarchy map was created to help guide the development of the project (*see Appendix B*). The map acted as a guide for the construction of the HTML pages in terms of links, number of pages and how each of the guide's pages related to each other. Using a hierarchy map to direct the construction of a website is a common practice for web designers, and applied well to this project as it was HTML based.

A spreadsheet was developed to keep track of the downloaded photographs and images (*see Appendix C*). It contained information on the name of the file, what website it was

downloaded from; its copyright status, a description of the image, whether or not it was used in the guide and in which file on my computer it resided.

Graphic and Layout Design

The ideas for the interface design began with rough pencil sketches that were developed into a few preliminary designs and then narrowed into a final design. The greatest challenge lay in creating a design where the menu items (19 main menu topics and their sub-topics) took up the least amount of page real estate yet remained easily accessible. The first two designs (*refer to Figures 3-2 & 3-3*) had too much space devoted to the menu items and left little space for the content. The final design (*refer to Figure 3-4*) utilized pop-up menus for the sub-topics, which disappeared when not activated. The pop-up menus would only appear if the mouse ‘rolled over’ a main menu topic or remained over a sub-topic pop-up window once it was activated. Ideas for the interface design were produced in Adobe Photoshop®. The dimensions of each page design were 795 x 470 pixels, with a resolution of 96 dpi. The size was determined by the average standard monitor size and the resolution was determined by new monitor resolution capabilities (96 dpi over 72 dpi). The primary goal was to offer an interface that would simplify the navigation, so that information would not be ‘buried’ within the guide and therefore difficult to access. The final design solution had all nineteen main menu items in a column on the left hand side of the page. Pop-up menus appeared as the user rolled-over the main menu items. This kept the main menu items in view all the time, which contributed to the ease of navigation throughout the guide.

It was also important to have a professional, slightly conservative look to the design. The design needed to be appropriate for the target audience and sensitive to the subject matter. A color palette of grays, blues and purples were chosen, as this cool combination was more appropriate for the somber subject matter.



Figure 3-2
Initial Interface Design #1



Figure 3-3
Initial Interface Design #2



Figure 3-4
Final Interface Design

Computer Software

A number of software programs were needed in order to bring all the elements together in the Smallpox Guide. Original artwork was created in Adobe Photoshop[®], Adobe Illustrator[®] and 3D Studio Max[®] by Discreet. The interface design was developed and in Adobe Photoshop[®], Adobe ImageReady[®], and finally produced using Macromedia Dreamweaver[®].

Adobe Photoshop[®] 7.0

Adobe Photoshop[®] is a professional grade software, available for both Mac and PC platforms. It is the industry standard software for the creation and manipulation of digital images. Photoshop[®] features a vast range of tools that mirror traditional artist tools (brush, airbrush, pencil, etc.), color palettes, and filter and texture effects to help the artist achieve the desired final product. In addition, Photoshop[®] offers a number of tools for editing existing images, as it was originally designed primarily for photographers. These tools allow the user to correct images that are not ideal by correcting color, focus, size, resolution or damaged areas. Photoshop[®] was used to ‘clean up’ and edit some of the downloaded images for the guide, as well as for the creation of original works.

Adobe Illustrator[®] 8.0

Adobe Illustrator[®] is another professional grade software package which is commonly used by designers and other professionals in art-related fields. Like Photoshop[®], it is available for

both PC and Mac platforms. It differs from Photoshop® in that it is a vector based program rather than a raster based program. A vector program creates images based on a series of interconnected points, whereas a raster program creates images based on a series of pixels. A vector based program, like Illustrator®, is most commonly used for linear elements and type. In the development of this project it was used to create some original art and for the CD inner jacket cover.

Adobe ImageReady® 7.0

Adobe ImageReady® is another software package from Adobe®. It was designed as an accompanying software to Photoshop®. It assists in transitioning an Photoshop® image into a more HTML friendly version for other HTML editing software (like Macromedia Dreamweaver® or Adobe GoLive®). Although, it could be used to create a final HTML document it is not as robust or well developed as other HTML editors such as Dreamweaver®. It was used to transition the original interface design (a Photoshop file) into a HTML file, which was then imported into Dreamweaver®.

Macromedia Dreamweaver® MX

Dreamweaver® is a professional HTML editor for designing, coding and developing websites, web pages and web applications. It is the industry standard for HTML editing software. I imported the approved interface design from ImageReady® and developed a working template from that document in Dreamweaver®. I created the roll-overs, pop-up sub-menus, and links for all of the menu items in the template as well as some other navigational

tools like page directional arrows (to go back or forward a page) and a 'Top of Page' link. I then produced all the guide's pages based on the template.

3D Studio Max® R5

3D Studio Max® is one of the leading 3D animation and modeling programs available on the market. It has diverse commercial and artistic applications, ranging in use in architecture, fine art, computer and video games, special effects in film production and medical animation. The program is designed to create the illusion of objects in three-dimensional space, animate these objects and create environmental elements to accompany the objects. I created a smallpox virion using 3D Studio Max®. By using this program I was able to light the virion, apply textures to some of its elements and turn it to view at any angle. Stills were produced and either used as they were or were imported into Photoshop® and were edited into other works.

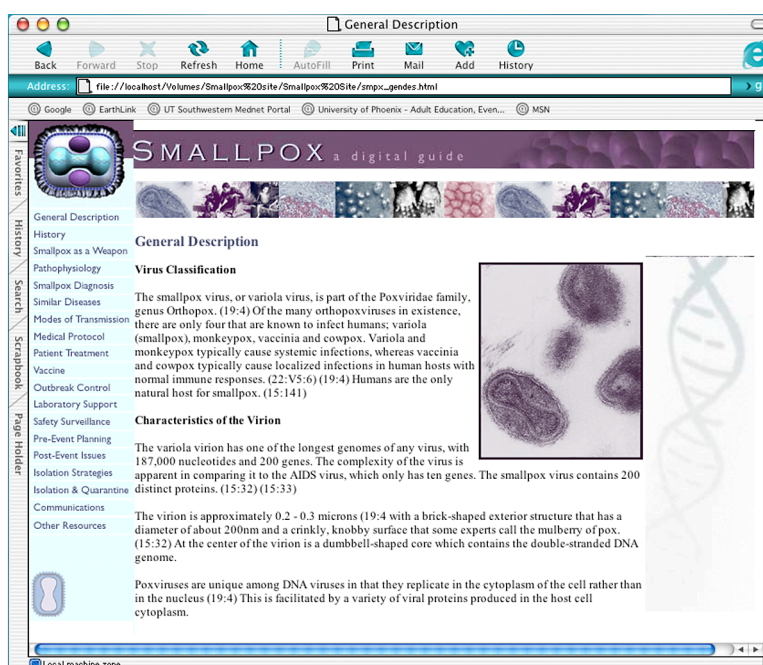


Figure 3-5
Screen capture of cells and nested tables breaking apart.

Production and Trial Run

Once the interface design was established and approved by the thesis advisory committee, production of the guide began. The final interface design, originally created in Adobe Photoshop® was exported to Adobe ImageReady® where it was divided into a series of named slices in preparation for importing it into Macromedia Dreamweaver®. The slices in ImageReady® translate into cells in a single table within Dreamweaver®. In Dreamweaver®, the pop-up menus for the sub-menu items were built and links for menu items and rollovers were created. Additional navigational features such as back and forward page arrows (to move back or forward a page) and a link to the top of the page (using an anchor) were also constructed. All of these items were constructed in a single HTML document that was saved

as a template document in Dreamweaver®. Editable areas were defined in the template that allowed me to change the content of the page and arrow links for each individual page. By creating a template document I was able to use it as the basis for all of the other pages. The color of links and the menu title were made based on the established color palette.

Upon the completion of the construction of all the pages in Dreamweaver®, I began the testing process. This included testing for functionality of the pages and their links, the images and page displaying as planned and that the navigational elements of each page worked correctly. Initial testing surfaced a problem with the cells and nested tables separating on a PC (*refer to Figure 3-5*). This was researched and finally resolved with restructuring the cells of the template page into a group of cells within a single table. The addition of a couple of navigational elements, a ‘top of page’ link at the bottom of each page and directional arrows that linked to the preceding or following page, were added to complete the final design (*refer to Figure 3-6*). Final testing was done on computers representing both platforms (Mac & PC), on differing operating systems and with different browsers. It performed well on:

1. Macintosh G5; OS X - version 10.2.8; Explorer 5.2.2, Safari 1.0.2, Mozilla 1.5.1; monitor resolution 1024 x 768.
2. Sony Vaio; Windows XP; Explorer 6; monitor resolution 1024 x 768.
3. Dell Pentium 4; Windows XP; Explorer 6; monitor resolution 1024 x 768.
4. Macintosh G4; OS X; Explorer 5.2; monitor resolution 1440 x 900.

There were some issues with its performance on one of the test machines;

1. Macintosh G4; OS 9; Explorer 5; monitor resolution 1152 x 870.

It broke up the cells to the right of the menu, not unlike the original problem of cells and tables breaking apart (*refer to Figure 3-5*). It was decided that since the problem was isolated to that one computer, setting minimum system requirements for Mac users would resolve the issue. After the testing was completed, a master CD was burned from which duplicates were produced.



Figure 3-6

Screen capture of the final version of the design for the Digital Smallpox Guide.

A CD jacket design (*refer to Figure 3-7*) and label were designed in Photoshop® so as to have a consistent design with the guide itself. The same color palette of grays, blues and purples was used as well as the same font types and some images. The image for the jacket cover was then imported into Illustrator® where the inner jacket page was laid out. The inner jacket contained credits and instructions on how to initiate the guide. The CD jacket was then printed using an Epson Stylus Color 1520 inkjet printer on inkjet quality paper.

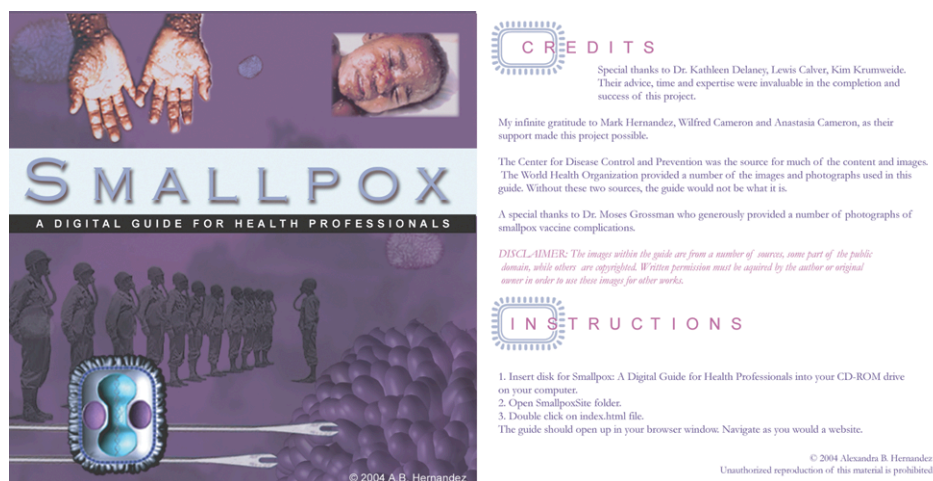


Figure 3-7
CD jacket design.

Once the guide was completed it was burned onto an Imation, 80min/700MB, CD-R disk.

Labels were applied to the CDs and the jacket was inserted into the jewel case.

A survey group was selected from the group of professionals representing some of the targeted fields that were initially questioned about their need for smallpox information. A questionnaire was created based on the goal and objectives of the guide. Each survey member was sent a cover letter, a questionnaire and a Digital Smallpox Guide CD. In the cover letter, the survey members were asked to view the content guide then complete the questionnaire. The cover letter also briefly explained the purpose of the guide and thanked them for their assistance in evaluating the project.

CHAPTER FOUR

ANALYSIS AND EVALUATION

Evaluation

Having tested the guide for errors, the CD was duplicated and sent with an accompanying questionnaire to eight health professionals for evaluation. The health professionals represented medical residents, nursing, emergency medicine, internal medicine and professors. The survey groups' responses were based on a Likert scale, with each statement having the choices of strongly agree, agree, no opinion, disagree or strongly disagree. They were also provided with space for additional comments or suggestions (See Appendix A).

The questions and responses on the returned seven surveys were as follows:

- 1) The CD-ROM format is a suitable method to deliver the guide.

Six strongly agree; one agree.

- 2) The smallpox digital guide is easy to navigate through.

Six strongly agree; one agree.

- 3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.

Six strongly agree; one agree.

- 4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.

Five strongly agree; two agree.

- 5) The didactic material describing smallpox topics is adequate.

Five strongly agree; two agree.

- 6) The images and supportive artwork are important in a thorough understanding of the material.

Six strongly agree; one agree.

- 7) The graphic design of the guide is visually appealing.

Five strongly agree; two agree.

- 8) Having printed pages of some of the material would be useful.

Three strongly agree; three agree; and one no opinion.

- 9) The diagnosis & differential diagnosis information provided in the guide was sufficient.

Six strongly agree; one agree.

- 10) The guide provided the information needed in order to correctly identify smallpox.

Seven strongly agree.

The feedback from the survey group was that it was a “very good project” (Appendix A,

Questionnaire, p. 52). There were some issues with the cells breaking apart on one

evaluator’s computer and the guide running very slowly on his machine. He used a

Macintosh G4, running OS 9, Explorer 5 browser to view the Digital Guide to Smallpox.

Another evaluator experienced similar problems with the guide running very slowly on her

machine, which was also a Macintosh running OS 9. She reported that “it took more than an hour to complete the guide on this computer.” There were also a couple of misspelled words that were noted by some of the evaluators. Those words were then corrected in the guide.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Results from the informal survey indicate that this project met its goal of producing an electronic resource guide for medical professionals to better prepare them in the case of a smallpox event. The objectives of the project, to cover pertinent smallpox topics in a single resource that was structured so that users could easily navigate to the information that was most pertinent to them and bypass familiar or unnecessary material, were also met. The overall design and supportive artwork were also successful elements of the guide. One evaluator wrote in the comments section of the questionnaire: “As a visual learner, I found the pictures of the smallpox rash progression and the pictures differentiating the different types of smallpox rashes vs. similar diseases very helpful.” Her written comments supported the questionnaire results of other evaluator’s opinions of the guide’s supportive artwork. The decision to provide the guide in an HTML format and on a CD-ROM was also well received. The problems with the page breaking apart and the guide running slowly in OS 9 on the two Macintosh computers (one a G4 the other an iMac) were the result of two of the evaluators not using the minimum system requirement of an OS X operating system for Macintosh computers. Overall this project clearly met its goal and objectives, and has the potential to become a useful teaching tool on smallpox for a great number of health professionals.

Suggested Areas of Further Study

With the global climate being what it currently is, and the possibility of terrorist attacks greater than any other time in history for the United States it is important for our population of medical professionals to be aware and knowledgeable regarding biological agents that could be used in an attack. Smallpox is one of the more frightening possible agents, but there are others that are likely candidates such as the plague, tularemia, anthrax, botulism and viral hemorrhagic fevers (the other Category A agents). Using the Digital Guide to Smallpox as a template for the other Category A agents to create a volume of educational CD-ROMs on potential biological agents would be of great value in the United States' effort for bioterrorism preparations.

The construction of the guide in a web-based format would lend itself well to being posted on an intranet site as a website in addition to being offered on CD-ROM. The advantage of an Intranet site over the internet is that usually Intranet sites are servicing a select group of individuals who have some sort of standardization of their computer systems. By providing the guide via an intranet site one could ensure that the minimum system standards would be met for all users who have access to that site.

Future modifications to the guide might also include giving teachers who are using the guide to teach a group of health professionals, the ability to add external links within the guide and

some type of testing program. By making these types of changes teachers would be able to model the guide to suit their specific lesson plans and have the guide become an even more valuable tool.

The survey results indicate that offering printable PDF versions of the guide's pages would also be valuable. Three of the six respondents indicated that they strongly agree that "Having printed pages of some of the material would be useful" (Appendix A, Question #8). Printed pages may also be valuable for those using the guide to teach a group of health professionals on smallpox. Handouts could be developed from those pages.

APPENDIX A

QUESTIONNAIRE AND RESPONSES

Appendix A contains the completed questionnaires and responses from a selected group of medical professionals.

Kenry Yang &
David Greiner

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

Alexandra, this is a great website that is extremely useful. I did a talk on smallpox and you hit all the important points. The graphics are extremely impressive and make the understanding of the disease easier.

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

It would be nice if the CD was self launching or you had the Index page inside the first folder.
 This is a wonderful Program. Thank You Sooo much for sharing it with us.

Noted Typos are on the Back:

Inside Cover of Disk - instruction is missing a + instruction

History of DZ

Origin

5th Paragraph - "Term first used during 6th" Needs something Before it To Flow Better

History of DZ

Small pox vaccine

Lead

4th Paragraph "Which led to the"

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

This was a very good project. I did notice 2 misspelled words. #1 Introduction to smallpox page 2nd sentence, "Transmission" add s. #2 CD cover "Instructions" add T. Thank you so much for allowing me to review your work. Call me if you have any questions. 214-590-6883

Lee Barnhart
ESD

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

As a visual learner, I found the pictures of the smallpox rash progression and the pictures differentiating the different types of smallpox rashes vs. similar diseases very helpful. I also agree that having a printed handout of these pictures and the medical protocol section would be helpful for healthcare workers.

System Information

Please fill in the appropriate bubbles to indicate your computer system specifics that were used in running the Digital Smallpox Guide CD-ROM.

Computer: ☐ Macintosh ☒ PC

Computer Name: (ex. Sony Vaio, Mac G5) Compaq

Operating System: ☒ Windows 98 ☐ Windows XP ☐ OS 9 ☐ OS X Other: _____

Browser: ☒ Explorer ☐ Navigator ☐ Safari ☐ Mozilla ☐ Other: _____

Browser Version: _____

Screen Resolution: ☐ 1024 x 768 ☐ 1152 x 870 ☐ 1280 x 960 ☐ 1440 x 900 ☒ Other: 800 x 600

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

On my computer, the transition between pages took a long time, ^{maybe 60 seconds part of the time.} I had to do other things, then go back to ^{view} the next screen. It took more than an hour to complete the guide on this computer. The guide itself is well done.

Thank you for your assistance in evaluating the Digital Guide to Smallpox.

System Information

Please fill in the appropriate bubbles to indicate your computer system specifics that were used in running the Digital Smallpox Guide CD-ROM.

Computer: ☒ Macintosh ☐ PC

Computer Name: (ex. Sony Vaio, Mac G5) iMac

Operating System: ☐ Windows 98 ☐ Windows XP ☒ OS 9 ☐ OS X Other: _____

Browser: ☒ Explorer ☐ Navigator ☐ Safari ☐ Mozilla ☐ Other: _____

Browser Version: 1.9.9.5

Screen Resolution: ☒ 1024 x 768 ☐ 1152 x 870 ☐ 1280 x 960 ☐ 1440 x 900 ☐ Other: _____

Thank you for your assistance in evaluating the Digital Guide to Smallpox.

Questionnaire for CD-ROM

A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
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<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	8) Having printed pages of some of the material would be useful.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

Works better on PC than Mac. ?

Thank you for your assistance in evaluating the Digital Guide to Smallpox.

System Information

Please fill in the appropriate bubbles to indicate your computer system specifics that were used in running the Digital Smallpox Guide CD-ROM.

Computer: ☐ Macintosh ☒ PC

Computer Name: (ex. Sony Vaio, Mac G5) Dell

Operating System: ☐ Windows 98 ☒ Windows XP ☐ OS 9 ☐ OS X Other: _____

Browser: ☒ Explorer ☐ Navigator ☐ Safari ☐ Mozilla ☐ Other: _____

Browser Version: _____

Screen Resolution: ☐ 1024 x 768 ☐ 1152 x 870 ☐ 1280 x 960 ☐ 1440 x 900 ☐ Other: _____

Thank you for your assistance in evaluating the Digital Guide to Smallpox.

Questionnaire for CD-ROM

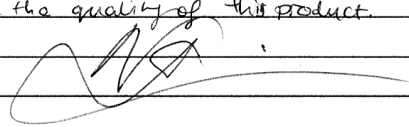
A Digital Guide to Smallpox

Instructions: Please shade in the bubble to rate your level of agreement with the statements to the right.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1) The CD-ROM format is a suitable method to deliver the guide.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2) The smallpox digital guide is easy to navigate through.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3) The guide provides the information needed to become better prepared in order to respond to a smallpox event.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4) The content of the guide is organized so that the most important smallpox topics are easily accessed, and familiar or unnecessary topics can be by-passed.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5) The didactic material describing smallpox topics is adequate.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6) The images and supportive artwork are important in a thorough understanding of the material.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7) The graphic design of the guide is visually appealing.
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<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9) The diagnosis & differential diagnosis information provided in the guide was sufficient.
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10) The guide provided the information needed in order to correctly identify smallpox.

Additional comments and/or suggestions:

The guide is set up in an accessible, easy to read format with an ample supply of supporting information. I appreciate the depth of research employed in collecting such information and distilling it into the important facts. Overall, I was very impressed with the quality of this product.



System Information

Please fill in the appropriate bubbles to indicate your computer system specifics that were used in running the Digital Smallpox Guide CD-ROM.

Computer: ☐ Macintosh ☒ PC

Computer Name: (ex. Sony Vaio, Mac G5) Dell Dimension 8100

Operating System: ☐ Windows 98 ☒ Windows XP ☐ OS 9 ☐ OS X Other: _____

Browser: ☒ Explorer ☐ Navigator ☐ Safari ☐ Mozilla ☐ Other: _____

Browser Version: 6.1

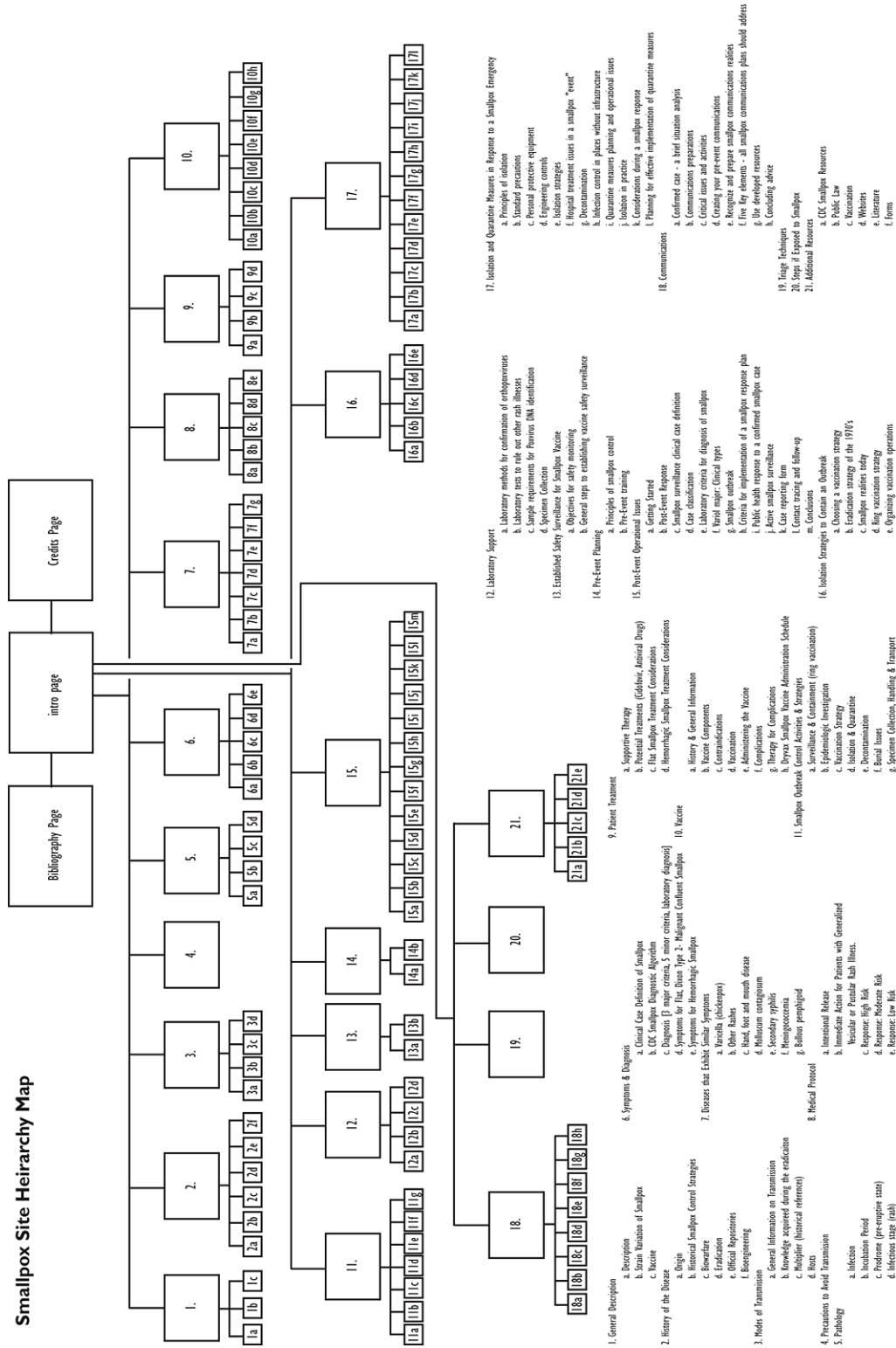
Screen Resolution: ☒ 1024 x 768 ☐ 1152 x 870 ☐ 1280 x 960 ☐ 1440 x 900 ☐ Other: _____

APPENDIX B

HIERARCHY MAP FOR HTML PAGES

Appendix B contains the hierarchy map used as a guide for the construction of the HTML pages in terms of links, number of pages and how each of the guide's pages related to each other.

Smallpox Site Heirarchy Map



APPENDIX C IMAGE SPREADSHEET

Appendix C contains the spreadsheet developed to keep track of the downloaded photographs and images and any significant information regarding those images.

Photo ID #	Copyright	Content Provider	My Source	Description	File Folder	USED	Misc. Info.
030123-O-9999-043.jpg	Public Domain	U.S. Air Force	http://www.af.mil/photos/	"Under Fire" - Camp Bullis, TX. U.S. Air Force photo by Staff Sgt. Richard Freeland.	Smps as a Weapon		Air Force Link
030331-F-0000C-001.jpg	Public Domain	The U.S. Army	http://www.af.mil/photos/	Fort Detrick, Md. - Air Force medical specialists from U.S. bases test the Small Shelter Patient Decontamination System.	Outbreak Control	YES	decontamination
030807-F-0000C-003.jpg	Public Domain	The U.S. Air Force photo by Staff Sgt. Jocelyn Rich	http://www.af.mil/photos/	Operation Iraqi Freedom - Maj. (Dr.) Lidia Illes loads her equipment in an ambulance. She is a flight doctor.	Transmission	YES	
036_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	This infant sustained complications after a smallpox vaccination diagnosed as generalized vaccinia.	Vaccine	YES	generalized vaccinia
039.jpg	Public Domain	The National Library of Medicine & World Health Organization	http://www.nlm.nih.gov/	Statue: Sitala Ma, the Hindu goddess of smallpox	History	YES	Order # A014039
040223-F-2352G-035.jpg	Public Domain	U.S. Air Force	http://www.af.mil/photos/	"Gas, gas, gas!" - Lackland Air Force Base, TX. U.S. Air Force photo by Master Sgt. Elfron Gonzalez.	Smps as a Weapon		Air Force Link
040323-F-3963C-070.jpg	Public Domain	U.S. Air Force	http://www.af.mil/photos/	"Guard Duty" - Osan Air Base, South Korea - U.S. Air Force photo by Staff Sgt. Bradley C. Church.	Smps as a Weapon		Air Force Link
040325-F-8705R-028.jpg	Public Domain	U.S. Air Force	http://www.af.mil/photos/	"Water Check" - Royal Air Force Fairford, England. U.S. Air Force photo by Master Sgt. Keith Reed.	Smps as a Weapon		Air Force Link
041_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	After receiving a smallpox vaccination, this child developed a cluster of satellite lesions surrounding the vaccination site.	Vaccine		satellite lesions Permission secured for usage.
137.jpg	Public Domain	The National Library of Medicine	http://www.nlm.nih.gov/	Warning Sign: Announcing smallpox warning.	History		Order # A021137
250.jpg	Public Domain	The National Library of Medicine	http://www.nlm.nih.gov/	Photograph: Freeze-dried vaccine being prepared from virus grown on the skin of a calf.	Vaccine		Order # A030250 WHO photo by J. Mole
419.jpg	Public Domain	The National Library of Medicine John Van Rensselaer Hoff - photographer	http://www.nlm.nih.gov/	Photograph: A smallpox patient at Military Hospital No. 45, an isolation hospital, Gungahlin	History	YES	Order # A020419 also available from PHIL - pub.dom.
4581_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	Progressive vaccinia occurs due to an immune defect in the vaccinated, or inadvertently inoculated individual who's had contact with a vaccinee. Nearly all instances have been those with a defined cell-mediated immune (CMI) defect (T-cell deficiency).	Vaccine	YES	PHIL ID# 4581 progressive vaccinia Permission secured for usage.
4582_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	This is an example of what is termed satellite lesions, which normally heal at the same rate as the primary lesion.	Vaccine	YES	satellite lesions Permission secured for usage.
4584_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	This was a case involving the onset of a progressive vaccinia reaction. This was 2wks following a smallpox vaccination.	Vaccine		progressive vaccinia Permission secured for usage.
4586_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	This patient presented with what was diagnosed as progressive vaccinia after being vaccinated for smallpox.	Vaccine		PHIL ID# 4586 progressive vaccinia Permission secured for usage.
4590_jores.jpg	Public Domain	CDC/Compiled by California Department of Health Services	PHIL: http://phil.cdc.gov	This patient presented with vaccinia gangrenosum after having been vaccinated for smallpox now called progressive vaccinia.	Vaccine	YES	progressive vaccinia
4606_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	An infant with diaper dermatitis is at a much higher risk of developing an adverse skin reaction following a smallpox vaccination due to autoinoculation of the affected area, and should wait for the condition to resolve before receiving a vaccination.	Vaccine	YES	PHIL ID# 4606 autoinoculation Permission secured for usage.
4608_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	These are eczema vaccinatum lesions on the skin of a smallpox vaccine recipient.	Vaccine	YES	eczema vaccinatum Permission secured for usage.
4609_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	These are eczema vaccinatum lesions on the skin of a smallpox vaccine recipient.	Vaccine		eczema vaccinatum Permission secured for usage.
4612_jores.jpg	©	Moses Grossman, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	These are eczema vaccinatum lesions on the skin of a patient who'd come into contact with a vaccinated dance partner.	Vaccine	YES	eczema vaccinatum Permission secured for usage.
4621_jores.jpg	©	Allen W. Mathies, MD, John Leedom, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	This 28 yr. old with eczema vaccinatum contracted it from her vaccinated child. She'd had a history of atopic dermatitis.	Vaccine		eczema vaccinatum
4640_jores.jpg	©	Allen W. Mathies, MD, John Leedom, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	Due to progressive vaccinia this patient required a graft in order to correct the necrotic vaccination site.	Vaccine		progressive vaccinia
4647_jores.jpg	©	Allen W. Mathies, MD, John Leedom, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	http://www.phil.cdc.gov	This child developed a secondary staphylococcal infection at the smallpox vaccination site.	Vaccine	YES	secondary staphylococcal Permission secured for usage.
4652_jores.jpg	©	Allen W. Mathies, MD, John Leedom, MD/California Emergency Preparedness Office (Cal/EPO), Immunization Branch	PHIL: http://phil.cdc.gov	After receiving a smallpox vaccination this 1 yr. old child developed erythema multiforme.	Vaccine Similar Diseases	YES	erythema multiforme Permission secured for usage.
4727_jores.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	This field clinician is examining a baby afflicted with smallpox.	Vaccine		
4728_jores.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	This child is showing the pan-corporal rash due to the smallpox variola major virus.	Misc. Images Safety Surveillance	YES	

5217_jores.jpg	©	CDC/Moses Grossman, MD/ California Emergency Preparedness Office (CalHEPO)	http://www.phil.cdc.gov	These are eczema vaccinatum skin lesions on the torso of a smallpox vaccine recipient	Vaccine	YES	Permission secured for usage.
5407_jores.jpg	Public Domain	CDC/Dr. K.L. Hermann	http://www.phil.cdc.gov	This pustulo-vesicular rash represents a generalized herpes outbreak due to the Varicella-zoster virus (VZV) pathogen. 1966.	Similar Diseases	YES	varicella-zoster
5546_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	These individuals on an airplane were admiring a newspaper article entitled "Smallpox Eradicated from the World!"	Vaccine		eradication
5633_jores.jpg	Public Domain	CDC/James Hicks	http://www.phil.cdc.gov	This photograph depicting a Bangladeshi boy with smallpox, reveals the usual distribution pattern of the maculopapular rash.	Misc. Images		
622.jpg	Public Domain	The National Library of Medicine	http://www.nlm.nih.gov/	Illustration of the hand Jenner used as a source for his vaccine.	History		Order # A012622 From book "An inquiry into the causes and effects of the variolae vaccine. 1798."
684.jpg	Public Domain	The National Library of Medicine	http://www.nlm.nih.gov/	Lithograph portrait of Edward Jenner.	History		Order # B015684
686.jpg	Public Domain	The National Library of Medicine	http://www.nlm.nih.gov/	Engraving of Jenner vaccinating a young boy.	History		Order # B015686
805174W.jpg	Public Domain	The New York Public Library Picture Collection Online	http://www.nara.gov/exhall/picturing_the_century/home.html	Illustration of a New York Smallpox Hospital	History		
826811R.jpg	Public Domain	The New York Public Library Picture Collection Online Pa-Qin, artist	http://www.nara.gov/exhall/picturing_the_century/home.html	"Mandarin" - Engraving of Mandarin man in traditional costume. Published 1800	History	YES	
8406122r.jpg	Public Domain	Library of Congress, Prints & Photographs Division, FSA-OWI Collection, [reproduction # LC-USW3- 004788-D DCLC]	http://memory.loc.gov/ammem/fo-whome.html	Edgewood Arsenal, Maryland. Gas demonstration. Reconditioning gas masks at the gas mask factory.	Smpx as a Weapon		Jack Delano, photographer. Created June 1942.
8440224r.jpg	Public Domain	Library of Congress, Prints & Photographs Division, FSA-OWI Collection, [reproduction # LC-USW3- 034953-D DCLC]	http://memory.loc.gov/ammem/fo-whome.html	Daniel Field, Georgia Air Service Command. Gas mask instruction.	Smpx as a Weapon		Created July 1943.
8e00137r.jpg	Public Domain	Library of Congress, Prints & Photographs Division, FSA-OWI Collection, [reproduction # LC-USW3- 000280-ZC DCLC]	http://memory.loc.gov/ammem/fo-whome.html	Scott Field, Illinois. Troops to the Army Air Forces Technical Training Command easily surmounting the "turkey roost," despite full equipment and gas masks. Gas mask drill.	Smpx as a Weapon		Created 1942?
968.jpg	Public Domain	The National Library of Medicine & World Health Organization	http://www.nlm.nih.gov/	Photograph: A large group of schoolboys carrying signs urging vaccination against smallpox.	History	YES	Order # A029968 Photo by T.S. Satyan WHO allows usage of images for academic purposes.
bloodvials.jpg	Royalty Free Purchased Art	Art Explosion	CD		Misc. Images		
drugcaps.jpg	Royalty Free Purchased Art	Art Explosion	CD		Misc. Images		
glovcbors.jpg	Royalty Free Purchased Art	Art Explosion	CD		Misc. Images		
gloves.jpg	Royalty Free Purchased Art	Art Explosion	CD		Misc. Images		
map_image.jpg	Public Domain	American Memory Maps Collection	http://memory.loc.gov/ammem/gmdhtml/gmdhome.html	1996 Map of China created by the Central Intelligence Agency	History	YES	
mvey0414.jpg	Public Domain	George Saxton, NESDIS, NOAA	http://www.photolib.noaa.gov/	People's Republic of China rice paddy	History	YES	
PHIL_1180_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC laboratory scene	Laboratory Support	YES	PHIL ID# 1180
PHIL_131_jores.jpg	Public Domain	CDC/NIP/Barbara Rice	PHIL: http://phil.cdc.gov	Man with smallpox.	General Description		
PHIL_1331_jores.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	Children of Cameroon with their vaccination certificates after having been vaccinated against smallpox.	Vaccine		eradication
PHIL_1849_jores.jpg	Public Domain	CDC/Fred Murphy; Sylvia Whitfield	PHIL: http://phil.cdc.gov	Transmission electron micrograph of the smallpox virus.	General Description	YES	
PHIL_1857_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A CDC scientist showers in a protective suite before leaving a Biosafety Level 4 laboratory.	Laboratory Support		PHIL ID# 1857
PHIL_1877_jores.jpg	Public Domain	CDC/Fred Murphy; Sylvia Whitfield	PHIL: http://phil.cdc.gov	Electron micrograph of a Vaccinia Virus.	Vaccine		
PHIL_1986_jores.jpg	Public Domain	CDC/Dr. Weyand	PHIL: http://phil.cdc.gov	Secondary infection of the cornea in a 12 year old male, post-vaccination reaction.	Vaccine	YES	autoinoculation
PHIL_1994_jores.jpg	Public Domain	CDC/Dr. J. Noble Jr.	http://www.phil.cdc.gov	Close up of smallpox lesions on the face of a patient living in Accra, Ghana, 1967.	Misc. Images	YES	
PHIL_2001_jores.jpg	Public Domain	CDC/K.L. Hermann	http://www.phil.cdc.gov	Generalized vesicular rash following primary smallpox vaccination.	Vaccine	YES	1966
PHIL_2002_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Child with full-body distribution of smallpox eruptions, Pakistan, 1955.	Misc. Images	YES	
PHIL_2003_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Patient with smallpox, Kosovo, Yugoslavia epidemic, March and April 1972.	Diagnosis		palms
PHIL_2004_jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Close-up of the skin reaction at a smallpox vaccination site.	Vaccine	YES	revaccination, major take
PHIL_2007_jores.jpg	Public Domain	Courtesy of World Health Organization; Diagnosis of Smallpox Slide Series	http://www.phil.cdc.gov	Smallpox eruptions on arm and palm.	Pathophysiology		smallpox lesions WHO allows usage of images for academic purposes.
PHIL_2008_jores.jpg	Public Domain	CDC/Dr. J. Noble Jr.	http://www.phil.cdc.gov	Early smallpox pustules on the face of an infant.	Misc. Images	YES	

PHIL_2009_lesions.jpg	Public Domain	Courtesy of World Health Organization; Diagnosis of Smallpox Slide Series	http://www.phil.cdc.gov	These smallpox pustules are round, smooth, deep and all at the same stage. 1969.	Pathophysiology	YES	smallpox lesions WHO allows usage of images for academic purposes.
PHIL_2010_lesions.jpg	Public Domain	CDC/Dr. Don Millar	http://www.phil.cdc.gov	An Iranian citizen with smallpox in Teheran, Iran, 1962.	Misc. Images		smallpox infection
PHIL_2143_lesions.jpg	Public Domain	CDC/Cynthia Goldsmith	PHIL: http://phil.cdc.gov	An electron micrograph of a Vaccinia virus.	Vaccine	YES	
PHIL_2291_lesions.jpg	Public Domain	CDC/Fred Murphy; Sylvia Whitfield	PHIL: http://phil.cdc.gov	A transmission electron micrograph of a tissue section containing variola viruses.	Laboratory Support		
PHIL_2292_lesions.jpg	Public Domain	CDC/Fred Murphy; Sylvia Whitfield	PHIL: http://phil.cdc.gov	A transmission electron micrograph of smallpox viruses.	General Description		
PHIL_2293_lesions.jpg	Public Domain	CDC/George Stenhouse	http://www.phil.cdc.gov	A jet injector gun being used during mass smallpox immunization procedures.	Vaccine		
PHIL_2294_lesions.jpg	Public Domain	CDC/Fred Murphy; Sylvia Whitfield	PHIL: http://phil.cdc.gov	A transmission electron micrograph of smallpox viruses using a negative stain technique.	General Description		
PHIL_2329_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Close-up of monkeypox lesions on the arm and leg of a female child. 1971	Similar Diseases		monkeypox
PHIL_2394_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	An electron micrograph of Vaccinia virions; a virion is a single complete and infectious virus particle. 1981	Vaccine		vaccinia
PHIL_2421_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A photograph of smallpox lesions on the skin of the arm during the 4th day of the rash. 1972.	Pathophysiology		4th day of rash
PHIL_2426_lesions.jpg	Public Domain	CDC/Dr. James Nakano	http://www.phil.cdc.gov	Electron micrograph of Variola, Varicella and Vaccinia virions. 1975	Similar Diseases		Ems
PHIL_2587_lesions.jpg	Public Domain	CDC/Stuffed Smith	PHIL: http://phil.cdc.gov	Early pre-1979 poster created to promote the importance of Smallpox and Measles vaccinations in foreign lands.	Vaccine	YES	
PHIL_2639_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Photograph of a Nigerian child being immunized during the Smallpox Eradication & Measles Control Program of West Africa.	Vaccine	YES	eradication
PHIL_2666_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A close-up of the tip of a bifurcated needle used to vaccinate individuals with the smallpox vaccine.	Vaccine		
PHIL_2667_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A close-up of the tip of a bifurcated needle used to vaccinate individuals containing some vaccine solution. 2002	Vaccine		
PHIL_2669_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Sterile packaging of bifurcated needles used to vaccinate individuals with the smallpox vaccine.	Vaccine	YES	
PHIL_2672_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	The tip of a hand-held bifurcated needle used to vaccinate individuals with the smallpox vaccine.	Vaccine		
PHIL_2674_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Components of a smallpox vaccination kit include, diluent, a vial of Dryvax® smallpox vaccine, and a bifurcated needle.	Vaccine	YES	
PHIL_2819_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC Clinician shows smallpox vaccine in the foam container and its diluent in a syringe during the 2002 Vaccinator Workshop. 2002	Vaccine	YES	
PHIL_2827_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC Clinician demonstrates the use of a bifurcated needle during the 2002 Smallpox Vaccinator Workshop.	Vaccine	YES	
PHIL_2832_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC Clinician shows bifurcated needle with saline solution used in smallpox vaccination during the 2002 Vaccinator Workshop. 2002	Vaccine	YES	
PHIL_2839_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC Clinician shows the saline solution and gloves used during the 2002 Smallpox Vaccinator Workshop. 2002	Vaccine		
PHIL_284_lesions.jpg	Public Domain	CDC/James Hicks	http://www.phil.cdc.gov	Smallpox lesions on skin of trunk.	Misc. Images		
PHIL_2841_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	CDC Clinician demonstrates the use of a bifurcated needle during the 2002 Smallpox Vaccinator Workshop.	History Vaccine	YES	
PHIL_2882_lesions.jpg	Public Domain	CDC/J.D. Millar	http://www.phil.cdc.gov	Note the Chickenpox lesions on the skin of this 4 year old Indonesian child's torso on day 5 of the illness.	Similar Diseases		
PHIL_2885_lesions.jpg	Public Domain	CDC/J.D. Millar	http://www.phil.cdc.gov	Note the chickenpox lesions on the skin of this patient's back and buttocks at day 6 of the illness. 1962	Similar Diseases		chickenpox
PHIL_3_lesions.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	Boy with smallpox.	General Description	YES	
PHIL_3217_lesions.jpg	Public Domain	CDC/Dr. Michael Lane	http://www.phil.cdc.gov	A post-smallpox vaccination complication, this baby developed secondary periorcular lesions.	Vaccine		autoinoculation
PHIL_3219_lesions.jpg	Public Domain	CDC/Brian Holloway	http://www.phil.cdc.gov	This is probably the last "variolation" dosage from India during the early 1970s. 1976.	History		variolation
PHIL_3226_lesions.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	This micrograph reveals the histologic changes in human skin that has been infected with the smallpox variola virus.	Laboratory Support		
PHIL_3236_lesions.jpg	Public Domain	CDC/John D. Millar	http://www.phil.cdc.gov	Photographs of vaccination sites "takes" shot at different intervals over a two week period.	Vaccine		1964
PHIL_3248_lesions.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	This 2 year old boy was photographed on the eighth day after an accidental periorcular inoculation of vaccinia virus.	Vaccine		autoinoculation periorcular inoculation
PHIL_3257_lesions.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This was a patient with confluent smallpox, a condition where pustules become so numerous that they merge together. 1970.	Diagnosis	YES	confluent smallpox
PHIL_3259_lesions.jpg	Public Domain	CDC/Don Eddins	http://www.phil.cdc.gov	This child underwent hypopigmentation, or loss of pre-existing melanin, after contracting smallpox. 1972.	Pathophysiology	YES	hypopigmentation

PHIL_3262_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Note the smallpox lesions on the body of this child during the 5th day of infection. 1972.	Pathophysiology		day 5
PHIL_3268_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This photograph depicts an African child displaying the typical rash distribution of smallpox on his face, chest and arms. 1970.	Diagnosis	YES	smallpox lesions
PHIL_3269_Jores.jpg	Public Domain	CDC/Don Edlins	http://www.phil.cdc.gov	This child infected by Variola major virus (smallpox) was photographed during the pustular stage. 1972.	Transmission	YES	pustules
PHIL_3282_Jores.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	These are classic bullous erythema multiforme lesions (Stevens-Johnson syndrome) 2 wks after a primary vaccination of an 8 mo old. 1969.	Vaccine	YES	bullous erythema multiforme Stevens-Johnson syndrome
PHIL_3286_Jores.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	This 8 mo. Old patient displayed erythema multiforme lesions 2 weeks after his primary smallpox vaccination.	Vaccine		erythema multiforme
PHIL_3297_Jores.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	This 5 yr. Old girl was a primary smallpox vaccinee who auto-inoculated both periorbital areas.	Vaccine		autoinoculation periorbital inoculation
PHIL_3298_Jores.jpg	Public Domain	CDC/Dr. William Foege	http://www.phil.cdc.gov	This photograph depicts the appearance of a smallpox vaccination site "take" after using a Ped-O-Jet® injector.	Vaccine		vaccination scar
PHIL_3303_Jores.jpg	Public Domain	CDC/Dr. Paul B. Dean	http://www.phil.cdc.gov	This child was infected with the smallpox virus, and on day 8 of the rash, shows the typical lesions on his palms. 1972	Pathophysiology	YES	palms
PHIL_3308_Jores.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	This child had developed a severe primary reaction after receiving a smallpox vaccination; 9 days post-vaccination.	Vaccine	YES	
PHIL_3327_Jores.jpg	Public Domain	CDC/Dr. James Nakano	http://www.phil.cdc.gov	This is a chickenpox scab (left), and a smallpox scab (right) viewed in profile as a demonstration in comparative morphology. 1977	Similar Diseases	YES	chickenpox
PHIL_3331_Jores.jpg	Public Domain	CDC	PHIL: http://phil.cdc.gov	This micrograph reveals the histologic changes in human skin that has been infected with the smallpox variola virus.	Laboratory Support		
PHIL_3333_Jores.jpg	Public Domain	CDC/Dr. William Foege	http://www.phil.cdc.gov	This patient was infected with smallpox during the Kosovo, Yugoslavian epidemic of 1972. Note the pustules on the mucous membranes in his oral cavity.	Misc. Images		
PHIL_3338_Jores.jpg	Public Domain	CDC/Arthur E. Kaye	http://www.phil.cdc.gov	This otherwise healthy child developed extensive vaccinal scarring after contracting the virus while still in-utero. 1969.	Vaccine	YES	contraindications pregnancy
PHIL_3480_Jores.jpg	Public Domain	CDC/Susan Lindsey	http://www.phil.cdc.gov	This patient presented with a papular rash on the sole of the foot due to secondary syphilis. 1977.	Similar Diseases	YES	secondary syphilis
PHIL_4103_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This plantar foot rash was suspected to be smallpox related, but was later determined to be caused by herpes zoster virus. 1971.	Similar Diseases	YES	herpes zoster virus
PHIL_4350_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This picture shows multiple pustules on the sole of the foot of a child known to be infected with smallpox.	Pathophysiology		smallpox lesions
PHIL_4352_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This photograph of the hands of a young smallpox patient shows the typical lesions on palms and forearms. 1969.	Misc. Images Outbreak Control	YES	palms
PHIL_4353_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This photograph of a smallpox patient shows a close-up view of the thigh with multiple pustules. 1969.	Pathophysiology		pustules
PHIL_4357_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	In this photo of a young woman with smallpox, fluid has begun to accumulate in several of the papules (day 3 of rash).	Misc. Images	YES	papules
PHIL_4367_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	In this chickenpox patient, many pox are present on the back, but only a few on his arms.	Similar Diseases		chickenpox
PHIL_4369_Jores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	This image reveals the appearance of the facial rash of a chickenpox patient during the 3rd day of the illness. 1969.	Similar Diseases	YES	chickenpox
PHIL_4433_Jores.jpg	Public Domain	CDC/Kelly Thomas	http://www.phil.cdc.gov	This smallpox vaccinee is shown placing a dirty waterproof bandage into a sealable plastic bag. 2003	Vaccine		
PHIL_4436_Jores.jpg	Public Domain	CDC/Kelly Thomas	http://www.phil.cdc.gov	This image demonstrates how a smallpox vaccinee prepares a gauze bandage in order to cover her vaccination site.	Vaccine		
PHIL_4438_Jores.jpg	Public Domain	CDC/Kelly Thomas	http://www.phil.cdc.gov	This image demonstrates how a smallpox vaccinee washes her hands after handling her vaccination site bandage. 2003.	Vaccine	YES	
PHIL_4454_Jores.jpg	Public Domain	CDC/Kelly Thomas	http://www.phil.cdc.gov	This demonstrates how a smallpox vaccinee covers a vaccination site with a gauze bandage and medical tape after taking a shower. 2003	Vaccine	YES	
pills.jpg	Royalty Free Purchased Art	Art Explosion	CD	Pills	Misc. Images		
pills2.jpg	Royalty Free Purchased Art	Art Explosion	CD	Pills	Misc. Images		
pills3.jpg	Royalty Free Purchased Art	Art Explosion	CD	Pills	Misc. Images		
ramsev.jpg	?		CDC Smallpox Course	Photograph of Ramses V mummy in profile.	History	YES	
qp2.html&doc.doc1.jpg	©	World Health Organization (WHO)	http://www.who.int/emc/diseases/smallpox/Smallpoxvaccination.html	Ordinary type smallpox that is discrete.	Diagnosis		ordinary type - discrete WHO allows usage of images for academic purposes.
qp2.html&doc.doc2.jpg	©	World Health Organization (WHO)	http://www.who.int/emc/diseases/smallpox/Smallpoxvaccination.html	Ordinary type smallpox that is confluent.	Diagnosis	YES	ordinary type - confluent WHO allows usage of images for academic purposes.
qp2.html&doc.doc3.jpg	©	World Health Organization (WHO)	http://www.who.int/emc/diseases/smallpox/Smallpoxvaccination.html	Flat type smallpox	Diagnosis	YES	flat type WHO allows usage of images for academic purposes.

sp2.html/doc.doc4.jpg	©	World Health Organization (WHO)	http://www.who.int/emc/diseases/smallpox/smallpoxvaccination.html	Late hemorrhagic smallpox	Diagnosis	YES	late hemorrhagic WHO allows usage of images for academic purposes.
Spox_001.jpg - Spox_036.jpg	©	World Health Organization (WHO)	http://www.who.int/emc/diseases/smallpox/slideset/	WHO slide set on the diagnosis of smallpox	Pathophysiology	YES	WHO allows usage of images for academic purposes.
vaxint5a.jpg	Public Domain	CDC	http://www.bt.cdc.gov/agent/smallpox/vaccineimages.asp	Primary vaccination site: Day 4, Day 7, Day 14, Day 21	Vaccine	YES	
030403-F-11668-004.jpg	Public Domain	The U.S. Air Force	http://www.af.mil/photos	McGuire Air Force Base, NJ - Honor Guard members of the 305th Air Mobility Wing. Twenty-one gun salute.	Outbreak Control	YES	funeral
PHIL_2826_lores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	Lorna Will (left) & Jacqueline Kowalski practice proper technique with a bifurcated needle as trainer Judy Gibson observes.	Pre-Event Issues	YES	vaccination
slide2_lores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A Zairian nurse prepares to enter the isolation ward during the Ebola VHF outbreak in Kikwit, Zaire, 1995.	Misc. Images		personal protection
PHIL_2557_lores.jpg	Public Domain	CDC	http://www.phil.cdc.gov	A photograph of a patient in a Vickers Isolation Unit.	Pre-Event Planning	YES	isolation
037.jpg	Public Domain	World Health Organization (WHO) Photo by J. Mohr	http://www.willm.nlm.nih.gov/	Filling the vaccine bottles before freeze-drying, one of the final steps in smallpox vaccine production.	Post-Event Issues	YES	WHO allows usage of images for academic purposes.
non-take1.gif	Public Domain	CDC	http://www.bt.cdc.gov/agent/smallpox/vaccination/takes/non-take1.htm	A "non-take" vaccination.	Vaccine		
720.jpg	Public Domain	National Library of Medicine	http://www.nlm.nih.gov/	U.S. Army Base Hospital Number 57, Paris, France: Isolation tent, interior.	Isolation & Quarantine	YES	
jsc2003c33735.jpg	Public Domain	NASA/Bill Ingalls	http://nrx.larc.nasa.gov	4 May 2003 - Astronaut Kenneth D. Bowersox (left), Expedition Six mission commander, talks about this mission to Robert D. (Bob) Calhoun, Director of Flight Crew Operations, while on the airplane flying from Astana, Kazakhstan to Moscow.	Isolation & Quarantine	YES	

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VITAE

Alexandra Belle Cameron was born on March 26, 1974 in Ottawa, Ontario, Canada to Anastasia Maria Cameron and Wilfred John Cameron. Alexandra is the oldest of four children. She is followed by her brother Nicholas John, her second brother John McNaughton and her only sister, Mariya Eleni. The Cameron family was relocated a number of times due to business. They moved from Ottawa to Plano, Texas in 1983, then from Plano to Atlanta in 1986, then from Atlanta to Southlake, Texas in 1996. Alexandra graduated with honors from The Galloway School (high school) and began classes at The University of Georgia in 1992. On advisement of an art professor, she was accepted into her major study of Scientific Illustration, a Bachelor of Fine Arts degree. During her senior year, she won third place in the Annual Student Scientific and Medical Illustration Judged Exhibition. Also in her senior year, she completed her undergraduate thesis on Botanical Illustrations of Endangered and Threatened Species Along the Broad River, which was used in conjunction with a brochure that the environmental law department was creating. Upon the completion of her undergraduate degree, she moved to Dallas, Texas to find full time work and gain some experience before applying to a graduate program. Alexandra was hired as a production artist for the telecommunications company GTE (now known as Verizon). Although she did not have a degree in graphic design, she did very well as a production artist and was promoted to a team lead position after a year and a half. Wanting to expand her skill set and gain new experiences, she applied for a number of other positions both within GTE and outside. She was offered an excellent position within GTE as a Graphics Development Specialist. As a Development Specialist she worked on a number of projects that impacted GTE's graphic artists. She gained experience in project management, development of new products and testing and training of new products. Although she was successful in her position as a Development Specialist, she missed the hands on aspect of creating artwork. During the course of her career at GTE she met a number of great friends and her future husband, Richard Mark

Hernandez. She was accepted to The University of Texas Southwestern Biomedical Communications Graduate Program in the winter of 2000. She married Mark and began classes the spring of 2001. During the second year she was awarded first place for the student-drawing category of the On My Own Time Show. She also was named as a Vesalian Scholar for recognition of the grant proposal for her Master's Thesis: Educating Health Care Professionals in the Threat of Biological Attacks: A Digital Guide to Smallpox. She also was awarded a Certificate of Merit at the annual Association of Medical Illustrators meeting for her student project depicting the normal anatomy of a human heart. She was awarded a Master of Arts in Biomedical Communications in June of 2004.

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