

CSHEMA INNOVATION AWARD SUBMISSION

Title: Print & Go Sheets for Post Exposure Medical Surveillance

Category: Process Improvement

Applicant: Columbia University Environmental Health and Safety. This submission prepared by Christopher Aston, Ph.D. Manager Biological Safety Programs.

Executive Summary:

In order to identify the immediate “first aid” treatment options by medical providers, EH&S has developed a series of “Print & Go” guidance sheets in .pdf format which can be printed and taken to the emergency room (ER) by individuals following occupational exposure to biological, chemical or radiological hazardous materials used in research. The sheets address the issue of emergency room physicians not typically seeing many cases of exposure to chemicals such as cyanide and hydrofluoric acid, or biologicals such as diphtheria toxin, lentiviral vectors and Macacine herpes virus 1. Our goal was to address potential issues of under-treatment or over-treatment of patients. The sheets provide information that medical personnel can reference but do not provide individualized medical care or treatment. The content includes immediate measures to take, types of specimen to collect, medication and countermeasure options, sources of additional information/expertise and next steps. No sheet is longer than two pages. The sheets have been promoted to the University community and enthusiastically endorsed by the medical directors of the local ER.

The Print & Go sheet project:

We describe below an improvement to a service delivery method in response to a campus need. This was developed to meet our vision statement mission of providing expert guidance and timely service. In this case, the mission translates as providing medical information for physicians responding to a medical emergency where timely action is critical, and could save lives. EH&S has developed a series of “Print & Go” guidance sheets in .pdf format. These can be printed, or downloaded to a mobile device, and taken to the emergency room (ER) by individuals following occupational exposure to biological, chemical or radiological hazardous materials used in research. *Fig 1.* Shows a screen shot from the EH&S website that lists the Print & Go sheets <https://research.columbia.edu/content/print-and-go-sheets>. To make these readily accessible there is an icon for the Print & Go sheets on our website home page <https://research.columbia.edu/content/environmental-health-safety>.

The content includes immediate measures to take, types of specimen to collect, medication and countermeasure options, sources of additional information/expertise and next steps. Examples of Print & Go sheets are shown in Fig 2. (hydrofluoric acid) and Fig 3. (macacine herpes virus 1).

Identifying the problem:

The Print & Go sheets were created to address a deficit of helpful information readily available to physicians who do not typically see many cases of exposure to chemicals such as cyanide and hydrofluoric acid, or biologicals such as diphtheria toxin, lentiviral vectors and Macacine herpes virus 1. Existing resources were inadequate; SDS do not exist for biological hazardous materials and the directions on an SDS in case of a chemical exposure are sometimes limited to stating

“seek medical attention”. There are also new treatment modalities such as the use of HIV post exposure prophylaxis medications to prevent genomic insertional events resulting from exposure to lentiviral vectors. Physicians lack the time to look up information on the internet as they are evaluating a patient who may have a critical medical issue.

Our campus providers, Student Health Services and our employee health services physicians would find Print & Go sheets useful, however these clinics are only open during business hours. The real value of the sheets comes into play when an exposure happens on evenings and weekends. In this case, students and employees are directed to go to the nearest emergency room. In contrast to the University medical services, the ERs have a high turnover of staff and while the physicians see plenty of strokes and broken bones, they are less likely to have seen an occupational exposure to an uncommon hazardous material such as hydrofluoric acid. This kind of issue was made clear in 2015 when an investigator who works with rhesus macaques was evaluated in the ER for a potential macacine herpes 1 virus exposure. He was then admitted to the hospital and put on contact isolation. This virus can be fatal if untreated but a more prudent course of action would have been to prescribe antiviral drugs and send him home with watchful self-monitoring of symptoms. In this case the patient received excellent medical care but was over-treated. In developing the sheets, our goal was to address not just potential issues of over-treatment of patients, but more importantly, under-treatment where the consequences could be harmful. The sheets provide information that medical personnel can reference but do not provide individualized medical care or treatment. The sheets help identify the patient as a University employee with a bona fide exposure and help physicians with the triage process. The sheets have been reviewed and endorsed by the ER Directors at our local hospital

Method of implementation and cost effectiveness:

The costs associated with developing the sheets were limited to personnel time collating the information, drafting the sheets and obtaining the endorsement of our leadership and the medical personnel.

The existence of the sheets has been promoted to the university community through campus-wide email and an article in our *SafetyMatters* newsletter (see Fig. 4). The sheets are easily available to print (or download to a mobile device) directly from the home page of our website.

Our primary goal is to employ a hierarchy of controls to prevent exposure to the hazardous materials described in the Print & Go sheets. Fortunately, the incidence of exposures has been low, so it is not possible to measure quantitatively the effectiveness of this re-engineered medical surveillance program. However, the sheets have been used in practice. When the University’s animal care program was reviewed for accreditation by AAALAC, the inspectors made special mention of the sheets as an exemplary initiative during the close out meeting.

Applicability to other institutions:

We believe other institutions could prepare similar sheets. The content on our sheets is in the public domain and freely available on the internet for others to review. We welcome feedback, sharing of information and best practices from other institutions to make our content as applicable as possible.

Fig. 1. Screen shot from the EH&S website that lists the Print & Go sheets
<https://research.columbia.edu/content/print-and-go-sheets>

Home Safety Print and Go Sheets

Print and Go Sheets

Post exposure first aid actions to be followed.

PRINT&GO

What are print and go sheets?

Following an occupational exposure to a hazardous biological or chemical material, this sheet identifies the immediate “first aid” actions that should be taken. A medical evaluation should be sought immediately following the exposure. The guidance sheet provides information that medical personnel can reference. **This sheet should be printed and taken to the medical provider.** Also, display your Columbia University ID card while visiting the medical provider.

Sheets are available for exposure to the following materials:

Biological

- Bloodborne Pathogens
- Macacine herpes virus 1 (herpes virus simiae, herpes B, or B-virus)
- Lentiviral vectors
- Diphtheria toxin
- Pertussis toxin
- Recombinant DNA

Chemical

- Cyanide
- Formaldehyde
- Hydrofluoric Acid

Radiation

- Radioactive material

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Fig. 2. Sample Page for Hydrofluoric Acid Print & Go sheet.

<https://research.columbia.edu/sites/default/files/content/EHS/Homepage/HFPrintAndGo.pdf>

 COLUMBIA UNIVERSITY ENVIRONMENTAL HEALTH AND SAFETY Post Exposure <i>PRINT&GO</i> Sheet	
Hydrogen Fluoride post-exposure guidance	Created: 8/25/2016 Revised: / / http://ehs.columbia.edu/HFPrintAndGo.pdf

What are print and go sheets?

Following an occupational exposure to the agent identified above, this information sheet identifies the immediate "first aid" actions that should be taken. A medical evaluation should be sought immediately following the exposure. The guidance sheet provides information that medical personnel can reference but does not provide individualized medical care or treatment. This sheet should be printed and taken to the medical provider. Also, display your Columbia University ID card while visiting the medical provider.

Agent: Hydrofluoric Acid (HF) is an inorganic acid which is derived from dissolving hydrogen fluoride in water. HF is a noncombustible, colorless, fuming liquid or gas with a strong, irritating odor and has a low permissible exposure limit (in air. HF readily dissolves in water to form colorless hydrofluoric acid solutions; dilute solutions are visibly indistinguishable from water. It is present in a variety of over-the-counter products at concentrations of 6% to 12%.

Synonyms include hydrogen fluoride, fluoric acid, hydrofluoride, and fluorine monohydride.

Routes of Exposure: Inhalation, ingestion, absorption (eyes), dermal contact

Immediate actions to be taken in the event of an exposure:

- Inhalation – Remove to fresh air. Remove source of exposure if possible. Seek medical attention.
- Ingestion – SDS typically advises to avoid inducing vomiting; rinse mouth with water and seek immediate medical attention.
- Absorption (eyes) – Rinse eyes cautiously with water at nearest eyewash station for fifteen minutes. Seek medical attention
- Dermal contact – Remove contaminated clothing and rinse affected area at deluge hose or safety shower for 15 minutes. Apply calcium gluconate first aid gel to affected area immediately after rinsing. Seek medical attention.

Post-exposure Medical Surveillance:

If exposure occurs Mon. to Fri., 8:00 am - 4:00 pm: Employees from CUMC, Morningside and Manhattanville campuses go to the Workforce Health and Safety (WHS) clinic located at Harkness Pavilion 1 South 176 Fort Washington Ave (212-305-7590). CUMC students go to Student Health Services at 60 Haven Avenue (212-305-3400). Morningside students go to Columbia Health in the John Jay Building (212-854-7426). For after-hours exposure, go to the New York Presbyterian Hospital or Mount Sinai St. Luke's Hospital (212-523-3335) Emergency Room (ER). Lamont Doherty Earth Observatory Staff should call 9-911 to connect with outside medical staff then call 555 from any campus phone or (845) 359-2900 to notify Safety/Security office to may the emergency responders. Give this sheet to the physician so they understand that you may have just been exposed to formaldehyde, and this is a medical emergency.

Information to be conveyed to Medical Provider – In all cases, a copy of the safety data sheet for the material used should be provided. Indicated the rough volume/weight of exposure. If air measurements were taken, provide average concentration to medical provider.

Countermeasures/tests available to Physician – Physician should consult the National Institute for Occupational Safety and Health's guide for Hydrogen Fluoride/Hydrofluoric Acid - http://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750030.html

- Affected individuals should be decontaminated prior to treatment to avoid secondary exposure. All clothing should be removed and placed in a labeled 6mil polyethylene bag.
- For eye exposures, an ophthalmologist must be consulted. For minor exposures with very dilute hydrofluoric acid (HF): mix 10 mL of 10% calcium gluconate with 100 mL of normal saline to give an approximately 1% calcium gluconate solution. With a syringe, irrigate the eye intermittently for a period of 15 to 30 minutes or until relief of pain occurs. For more serious hydrofluoric acid (HF) eye burns, mix 50 mL of 10% calcium gluconate with 500 mL of normal saline to give an approximately 1% calcium gluconate solution.
- For inhalation exposure administer a 2.5% calcium gluconate solution as a nebulized treatment with oxygen.

Fig. 2. Sample Page for Macacine Herpes Virus 1 Acid Print & Go sheet.

<https://research.columbia.edu/sites/default/files/content/EHS/Homepage/herpesBPrintAndGo.pdf>

 COLUMBIA UNIVERSITY ENVIRONMENTAL HEALTH AND SAFETY Post Exposure <i>PRINT&GO</i> Sheet	
Macacine Herpes Virus 1 post-exposure guideline	Created: 5/6/2016 Revised: / / http://ehs.columbia.edu/herpesBPrintAndGo.pdf

What are print and go sheets?

Following an occupational exposure to the agent identified above, this information sheet identifies the immediate "first aid" actions that should be taken. A medical evaluation should be sought immediately following the exposure. The guidance sheet provides information that medical personnel can reference but does not provide individualized medical care or treatment. This sheet should be printed and taken to the medical provider. Also, display your Columbia University ID card while visiting the medical provider.

Background:

Macacine herpes virus 1 (previously known as herpes virus simiae, herpes B, or B-virus) is a zoonotic agent that, if untreated, can cause fatal encephalomyelitis in humans and can be transmitted by research macaques from a bite, scratch, splash or percutaneous sharps injury.

First aid (begin immediately):

Cleanse the exposed area using the material in the bite kit. Thoroughly wash and scrub the area or wound with soap, concentrated solution of detergent, povidone-iodine, or chlorhexidine and water for 15-20 minutes. Then, irrigate the washed area with running water. If splashed in the eyes, rinse them immediately with water only for 15 minutes using the eyewash station nearest you.

Post-exposure medical surveillance:

If exposure occurs Mon. to Fri., 8:00 am - 4:00 pm: Employees and students from CUMC, Morningside and Manhattanville campuses go to the Workforce Health and Safety (WHS) clinic located at Harkness Pavilion 1 South 176 Fort Washington Ave. For after-hours exposure or severe injuries, go to the New York Presbyterian Hospital Emergency Room (ER). Give this sheet to the physician so they understand that you may have just been exposed to Macacine herpes virus 1 (or herpes B virus), and this is a medical emergency.

Physician information:

Perform the following sample collection (tubes/culture media provided by the patient):

- Two (2) serum samples [red and gray tiger-top tubes]
- Viral swab(s) of affected area [if appropriate, based on nature of exposure]

WHS staff will collect specimens. Specimens will be held there and subsequently picked up by the Columbia Institute for Comparative Medicine (ICM) Pathology Section (Black Building 19th floor, room 1912C) for shipment to the National B Virus Resource Center in Atlanta, GA

ER staff will submit specimens to the NYPH automated lab. Two requisition forms will be completed; a Columbia Order requisition form and the National B Virus Resource Center form. The NYPH automated lab will FedEx the specimens to the National B Virus Resource Center at Georgia State University.

Fig. 4. Excerpt from *SafetyMatters* newsletter demonstrating promotion of the Print & Go sheets to the University community.

<https://research.columbia.edu/sites/default/files/content/EHS/Newsletters/Winter2017.pdf>

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Environmental Health & Safety

SafetyMatters

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ENVIRONMENTAL HEALTH & SAFETY

[HTTP://EHS.COLUMBIA.EDU](http://ehs.columbia.edu)

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EH&S is Expanding to Manhattanville

by Corey Wintamute, Senior Research Safety Specialist

With the opening of the Jerome L. Greene Science Center (JLGSC) fast approaching, EH&S is looking forward to expanding its programs to Manhattanville. EH&S's JLGSC office, located on the mezzanine level, will be the Manhattanville home base from which we will provide full support for research operations at the Zuckerman Institute (ZI).

EH&S's involvement with Columbia's Manhattanville operations began over a decade ago in the early phases of the campus' development. From community meetings and building demolitions to soil sample analysis, EH&S worked with the Manhattanville Development Group (MDG) every step of the way to provide health and safety guidance for the project. EH&S will continue to serve in this role into the next phases of the Manhattanville campus' evolution.

In addition to working with the MDG, EH&S has worked closely with ZI Operations on developing best practices, policies and procedures for safety. EH&S is an active member of the Relocation Team, planning the moves of numerous existing Columbia laboratories to JLGSC. The campus will feature a chemical tracking system using radio frequency identification (RFID) technology, laboratory recycling, enhanced hazard communication, and centralized spill kits for every laboratory, all to ensure safety standards are met and exceeded in the University's newest research spaces.

EH&S will continue to ensure the highest level of client focused safety programs at Manhattanville and with the ZI.

What Are "Print & Go" Sheets?

by Christopher Aston, Manager of Biological Safety Programs

EH&S has compiled a series of "Print & Go" guidance sheets that are a valuable resource following a potential occupational exposure to a hazardous biological or chemical material. Sheets are available for general bloodborne pathogens, macacine herpes virus 1, lentiviral vectors, diphtheria toxin, pertussis toxin and recombinant DNA, as well as a variety of hazardous chemicals including cyanide, formaldehyde and hydrofluoric acid.

In the event of a potential exposure, the Print & Go sheet should be printed and taken to the medical provider. Each Print & Go sheet identifies the immediate "first aid" actions that should be taken. A medical evaluation should be sought immediately following the exposure at the respective campus provider or hospital emergency room. Once in the care of a medical provider, the guidance sheet contains information that can be quickly referenced. Also, remember to display your Columbia University ID card while visiting the treatment location. Sheets are available on the EH&S website: <http://ehs.columbia.edu/PrintAndGo.html>.

Are you working with a hazardous material that you think warrants a "Print & Go" sheet? Contact an EH&S safety professional to discuss at biosafety@columbia.edu.