

Mass Decontamination Resources and Capabilities of HOSPITAL PROVIDERS



Version 1.1

NHA: Disaster Medical Response: A Model For America

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PREFACE

The Mass Decontamination Resource and Capabilities of Hospital Providers is a supplemental handbook that presents an estimate of current hospital decontamination capacity within the State of Nevada. This handbook is designed to support emergency managers, particularly within the Emergency Service Function – #8 Public Health and Medical Services. This handbook presents the data in a static format and is only current as of the publication date.

Purpose. The purpose of this handbook is to provide emergency managers and health care planners with an improved understanding of the current capabilities of the hospital system within Nevada. This understanding will support operational missions, institutional training and professional education.

Intended Audience. This handbook exists primarily for the emergency planners, hospital personnel and ESF-8 personnel who will be called to respond to any disaster or public health emergency. It is intended to provide a basic situational awareness of the hospital decontamination resources within Nevada.

Handbook Use. The handbook is primarily designed to help emergency planners develop response plans before any event occurs. It is important to recognize that this book references equipment capacity only. Actual decontamination capability may be significantly different based on the availability of hospital staff and other human resources.

Proponent Statement. The Nevada Hospital Association's Hospital Preparedness Program is the proponent for this guidebook. Periodic updates will accommodate any changes within the hospital system. Send comments and recommendations to: Dr. Christopher Lake, Director Hospital Preparedness via email at: chris@nvha.net. This handbook is also online at www.nvha.net/bio/intro.htm or within the EMSystem hospital communications program.

Introduction

A terrorist's use of nuclear, biological, radiological or chemical weapon may create a combination of contaminated patients, contaminated non-injured people as well as contaminated rescuers, hospitals and equipment. This manual is designed to identify the capacity of the Nevada Hospital Providers to facilitate planning and hence a better response to any large scale NBC release.

The equipment purchased and distributed was based on current research, identified best practices and tested methods. Many of the equipment, processes and procedures are adapted from current military practices. Whenever possible, the Nevada Hospital Association (NHA) met with and conducted interviews with tactical response teams and those individuals who have current direct handling experiences with NBC weapons. Interviews were conducted with the Office of the Air Force Surgeon General – Modernization - Chief of Plans and Programs as well as the Department of the Army – US Army Technical Escort Unit, Aberdeen Proving Ground, equipment manufacturers and other states' emergency planners.

The NHA acknowledges that the processes and procedures described in this manual may be specific to the equipment selected and distributed to hospitals within the State of Nevada through the National Bioterrorism Hospital Preparedness Program funded through HRSA. If your facility or State is using different equipment, it will be necessary for you to understand the technical specifications and protective properties of the equipment and adapt any protocols or guidelines as needed and as recommended by the manufacturers.

Contamination Types:

As a general rule contamination may be seen in four different forms including: solids, liquids, vapors or gases and, aerosols. The contamination type may extend the time needed to properly decontaminate a person and the amount of equipment and supplies that will be required.

Example:

A solid contaminate such as radioactive particles can be rinsed off relatively easily with soap and water. Liquids such as tar or military mustard based chemicals, are generally very thick and difficult to remove from anything. Vapors and gases can be absorbed into a patient's lungs and create subsequently vaporized contaminants that thereby create a method of secondary transmission even after the decontamination process has been completed.

Hence it is imperative for planners to realize that all estimates for the number of patients that can be decontaminated per hour are dependant on several planning assumptions. These assumptions are: the contaminant can be easily removed with water and/or soap, level C protection for the hospital staff will be sufficient, adequate numbers of trained personnel are available to complete the process and secondary transmission is not a significant problem.

Solids – include radioactive particles, biological spores, dusty agents or powders and dangerous building materials that may be released during an explosive incident, such as asbestos.

Liquids – these may include fine spray like rain, or bulk liquids. Liquids can range from water like consistency to very thick and sticky solutions.

Vapors and Gasses – these maybe either visible or invisible to the naked eye and can cover large land masses. These vapor / gas clouds are readily affected by weather and environmental factors.

Aerosols – these include both solids and liquids that are suspended in the air. Aerosols behave much like vapors or gas.

Contamination Hazards and Transmission Methods

Note: Most healthcare practitioners are very well versed in the transmission methods of germs and various pathogens. However it is important to note that some of a hospital's decontamination team members are most likely not practitioners. For this reason, contamination hazards and transmission methods are briefly described within this introduction. These transmission methods may impact decontamination processes, operational time requirements and the need for specialized equipment or fire department assistance.

Contamination from any of the agents, as well as other toxic industrial chemicals (TICs) and toxic industrial gases (TIGs), can be transmitted from person-to-person or to equipment in much the same ways as pathogens and household dust/dirt. These methods include: transfer, spread, vapor, desorption and radiation.

Transfer – is the process of touching something or someone contaminated “dirty” and having the contamination *transfer* from the dirty person or object on to the other person or object. This is the reason that hand washing is such an effective infection control process as it cleans the dirty hands prior to touching something else thereby eliminating the ability to transfer the contaminant to anything else.

Spread – is the process of a chemical or liquid contaminant spreading over an area. This can be illustrated easily with water or blood. If blood is contained within a laboratory tube it may have measurable depth but it is controlled or contained into a small area. If the blood spills on a floor or counter top, the blood now has no depth but is *spread* to areas in a random out-of-control fashion. This is an important concept for hospital decontamination teams to understand, as when using equipment it becomes possible for contamination to spread into areas of the equipment that can not be cleaned.

Vapor – is the process of a contaminant being carried through the air. In the medical setting this can be achieved accidentally through the use of equipment such as a bag valve mask, through the decontamination process itself or through poor work practices. Hospital decontamination teams and safety officers must be aware of the ability to *vaporize* contaminants and thereby create a method of secondary transmission.

Desorption – is the process of evaporation or “off gassing”. Once a liquid chemical has been absorbed into a porous item, it will begin to *desorb* or allow low levels of vapors to pass out of the contaminated surface into the air. This desorbed vapor now can be transferred to any surface including personnel. As an example, consider a patient that has had a general anesthesia. When these patients are in post-op, it is very common to be able to smell the anesthesia gas as the person exhales. This is off gassing or desorption.

Radiation – is a complex process that takes place when certain electrons from within an atom are searching for a neutron to which to attach. Radiation is most often given off by radioactive dust and dirt, in the NBC contamination environment, and those should be thought of as a solid contaminant. Radiation has several good properties that other contaminants don’t primarily it can be easily detected and contamination levels easily quantified.

Persistency -refers to the duration or effectiveness of a substance after it has been dispersed. The longer a substance remains potent the higher its “*persistency*” rating. Solids, particularly in the form of powders, and some high viscosity liquids, are rated with a “high” persistency. An agent is considered to be “persistent” if it remains for 24 hours or longer; and “non-persistent” if it evaporates and/or dissipates within 24 hours. This concept is of particular importance to hospitals. If a person contaminated with a persistent agent gains entry into the hospital, the facility itself may require decontamination and possible closure. The levels of hospital decontamination and or length of closure will also depend on the quantity of the agent found within the facility and the agent’s permissible exposure limit (PEL).

Stability – refers to how long a substance remains in the environment without degrading. All substances degrade at varied rates of speed. However, using radiation or dry cleaning solution (PERC) as an example the time needed to degrade maybe measured in decades or hundreds of years.

Migration - refers to an ability of the substance to freely move away from its point of release. The further the distance of travel, the greater the *migration* threat becomes and the greater the spread potential. Mitigation can be based on several factors including the weight of the chemical molecule and the relationship to the environment in which the chemical is released (i.e. does it float, if released in water or is it lighter or heavier then air if released in the air).

Break-Through Factors

It is imperative that break-through times are known for all likely agents as they relate to all issued safety or personal protective equipment. This is important for the rescuers safety, to ensure the tempo and length of sustained decontamination operations based on logistical supply concerns, and to prevent a secondary hazardous materials event from occurring at the hospital.

Break-through time, measured in minutes, will generally be different for each item of equipment as well as may change with each chemical. When the exact chemical or agent remains unknown, it must be assumed to be the worst case scenario or restated it must be assumed to have the fastest break-trough time. Additionally, only safety equipment that has been live agent tested, using warfare agents as well as industrial chemicals, and has completed and has documented results of an independent break-through analysis; shall be used in this application.

Break-through times as follows:

Tyvek F Chemical Suits	
<u>Chemical</u>	<u>Time</u>
Taban	>720 minutes
Sarin	>720 minutes
Soman	>720 minutes
VX	>720 minutes

FR-57 PAPR Filters	
<u>Chemical</u>	<u>Time</u>
Taban	59 minutes*
Sarin	59 minutes*
Soman	59 minutes*
VX	59 minutes*

* Respiratory protection with the FR-57 filter may be significantly greater depending on actual concentration levels and percentage of relative humidity.

Butyl outer gloves are 14 mil thick and have documented break-through times as follows:	
<u>Chemical</u>	<u>Time</u>
Taban	>450 minutes
Sarin	>450 minutes
Soman	>450 minutes
VX	>450 minutes

Hospital Decontamination Capacity By Region



NORTHERN REGION:

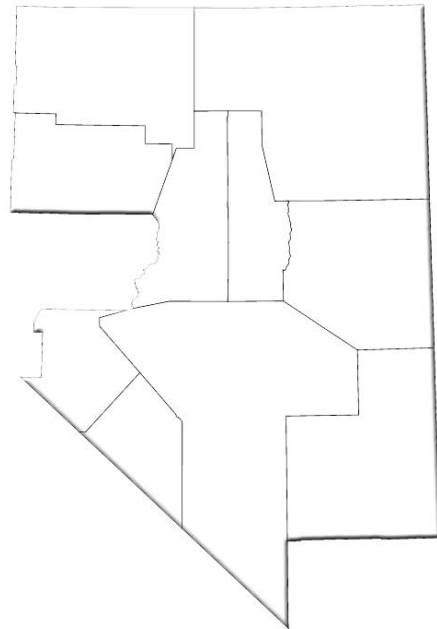
Hospitals within the northern region generally have the capability of providing decontamination services for up to 1-3 patients per hour, whether ambulatory or not.

These hospital plans identify a means for decontaminating Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) patients based on an internal hazard vulnerability analysis.

Two (2) hospitals within this region have decontamination trailers (provided by either Local Emergency Planning Committee (LEPC) or HRSA funding) capable of decontaminating upwards of 20-40 patients per hour, depending on the levels of contamination, supplies, staffing availability and patient acuity levels. These hospitals are Washoe Medical Center and St. Mary's Hospital which both are geographically located close to the downtown Reno area; an area that hosts many large-scale, heavily attended events such as concerts, Hot August Nights, Street Vibrations, etc.

RURAL REGION:

Hospitals within the rural region generally have the capability of providing decontamination services for up to 1-3 patients per hour, whether ambulatory or not. These hospital plans identify a means for decontaminating CBRNE patients based on an internal hazard vulnerability analysis.



Northern Nevada Hospital Decontamination Equipment Capabilities*

Hospital Name ¹	Decon Capability (Patients per hour)	Est. Sustained Tempo*** (Sustained operational Period in hours)	Fixed Decon System	Portable Decon System
Banner Churchill	1-3	1	x	
Carson Tahoe	1-3	1	x	
Carson Valley	1	1	x	
Incline Village	1	1	x	
NNMC	1-3	1	x	
St. Mary's	20-40	3		x
South Lyon	1	1	x	
VA Sierra Nevada	1-3	1	x	
Washoe Med. Ctr	20-40	3		x
Washoe Med. South Meadows	1-3	1	x	
Totals:	48-98**			

* Table references equipment capabilities; hospitals are not currently staffed in a manner that will achieve maximum efficiencies of the available decontamination equipment.

** Trained, available personnel will be the single largest determinant of actual decontamination capability.

*** Sustained tempo will be influenced based on outside factors such as weather, humidity percentage and ambient air temperatures. Without the use of a cooling vest, the estimated maximum work time for decontamination team members is 20-30 minutes, before a rest period and hydration will be required.

¹ See page 15 for additional information

Rural Nevada Hospital Decontamination Equipment Capabilities*

Hospital Name ²	Decon Capability (Patients per hour)	Est. Sustained Tempo*** (Sustained operational Period in hours)	Fixed Decon System	Portable Decon System
Battle Mtn.	1	1	x	
Humboldt	1-3	1	x	
Grover C. Dils	1	1	x	
Mt. Grant	1	1	x	
Northeastern NV	1-3	1	x	
Nye Regional	1	1	x	
Pershing General	1	1	x	
William Bee Ririe	1	1	x	
Totals:	8-12**			

* Table references equipment capabilities; hospitals are not currently staffed in a manner that will achieve maximum efficiencies of the available decontamination equipment.

** Trained, available personnel will be the single largest determinant of actual decontamination capability.

*** Sustained tempo will be influenced based on outside factors such as weather, humidity percentage and ambient air temperatures. Without the use of a cooling vest, the estimated maximum work time for decontamination team members is 20-30 minutes, before a rest period and hydration will be required.

² See page 16 for additional information

CLARK COUNTY / SOUTHERN REGION:



Hospitals within the southern region generally have the capability of providing decontamination services for up to 1-3 patients per hour, whether ambulatory or not. These hospital plans identify a means for decontaminating CBRNE patients based on an internal hazard vulnerability analysis.

Nine (9) hospitals within this region have decontamination trailers (provided by HRSA funding) capable of decontaminating upwards of 20-40 patients per hour, depending on the levels of contamination, supplies, staffing availability and patient acuity levels.

These 9 hospitals are: Sunrise Medical Center, University Medical Center, Desert Springs Hospital, Mountain View Hospital, Valley Hospital, Summerlin Hospital, Spring Valley Hospital, St. Rose Hospital and Boulder City Hospital.

Southern Nevada Hospital Decontamination Equipment Capabilities*

Hospital Name ³	Decon Capability (Patients per hour)	Est. Sustained Tempo*** (Sustained operational Period in hours)	Fixed Decon System	Portable Decon System
Boulder City Hospital	20-40	3		x
Desert Springs Hospital	20-40	3		x
Mesa View Regional	1-3	1	x	
Mike O' Callahan	1-3	1	x	
Mountain View Hospital	20-40	3		x
North Vista Hospital	1-3	1	x	
Southern Hills	1-3	1	x	
Spring Valley	20-40	3		x
St. Rose – de Lima	1-3	1	x	
St. Rose – Siena	20-40	3		x
Summerlin	20-40	3	x	x
Sunrise Hospital	20-40	3		x
University Medical Ctr	20-40	3	x	x
Valley Hospital	20-40	3		x
Totals:	185-375**			

* Table references equipment capabilities; hospitals are not currently staffed in a manner that will achieve maximum efficiencies of the available decontamination equipment.

** Trained, available personnel will be the single largest determinant of actual decontamination capability.

*** Sustained tempo will be influenced based on outside factors such as weather, humidity percentage and ambient air temperatures. Without the use of a cooling vest, the estimated maximum work time for decontamination team members is 20-30 minutes, before a rest period and hydration will be required.

³ See page 17 for additional information

Northern Nevada Hospitals

Name/Address	Main Phone
Banner Churchill Community Hospital 801 E. Williams Ave. Fallon, NV 89406	(775) 423-3151
Carson Tahoe Regional Medical Center 1600 Medical Parkway Carson City, NV 89702	(775) 445-8669
Carson Valley Medical Center 1107 Highway 395 Gardnerville, NV 89410	(775) 782-1600
Incline Village Community Hospital 880 Alder Avenue Incline Village, NV 89451	(775) 833-4100
Northern Nevada Medical Center 2375 E. Prater Way Sparks, NV 89434	(775) 331-7000
Saint Mary's Regional Medical Center 235 W. Sixth St. Reno, NV 89503	(775) 770-3000
South Lyon Medical Center 213 South Whitacre Yerington, NV 89477	(775) 463-2301
VA Sierra Nevada Healthcare System 1000 Locust St. Reno, NV 89477	(775) 786-7200
Washoe Medical Center 77 Pringle Way Reno, NV 89502	(775) 982-4100
Washoe Medical Center South Meadows 10101 Double R Boulevard Reno, NV 89511	(775) 982-7000

Rural Hospitals

Name/Address	Main Phone
Battle Mountain General Hospital 535 South Humboldt Street Battle Mountain, NV 89820	(775) 635-2550
Grover C. Dils Medical Center Highway 93 North Caliente, NV 89008	(775) 726-3171
Humboldt General Hospital 118 E. Haskell Street Winnemucca, NV 89445	(775) 623-5222
Mt. Grant General Hospital P.O. Box 1510 Hawthorne, NV 89415	(775) 945-2461
Northeastern Nevada Regional Hospital 2001 Errecart Blvd. Elko, NV 89801	(775) 738-5151
Nye Regional Medical Center 825 Erie Main Tonopah, NV 89049	(775) 482-6233
Pershing General Hospital P.O. Box 661 Lovelock, NV 89419	(775) 273-2621
William Bee Ririe Hospital 1500 Ave. H Ely, NV 89301	(775) 289-3001

Southern Nevada Hospitals

Name/Address	Main Phone
Boulder City Hospital 901 Adams Boulevard Boulder City, NV 89005	(702) 293-4111
Desert Springs Hospital Medical Center 2075 E. Flamingo Rd. Las Vegas, NV 89119	(702) 733-8800
Mesa View Regional Hospital 1299 Bertha Howe Avenue Mesquite, NV 89024	(702) 346-8040
Mike O'Callaghan Federal Hospital 4700 North Las Vegas Blvd. Nellis Air Force Base, NV 89191	(702) 653-2227
MountainView Hospital 3100 North Tenaya Way Las Vegas, Nevada 89128	(702) 255-5000
North Vista Hospital 1409 E. Lake Mead Blvd. N. Las Vegas, NV 89030	(702) 649-7711
Southern Hills Hospital & Medical Center 9300 W. Sunset Road Las Vegas, NV 89148	(702) 880-2100
Spring Valley Hospital Medical Center 5400 S. Rainbow Blvd. Las Vegas, NV 89118	(702) 853-3000
St. Rose Dominican Hospitals - Rose de Lima Campus 102 E. Lake Mead Dr. Henderson, NV 89052	(702) 616-5000
St. Rose Dominican Hospitals - Sienna Campus 3001 St. Rose Parkway Henderson, NV 89052	(702) 616-5000
Summerlin Hospital Medical Center 657 Town Center Drive Las Vegas, NV 89144	(702) 233-7000
Sunrise Hospital & Medical Center 3186 S. Maryland Pkwy, S-400 Las Vegas, NV 89109	(702) 731-8000
University Medical Center 1800 W. Charleston Blvd. Las Vegas, NV 89102	(702) 383-2000
Valley Hospital Medical Center 620 Shadow Lane Las Vegas, NV 89106	(702) 388-4000