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CDC and IOM Warn of Adverse Psychosocial, Cancer Effects From Gulf Oil Spill

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Authors and Disclosures

June 28, 2010 — Psychosocial, as well as medical, effects will be important consequences of the Gulf oil spill, according to experts from the Institute of Medicine (IOM) and the Centers for Disease Control and Prevention (CDC).

The explosion of the Deepwater Horizon oil rig in the Gulf of Mexico took place on April 20, 2010. At the time, the explosion killed 11 workers and injured 17 others, but the long-term effects of the resulting oil spill remain unclear. As of June 25, 2010, 453 oil exposure complaints had been reported to the American Association of Poison Control Centers. Of these, 174 calls came from Louisiana, 111 from Florida, 95 from Alabama, and 38 from Mississippi. Callers reported symptoms including headaches, throat irritation, nausea, vomiting, eye pain, and dizziness.

Crude oil contains a mixture of volatile hydrocarbon compounds — polycyclic aromatic hydrocarbons that typically include the carcinogens benzene, toluene, and xylene. According to the CDC, symptoms of exposure to these compounds include drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, and unconsciousness

On June 22 and 23, the IOM, part of the US National Academies in Washington, DC, held a workshop in New Orleans, Louisiana, at the request of the US Department of Health and Human Services to discuss health concerns related to the spill.

Exposure Effects May Follow a Latent Period

Scott Barnhart, MD, MPH, from the University of Washington, in Seattle, noted during his presentation that exposure effects from the oil spill may follow a latent period. "*Crude oil contains a complex mixture of heavy metals and volatile and nonvolatile polyaromatic hydrocarbons, with the possibility of carcinogens*", he said.

According to Dr. Barnhart, exposure can occur through dermal and inhalational routes and possibly through ingesting oil-contaminated foods. Toxicities are dose-dependent and may include neurologic, renal, hepatic, dermatologic, and hematologic effects.

Levels of Carcinogens Unclear

Gina Solomon, MD, a senior scientist with the National Resources Defense Council, noted in her blog that British Petroleum (BP) is claiming that "*because the air concentrations of carcinogens such as benzene are below [Occupational Safety and Health Administration] limits, the workers involved in cleaning up the Gulf oil spill are not at risk of health effects*".

However, she adds that "*BP is dismissing the fact that its own data have shown levels of hydrocarbons above BP's 'action level', and have shown levels of benzene and 2-butoxyethanol (the dispersant chemical) above the Recommended Exposure Limit set by the National Institute for Occupational Safety and Health*".

Psychosocial Issues From Spill Are Important

According to Maureen Lichtveld, MD, MPH, professor and chair of the Department of Environmental Health Sciences at Tulane University, in New Orleans, Louisiana, the number one effect that clinicians should look for are the psychosocial consequences.

"Clinically, the immediate effects are irritation and respiratory effects caused by volatile organics", Dr. Lichtveld told *Medscape Medical News*, "but during the IOM meeting we agreed that the psychosocial aspect needs to have a much higher priority than currently is apparent, and often clinicians don't think about that", she said. "It was clear for us, after Katrina, in New Orleans, in fact, that those adverse psychosocial effects are still there". Dr. Lichtveld was a participant at the IOM workshop.

Dr. Solomon noted that follow-up studies after the Exxon Valdez oil spill showed significant increases in mental health disorders in the local population for years after the spill. "There were increases in depression, posttraumatic stress disorder, and other anxiety disorders, as well as generally poorer scores on mental health assessments", she told *Medscape Medical News*. She added that currently there are not enough data to predict whether there could be future elevations in cancer risks, reproductive issues, or neurological sequelae from this oil spill. "Prospective health monitoring will be very important in this population", she added.

Guidance for Healthcare Professionals

According to Dr. Solomon, clinicians play an important role in providing anticipatory guidance to help protect their patients. "Community residents should not fish in any areas that have been declared off-limits or where they see evidence of oil contamination, and fish or shellfish that has an oily odor should be discarded and not eaten".

In addition, Dr. Solomon said, direct skin contact with contaminated water, oil, or tar balls should be avoided. "If community residents at any time notice a strong odor of oil or chemicals, and are concerned about health effects, they should seek refuge in an air conditioned environment, preferably with the air conditioner on recirculation mode to avoid intake of polluted air".

"Overall, residents can be reassured that the air quality has been generally good on the Gulf coast, and that long-term health effects are unlikely", she said.

The CDC is monitoring potential health threats or conditions that may result human exposure to the oil spill. At this time, 242 CDC and Agency for Toxic Substances and Disease Registry staff members are involved in the response to the oil spill. As of last week, 21 staff members had been deployed to Gulf Coast states.

Information about the oil spill for health professionals is available on the CDC's [Web site](#). Topics include fuel oil toxicity frequently asked questions, recommendations for taking an exposure history, health surveillance, and fact sheets about dispersants and light crude oil.

The CDC encourages clinicians to [email](#) them with any questions about the 2010 Gulf of Mexico oil spill.

CDC Home

http://emergency.cdc.gov/gulfoilspill2010/health_professionals.asp

Emergency Preparedness and Response

<http://emergency.cdc.gov/>

EPR > Specific Hazards > Gulf Oil Spill 2010

Gulf Oil Spill 2010: Information for Health Professionals

Hazardous Substances Information

Table of Chemical Constituents Commonly Found in Crude Oil (PDF File)

http://emergency.cdc.gov/gulfoilspill2010/pdf/chemical_constituents_table.pdf

Fuel Oils ToxFAQs

<http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=515&tid=91>

Fuel Oils Tox Profiles

<http://www.atsdr.cdc.gov/toxprofiles/TP.asp?id=516&tid=91>

Total Petroleum Hydrocarbons (TPH) ToxFAQs

<http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=423&tid=75>

Total Petroleum Hydrocarbons (TPH) Tox Profile

<http://www.atsdr.cdc.gov/ToxProfiles/TP.asp?id=424&tid=75>

Health Surveillance

http://emergency.cdc.gov/gulfoilspill2010/2010gulfoilspill/health_surveillance.asp

Taking an Exposure History

http://www.atsdr.cdc.gov/csem/exphistory/ehcover_page.html

Dispersants (fact sheet for health professionals)

http://emergency.cdc.gov/gulfoilspill2010/dispersants_hcp_info.asp

Light Crude Oil (fact sheet for health professionals)

http://emergency.cdc.gov/gulfoilspill2010/light_crude_health_professionals.asp

COCA Conference Call on Gulf Oil Spill

http://emergency.cdc.gov/coca/confcall_archive.asp#gulf

Seafood Safety Following the Gulf Oil Spill

http://emergency.cdc.gov/gulfoilspill2010/seafood_safety.asp

Key Points - Deepwater Horizon Oil Spill and Human Health Interim Clinical Guidance

http://emergency.cdc.gov/gulfoilspill2010/key_points.asp

Deep Water Horizon Oil Spill Human Health Interim Clinical Guidance

http://emergency.cdc.gov/gulfoilspill2010/oilspill_clinical.asp

NEW: Condensed Human Health Interim Clinical Guidance with Mental Health Guidance (PDF)

http://emergency.cdc.gov/gulfoilspill2010/pdf/Oil_spill_4p_July_29_v2.pdf

Gulf Oil Spill 2010

<http://emergency.cdc.gov/gulfoilspill2010/>

2010 Gulf of Mexico Oil Spill

Hurricanes and the Gulf of Mexico Oil Spill

What will hurricanes do to the oil slick in the Gulf?

CDC is monitoring potential health threats or conditions across the five Gulf States that may arise as a result of human exposure to the oil spill. In the case of a hurricane or tropical depression in the Gulf of Mexico, [here are quick facts](http://emergency.cdc.gov/gulfoilspill2010/oilspill_hurricane.asp) (http://emergency.cdc.gov/gulfoilspill2010/oilspill_hurricane.asp) that families can take to protect their health after the storm.

CDC Response to the Gulf of Mexico Oil Spill

<http://emergency.cdc.gov/gulfoilspill2010/cdcreponds.asp>

UPDATE: This information is current as of August 31, 2010 at 4:00pm EDT

CDC and the U.S. Department of Health and Human Services recognize the importance of responding to potential public health issues related to the Deepwater Horizon Oil Spill in the Gulf of Mexico. CDC's National Center for Environmental Health (NCEH) initiated the agency's response on April 20th. CDC activated its Emergency Operations Center (EOC) on May 6th as part of the federal response to the environmental disaster.

Health Surveillance

http://emergency.cdc.gov/gulfoilspill2010/2010gulfoilspill/health_surveillance.asp

UPDATE: This information is current as of September 29, 2010 at 1:00pm EDT

The Gulf Coast Oil Spill has the potential to affect human health in addition to the effects already seen on animal and marine life. CDC, along with the affected Gulf Coast states, has developed a plan to track the potential short-term health effects related to the oil spill in the affected communities.

RELATED ARTICLES

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Water Safety: Reducing the Infectious Disease Burden Due to Unsafe Water, Sanitation, and Hygiene

An Expert Interview With Omar A. Khan, MD, MHS

Linda Brookes Good, MSc

Authors and Disclosures

Posted: 12/30/2009

Editor's Note:

The theme of the recent American Public Health Association (APHA) annual meeting, held November 7-11, 2009, in Philadelphia, Pennsylvania, was "Water and Public Health: the 21st Century Challenge." Water is necessary for all forms of life, and the demands for it are increasing. The ability to provide or the failure to provide and maintain a supply of safe and clean drinking water affects numerous aspects of society, including the health of its individuals, its ecosystems, and its economy. In the United States, as the APHA pointed out, a vast number of utility workers, scientists, sanitarians, engineers, government officials, and many others work around the clock to provide safe and clean drinking water to America's homes and businesses. Worldwide, however, 884 million people do not have access to an "improved" water source, eg, water supplied through a household connection, public standpipe, borehole well, protected dug well, protected spring, or rainwater collection.[1] An estimated 2.5 billion people lack access to adequate sanitation (more than 35% of the world's population).[2-5] The latest estimates from the World Health Organization (WHO) placed unsafe water, sanitation, and hygiene among the leading global risks for death, responsible for 1.9 million deaths and 64.2 million years of life lost as a result of premature death or illness and disability (disability-adjusted life years) in 2004.[6] These numbers represent 3.2% of all deaths and 4.2% of all disability-adjusted life years, respectively.

According to the WHO, around 10% of the total burden of disease worldwide could be prevented by improvements related to drinking water, sanitation, hygiene, and water resource management. The latest estimates link unsafe drinking water, inadequate availability of water for hygiene, and lack of access to sanitation with about 88% (1.5 million) of deaths from diarrheal diseases (including cholera, typhoid and dysentery) in children younger than 5 years of age. Unsafe water, inadequate sanitation, and insufficient hygiene are also associated with 2 billion nematode infections, 200 million cases of schistosomiasis, 0.5 million cases of malaria, as well as outbreaks of dengue, Japanese encephalitis, and onchocerciasis.

Outbreaks of disease caused by unsafe water remain comparatively rare in North America, but physicians may become complacent about the dangers of waterborne pathogens. However, several recent outbreaks of waterborne infections have occurred in the wake of disasters. Altered patterns of rainfall and increased frequency of extreme weather events are likely to influence the incidence of waterborne gastrointestinal and respiratory diseases in North America and elsewhere.

In this interview, Omar A. Khan, MD, MHS, spoke with Linda Brookes, MSc, for Medscape, to discuss water safety with respect to waterborne infections, how they affect health in developing countries, and how developed countries should become more aware of how to prevent and treat these diseases. Dr. Khan, a member of the Advisory Board for Medscape's Public Health & Prevention is a leading authority on global health and family medicine.

Medscape: The term "water safety" presumably means different things in different places; would you agree?

Dr. Khan: I would say that "water safety" as an overall term really should include all of what water can do that might be potentially harmful, and that includes, in the broadest interpretation, environmental issues like drought, and diseases (such as malaria) for which water is simply a medium for organisms to reproduce- although the water itself does not cause any problem. The WHO includes malaria as one of its water issues because the malarial larvae need stagnant water to hatch, and if you eliminate stagnant water, you reduce the number of mosquitoes carrying

either dengue fever or malaria. So a broad interpretation allows us to link those other conditions with water, which might otherwise be missed.

Medscape: The theme of the APHA conference was global, but it is an American organization, so how much concern is there about water safety in the United States?

Dr. Khan: In the United States, I think that we tend to think less of water as a mode of spreading disease because, generally, we have quite good municipal water safety systems. Where I live, our municipality regularly issues a water safety report on the basis of tests for 10 elements or compounds in samples of our town water to ensure that these substances remain below allowable limits. Most people in the United States seem to care about polychlorinated biphenyls, lead, and, to some degree, fluoride. In my locality, many people worry about lead in the water. As a US-based physician, a lot of parents ask me, should my child be tested for lead? In a city like Karachi (Pakistan), however, lead is the least of the concerns; there you are concerned about getting sick and dying from drinking 1 cup of infected water, such is the level of bacteria. So, what they are concerned about in New York City is different from what they might worry about in Karachi.

Medscape: The risk in Karachi would be almost exclusively related to infections?

Dr. Khan: Yes, contracting an infection and dying either of the infection itself or of the sequelae thereof. People die of malnutrition because they experience so much vomiting and have so much diarrhea that they do not have enough time to replenish food and water. So, diarrhea, for example, is responsible for 1.5 million deaths in children each year (nearly 1 in 5 deaths in children) worldwide.[7] In the United States, in a typical week, I might see 2 cases of diarrhea a week, which is not insignificant, and of course I am going to think about all the ways that they could have acquired this diarrhea. So, in that sense, I am involved with waterborne infections in the United States. I also do travel medicine, so if someone returns from, say, Venezuela, and says he or she has diarrhea, that person is very different from an 80-year-old in a local nursing home who was recently on antibiotics and who has diarrhea. I am required to think about all of the possibilities. Much of my current medical education work involves having our medical students and residents work at our partner hospitals such as in Dhaka, Bangladesh, one of which, the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) is the leading center for waterborne disease research in the world. The researchers there have done an extensive amount of cholera research. They developed an oral rehydration therapy in the 1960s[8], before the WHO, and they developed a cholera vaccine (Dukoral®).

Diarrheal disease, specifically infectious diarrheal disease, is the greatest worldwide threat from poor water, and more specifically I would say that the most severe diarrheal diseases would be cholera, typhoid, and various forms of dysentery, including enterohemorrhagic *Escherichia coli*, which can cause severe bloody diarrhea. Clearly, North America and, to some extent now, Central and South America and Europe are the most protected against diarrheal disease simply because they have better sanitation and more education. The worst hit areas are typically South Asia and sub-Saharan Africa for different reasons. In South Asia, there is a lot of mixing of water types, for example, because of the geography of Bangladesh, which is a low-lying country formed by a delta plain at the confluence of 3 rivers, drinking water there very quickly gets contaminated with sewage. Sub-Saharan Africa is affected more, simply because the other health indicators and the health infrastructure are so poor. The risk of dying from diarrheal disease is also increased because of the high rates of malnutrition and high numbers infected with HIV, in whom diarrhea becomes more frequent and severe as the immune system deteriorates. Of course, access to treatment differs also. You can get sick from cholera in America and get treated successfully very quickly. You can get sick with cholera in Bangladesh, and it will take quite a bit longer to get treated. If you get sick in sub-Saharan Africa, however, you might die. That is the issue.

Improving water safety would also prevent the several billion nematode infections that occur worldwide.[2] These include diseases of the small intestine, such as hookworm (*Ancylostoma duodenale*/*Necator americanus*) and ascariasis, an infection caused by *Ascaris lumbricoides*, a large roundworm. Nematodes cause morbidity but probably not as much death, although they can cause slow death by malnutrition and anemia. Nematode infections do not cause as much mortality per capita as, for example, cholera. For every 10 cholera infections, there might be 2 deaths, whereas for every thousand intestinal nematode infections, there might be 2 deaths. That may be an exaggerated difference, but it is meant to show the order of magnitude of difference between the 2 types of infection.

Medscape: Recently, the WHO identified 5 leading risk factors --childhood underweight, unsafe sex, alcohol use, high blood pressure, unsafe water and sanitation-- as together responsible for one quarter of all deaths in the world and one fifth of all disability-adjusted life years. The WHO calculated that reducing exposure to these risk factors would increase global life expectancy by nearly 5 years.[6] Some of these risk factors can be dealt with on a one-to-one basis, but how do we improve the water?

Dr. Khan: It would be possible to achieve a one-third reduction in diarrheal disease frequency with any of the following interventions: hygiene, sanitation, water supply, and water quality. Simple handwashing with a soap solution after coming into contact with infected material cuts diarrhea frequency by one third.[9] Sanitation is a more difficult challenge, but having latrines where the sewage does not interfere with the drinking water supply will immediately reduce that community's diarrhea frequency by about one third. Constructing water supply facilities will also cut diarrhea by about one third, but that is one of the more difficult structural problems to address. Of course, cleaning the water will help, so if the government or some agency puts in tube wells or pumps that provide clean water, that would produce another one-third reduction. Improving water quality by water purification such as boiling or chlorination will reduce disease by a third as well. Very simple interventions will produce very large reductions in the frequency of diarrheal disease. So, the question is, where should one put the money? In a sense, you can put it almost anywhere in the above categories, and it will make a difference, and different communities need different things. Some communities might have a tube well, but they do not have a container to carry the water to their homes, so they have a great supply but poor quality. Or they have good supply and have good quality, and yet they are not practicing handwashing adequately; that would be a hygiene issue.

The most important issues in sub-Saharan Africa are different from the ones in South Asia. In much of South Asia, the issue is not water supply -- there, the problem is "water, water everywhere, nor any drop to drink." The quality of the water is fairly poor, however, because it gets contaminated very quickly. It has been suggested that rainwater might be used rather than trying to collect water from the ground, which might also be contaminated. So, in South Asia, it is a quality issue, whereas in Africa, it is a supply issue. Where do you get the water to begin with? In Africa, they do not have enough water, and when they do get enough water, it tends to be of fairly poor quality. I think in Africa we need to set up a network of supply systems. In South Asia, I would focus on improving water quality.

Medscape: How is this sort of thing set up? Which organizations are most involved?

Dr. Khan: The WHO takes an explicitly normative view of areas related to population health, ie, it sets norms and defines standards for issues such as clean drinking water. Among the individual organizations, The United Nations Children's Fund (UNICEF) and the Geneva-based Water Supply and Sanitation Collaborative Council (WSSCC) launched their "Water, Sanitation and Hygiene (WASH; now WASH-Plus)" campaign in 2006. The campaign uses a variety of interventions to improve the water and sanitation situation in developing countries. In 2008, UNICEF performed WASH activities in more than 100 countries.[10] WASH focuses on working with local nongovernmental organizations to implement hygiene promotion, water quality testing, emergency programs, community support, and education. It also seeks to influence policy at the national level. Nongovernmental organizations around the world have been attempting to change water policy decision-making and are granting funds for projects to improve drinking water, sanitation, and hygiene.

Medscape: Once these initiatives are up and running, how are water supplies monitored?

Dr. Khan: In the United States, this happens in 2 ways. One is, of course, at the point of contact or use, which is the water supply itself, and this can happen in water purification plants or at the faucet. The second is monitoring after the fact, which is the number of people who contract diarrhea. In the United States, for example, if someone gets diarrhea, that is not very interesting to the health department. But if I do a culture, and I detect *Cryptosporidium*, depending on the state, that could be a reportable diarrhea. For example, there was a big outbreak of acute watery diarrhea due to *Crypto* in Milwaukee, Wisconsin, in 1993, in the largest waterborne outbreak in the United States in the past 30 years.[11] We can get an estimate of what is going on with the water quality on the basis of how many people are reporting diseases.

In developing countries, monitoring is very variable. Countries with well set-up environmental protection agencies, ministries of health, and ministries of environment go out and do active surveillance. In Bangladesh, for example, people who work either for the government or for the large research centers go out and dip test tubes in water and go back into the lab and test for coliforms, cholera bacteria, etc. They also do passive surveillance, which is when

people arrive at a hospital with documented cholera or diseases of that sort, the information goes into the government's or the ICDDR,B's database, and at the end of the year, they can say that we had more or less cholera than we usually do. In the United States, we do laboratory diagnosis, meaning each hospitalized person gets tested, and we can say with certainty whether the patient has cholera or some other disease because his or her stools are tested. In developing countries, however, there are so many people that it is not possible to cost-effectively test everybody, so if someone becomes symptomatic in Bangladesh during cholera season, we assume he or she has cholera. In Bangladesh, when we say that someone has cholera, it is not because we made a laboratory diagnosis, it is because we made an "epidemiologic diagnosis". The way of counting people is different, but you do still end up counting people and figuring out whether cholera is increasing or decreasing.

Medscape: How realistic is it to expect improvements soon in waterborne infections?

Dr. Khan: I think that 155 years ago, when John Snow advised removing the handle of the Board Street public pump in London (when he theorized that contaminated water from the pump was the cause of cholera during the 1854 outbreak), it must have seemed very much like what we see in parts of the developing world today. London was full of plagues and poxes and diseases at that time, and there and in every other big city, many people died in their 20s and 30s from all sorts of infections and other causes that we cannot possibly imagine now. That was only a few generations ago. We have seen in our lifetimes massive improvements being made in terms of the world's water and health. Although 1.5 million children younger than 5 years of age die each year of diarrhea, and that is a lot of people, 30 years ago, we had an even higher percentage of unnecessary morbidity and mortality. So, I think we are improving; the trick is, of course, to keep going forward and recognizing the different challenges. They keep changing, but I am confident that in 100 years, we will as a scientific community look back at the time when there were so many children dying of diarrhea worldwide and at the progress we have made since then.

Medscape: Improvements have to mainly come about through prevention, right?

Dr. Khan: That is the main thing, I would say. For some diseases, we have to come up with new treatments, but there is no new diarrheal disease therapy out there on the horizon, and perhaps there won't be. There is no medicine for malnutrition, or for viral diarrheal disease, or for dengue. The medicine is prevention, and that is where, in the United States, we have made the greatest strides in hygiene and public health. The first school of public health in the United States was the Johns Hopkins School of Hygiene and Public Health in Baltimore, Maryland. It was founded more than 100 years ago with help from the Rockefeller Foundation, which named it that because hygiene improved the health status of so many people. So, that is where the biggest gains are going to come from. I am less worried about diarrhea than some other diseases like HIV, which have no cure and not even a vaccine. Interestingly, there already are some diarrheal disease vaccines, including rotavirus and cholera.

Medscape: Are new pathogens emerging, or are the old ones reemerging anywhere in the world?

Dr. Khan: Good question. I think we are seeing emerging infections. We are not seeing them in the sense that brand new disease organisms, like HIV, are evolving. We are not seeing that type of completely new disease entity in waterborne diseases. What we are seeing is what happens when human habitat, the insect habitat, and the bacterial habitat coincide. For example, if the humans decide to go into forested areas and build houses next to water sources where there may have been dengue, malaria, or Japanese encephalitis-carrying mosquitoes for hundreds and thousands of years, now it is a problem. Cities around the world were not always very crowded, so no one lived in the geographically undesirable areas where there was stagnant water. Now cities like Karachi, Mumbai, and Dhaka have expanded so much that the inhabitants take whatever patch of land they can get. So, there are many people now living next to areas of stagnant water with encephalitis-, dengue-, and malaria-carrying mosquitoes hatching just below the water's surface.

Medscape: Could global climate change affect the incidence of waterborne infectious diseases, even in areas like North America?

Dr. Khan: That has been discussed, and we do not have very much evidence for the effects of climate change yet, but we do in terms of disasters, and climate change leads to more disasters. I think with global warming, a major risk would be a greater frequency of natural disasters. To take one example, after Hurricane Katrina in 2005, Vibrio-type infections were identified in Louisiana, mainly *Vibrio vulnificus*, but also some cases of *Vibrio parahaemolyticus*, all noncholerae. [12] *Vibrio* infections were previously rare in Louisiana, but suddenly, when

you had fecal matter mixing with drinking water, the entire drinking water pool became contaminated, and Louisiana was converted into Bangladesh. Bangladesh and Louisiana are geographically fairly similar in terms of how low-lying they are compared with the surrounding water areas. It is actually rather shocking how little it takes to convert a developed area into a developing area. That was the result, perhaps, of climate change and of poor planning on the part of many people. The more Katrinas we have, the more disruption of drinking water we will have, and when drinking water is disrupted, you essentially become a developing country. New Orleans became a developing country after Katrina hit, and there was water everywhere, but you could not possibly dip your hand in it and drink it because it was mixed with sewage.

Medscape: So, you are saying that waterborne infectious diseases could reemerge in other cities such as New York, if water levels rose?

Dr. Khan: The water level around Manhattan would only have to rise about 6 in, and you pretty much flood the city.

Medscape: And then the city has a water safety problem like the one you described?

Dr. Khan: Absolutely. The sea level rising is one issue because it will contaminate the water system. The other big issue is, as the weather gets warmer, the habitat may become more attractive to mosquitoes. If it does, and simultaneously there is more stagnant water, then we could potentially see a resurgence of malaria in this country, which we have not had for 30 years, or dengue, which we have never seen, except for isolated cases on the Mexican border. With warmer weather, we could have a resurgence of all mosquito-borne diseases.

Medscape: So, North America shouldn't become too complacent?

Dr. Khan: Yes, that is unfortunately how human nature works. We need something to prod us into action. For example, severe acute respiratory syndrome (SARS) almost coming to America in 2002-2003 was what made us think that we should accelerate the finalization of an influenza pandemic plan. There is an unfortunate truism in medicine that for change to happen, someone has to die. But public health works best on prevention, not by having people die and then doing something. So, it would be nice to be able to prevent all these issues, but there isn't adequate funding for a public health infrastructure in the country. Public health is largely a publicly funded enterprise, and at this point, most people are less concerned about malaria and dengue happening 30 years from now than they are about healthcare and jobs and the economy.

Medscape: But maybe they don't need to worry yet?

Dr. Khan: We are living in an interconnected world. Within about 16 hours, you can reach 85% of the points in the globe from North America. So, if someone has cholera in a faraway country, they could have cholera in New York City 16 hours later. They could have a so-called tropical diarrheal disease here. I think the point is, we have to be prepared not only to prevent but care for people who have certain illnesses at any point in time and anywhere. The sense of place is becoming less and less a valid metric of how anyone is doing. People are migratory and are moving all the time, and that sense of interconnectedness means that all of us need to care about approximately the same set of issues: If you do not care about someone else's set of issues today, they will probably be your set of issues tomorrow. So, for that selfish reason, even if we cannot convince people to be altruistic, we can at least provide some evidence of the positive aspects of acting selfishly; in this case, in one's own future self-interest.

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What Are the Potential Physical Health Effects From the Gulf Oil Spill?

An Expert Interview With Vikas Kapil, DO, MPH, From the US Centers for Disease Control and Prevention

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Authors and Disclosures

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Editor's Note:

The oil spill in the Gulf of Mexico that began on April 20, 2010, when an oil rig exploded in Louisiana, killing 11 workers, is now the worst US environmental disaster. The amount of oil that gushed into the Gulf since then could be as high as 60,000 barrels a day. Various measures to cap and stop the flow had been unsuccessful until July 15, when the oil leak was observed to have stopped after a new containment cap was completely installed on July 12. Also on July 15, a well integrity test was implemented to measure pressure within the oil well and to determine whether the new cap will successfully hold back the flow of oil or prevent a new leak from forming elsewhere. At the time of this interview, the results of the test remain uncertain.

Regardless, the impact to the local ecosystem and to the livelihoods of residents in the affected Gulf states continues to worsen. Detrimental health effects are being observed in the animal and marine life; the body of water of the Gulf itself remains contaminated by an estimated current volume of 90-180 million gallons of oil; oil and tar balls have been washing up on the shores; and volatile organic compounds (VOCs) are still being released into the surrounding ambient air.

The methods used for cleaning up the oil, such as the application of dispersants and burning the oil, are also presenting challenges, introducing new exposures from other chemical pollutants and from particulate matter (PM).

A significant growing concern is how the health of coastal residents and response workers involved with the cleanup efforts could be affected over the short and long term.

At the request of the US Department of Health & Human Services, the Institute of Medicine (IOM) quickly convened a workshop, "Assessing the Human Health Effects of the Gulf of Mexico Oil Spill," on June 22 and 23 in New Orleans, Louisiana. Experts in attendance agreed that existing research that evaluated the adverse health effects for humans from previous oil spills is surprisingly lacking; many of these studies were small, used poor methodology, or focused on short-term health outcomes only.

The US Centers for Disease Control and Prevention (CDC) has published a collection of content updated daily for health professionals, coastal residents, response workers, and the general public that is devoted to this disaster on their Website, CDC: 2010 Gulf of Mexico Oil Spill. Vikas Kapil, DO, MPH, is the Associate Director for Science for the Deepwater Horizon Oil Spill Response at the CDC in Atlanta, Georgia. Dr. Kapil spoke with Medscape about the potential physical health effects in humans who are exposed to an oil disaster and what clinicians can do in response to such situations.

Medscape: What are the potential hazardous substances related to the oil spill itself as well as its cleanup, and what are their specific effects on human health?

Dr. Kapil: The recent Gulf of Mexico oil spill more likely presents a risk for adverse ecologic impact rather than severe adverse human health effects. However, depending on the exposure, the potential exists for human health effects.

On the basis of data from oil recovered from other wells in this area, we expect that the more hazardous substances found in crude oil, such as benzene and sulfides, will make up less than 1% of this oil spill.

Workers at the site of the spill may be more at risk of being exposed to the VOCs, such as benzene or toluene, that are present in crude oil. This guides the National Institute for Occupational Safety and Health's (NIOSH's) recommendations on personal protective equipment for workers. Oil spill workers may need to wear personal protective equipment on the basis of the particular cleanup duties that they perform. The NIOSH Website has more information about their ongoing efforts to protect the health and safety of response workers.

Many of the VOCs have largely evaporated from the weathered oil that reaches the shore, so they present less of a risk for the general public and for those working onshore.

The crude oil involved in this oil spill is called medium sweet crude. "Sweet" means that the oil contains fewer sulfur compounds and is therefore less toxic than other forms of crude oil. Medium crude generally has fewer VOCs and fewer chemicals known to pose long-term health risks compared with other oil types.

One method being used to reduce the amount of oil before it arrives on the shores of the Gulf of Mexico is to burn it. Burning oil may generate PM. PM includes a mix of very small airborne particles and liquid droplets. PM varies in size; some of the smaller PM can be inhaled and deposited in the lung.

Because intentional burning is being conducted far offshore, it is unlikely to reach inhabited areas of the coast. In situ burning is monitored by the US Coast Guard for safe operational practices. As crews burn spilled oil, they carefully watch the weather, wind, and water conditions and monitor the air. If any problems are encountered, oil burning is stopped immediately. The CDC and the Agency for Toxic Substances and Disease Registry (ATSDR) are monitoring the air sampling results to help guide public health decisions. Up-to-date information about the public health effects of burning oil can be found on the CDC Website.

If PM does make it to the shore, it may pose a greater risk for people with underlying health conditions, such as asthma, chronic obstructive pulmonary disease, or heart disease.

People in the area who smell or see smoke may take certain steps to protect themselves:

They can choose to leave the area. Those at greatest risk of breathing smoke should evacuate.

They can limit their exposure to smoke by remaining indoors and using an air conditioner to filter the air. If available, air conditioning units should be set to "recirculation mode." Those without access to an air conditioner may wish to evacuate until the smoke is completely gone.

They should refrain from physical exertion. Physical activity that places extra demands on the lungs and heart -- exercise or physical chores, indoors or outdoors -- should be kept to a minimum.

Dust masks, bandanas, or other cloths -- even if wet -- will not protect against smoke inhalation.

The oil spill is not expected to affect any municipal water supplies. If people have concerns about the quality of their water, they should contact their local water utility.

The US Environmental Protection Agency (EPA) is monitoring the air quality in the region. Maps and charts at <http://gulfcoast.airnowtech.org> show current ozone and fine particulate Air Quality Index values that are being measured by air quality monitors located along the Gulf Coast. These maps and charts are updated hourly to show the most recent conditions.

Oil spill response workers may be exposed to many different chemical and physical hazards. The risk for each type of exposure depends on the type and location of the oil spill, the type and stage of response, and the workers' specific tasks.

Chemical exposures may include:

Benzene, toluene, ethylbenzene, xylenes, and other VOCs;

Oil mist; or

Naphthalene and other polycyclic aromatic hydrocarbons.

More information about these chemicals is available on the CDC [CDC: Facts About Benzene] and ATSDR Websites [ATSDR: ToxFAQsTM for Benzene; ATSDR: ToxFAQsTM for Polycyclic Aromatic Hydrocarbons (PAHs)].

Physical hazards may include:

Heat stress due to the high temperatures and humidity;

Ergonomic hazards that can cause injury to the musculoskeletal system;

High noise levels;

Sun exposure and dehydration; and

Injuries due to slips, trips, and falls on slippery walking and working surfaces.

Other safety hazards may come from the use of tools, equipment, machinery, and vehicle operations near workers.

The dispersants used in the oil spill have been COREXIT[®] 9500 and 9527 [Nalco Company; Naperville, Ill]. Both will begin to break down once applied to the oil slick. In aquatic environments, each will break down within 16 days. Exposures to dispersants will most likely occur among workers applying the material.

Health effects that could be experienced are dependent on the extent of exposure to the dispersants and may include:

Defatting and drying of the skin and possibly dermatitis, as a result of prolonged contact with the skin;

Chemical pneumonitis, if aspirated into the lungs;

Respiratory irritation as a result of repeated and prolonged inhalation exposure to vapor; and

Eye irritation as a result of repeated and prolonged exposure.

Repeated or excessive inhalation exposure to dispersants may lead to nausea, vomiting, hemolysis, renal or hepatic injury, metallic taste, central nervous system depression, or anesthetic or narcotic effects. 2-Butoxyethanol, a component of one of the dispersants, has not been classified as to its carcinogenicity. For most people brief contact with a small amount of oil dispersants presents no harm.

Employers should train oil spill response workers about their potential hazards and safe work practices to prevent and control these risks.

If healthcare professionals require additional, specific information about a particular case, they can call their local poison control center at 1-800-222-1222.

Medscape: What is the CDC doing to monitor or track the potential human health effects in the areas affected?

Dr. Kapil: The CDC and the US Department of Health & Human Services recognize the importance of anticipating, monitoring, and responding to any potential public health hazards that may affect human health. Currently, over 300 CDC and ATSDR staff members are involved in the response, including a number of staff members deployed to Gulf Coast states.

The CDC, along with state and local health departments, is conducting surveillance across the 5 Gulf states for health effects possibly related to the oil spill using national and state-based surveillance systems, including the National Poison Data System (NPDS) and BioSense. These surveillance systems track symptoms related to the eyes; skin; and respiratory, cardiovascular, gastrointestinal, and neurologic systems of exposed persons. This tracking effort also includes collecting data on persons with worsening of asthma or those with cough, chest pain, eye irritation, nausea, and/or headache. If these surveillance systems identify groups of people with these symptoms, state and local public health officials will be able to follow up as needed to investigate whether an association is present between the symptoms and the oil spill. This follow-up is important because the same symptoms could be related to a different cause.

NIOSH is working to protect workers and volunteers from potential safety and health hazards related to the spill and cleanup efforts. The CDC is sharing its health information with industry, the Occupational Safety & Health Administration (OSHA), the US Coast Guard, and other federal and state agencies. NIOSH is also helping OSHA and the National Institute of Environmental Health Sciences (NIEHS) by providing technical assistance for training response workers.

Furthermore, NIOSH is collaborating with British Petroleum (BP) Safety and OSHA compliance personnel to coordinate the collection and analysis of injury and illness data that BP are reporting to OSHA. NIOSH is also establishing a voluntary roster of workers participating in the response to create a record and a mechanism to contact these workers about spill-related symptoms of illness or injury, if it becomes necessary. More than 45,000 responders -- BP-trained, volunteer, vessel of opportunity operators, and federal workers -- have been added to the roster. Workers are entered into the roster through a voluntary system at the staging areas to which workers report daily and during worker training, and through an electronic version of the form that is posted on a secure Website; NIOSH has provided the link to multiple federal agencies and BP, and has asked them to refer workers to the Website to complete the roster form electronically.

A CDC team of environmental health experts continues to review environmental data packages in coordination with the EPA. CDC scientists are reviewing these data to determine whether exposure to oil, oil constituents, or dispersants might cause potential short- or long-term health effects. These data include sampling results for air, water, and soil/sediment as well as waste oil samples, which are material actually reaching the beaches or marshes.

Some of the pollutants that have been reported may cause temporary eye, nose, or throat irritation; nausea; or headaches, but scientists believe that levels are not high enough to cause long-term harm.

The EPA and CDC will continue to monitor the air, water, and soil/sediment. If we begin to find levels that may be of health concern, we will update the public. The latest information on air quality and monitoring data along the Gulf Coast is available on the [EPA \(http://www.epa.gov/bpspill/air.html\)](http://www.epa.gov/bpspill/air.html) and [Data.gov \(http://www.data.gov/restorethegulf/datasites\)](http://www.data.gov/restorethegulf/datasites) Websites.

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Medscape: The breadth of this type of disaster is unheard of in this country, and its potential toll on human health has yet to be fully determined. Exposure to oil appears to affect multiple systems of the body; however, few human studies or experiences are available that provide actual guidance on what to expect. What might be extrapolated from existing data about the potential acute or short-term physical health effects?

Dr. Kapil: Any potential acute or short-term health effects are generally dependent on amount and duration of exposure. Prolonged skin contact with crude oil and petroleum products can cause skin erythema, edema, and burning. Swallowing crude oil, unless in large quantities -- for example, greater than 8 oz -- is unlikely to result in more than transient nausea, vomiting, gastrointestinal tract disturbances, and diarrhea. Ocular exposure can cause chemical conjunctivitis. Serious ocular injury is uncommon in the absence of other contaminants. Exposure to fresh crude oil may result in inhalation of associated vapors from volatile hydrocarbon components. Symptoms may include headache, dizziness, confusion, nausea, or vomiting.

Heat-related illness, such as heat stroke, heat exhaustion, heat cramps, or fainting, related to cleanup of the oil spill is an important health concern, particularly for responders. In addition, workers, volunteers, and residents of affected communities may experience stress and fatigue and may also be at risk for more serious mental health consequences. It's important that responders and residents of affected communities monitor their health and well-being closely and seek professional medical and/or mental health assistance when indicated.

Additional information on prevention and management of acute health effects, including heat illness and mental health aspects, is available on the CDC [[CDC: Gulf Oil Spill 2010: Information for Health Professionals](#); [CDC: NIOSH Workplace Safety & Health Topics: Deepwater Horizon Response: Gulf of Mexico Oil Cleanup](#)] and Substance Abuse and Mental Health Services Administration (SAMSHA) Websites [[SAMSHA: Find Substance Abuse and Mental Health Treatment](#); [SAMSHA Disaster Response: Mental Health Awareness in Times of Emotional Distress](#)]. Another useful resource is the National Suicide Prevention Lifeline at 1-800-273-TALK [1-800-273-8255].

Medscape: One of the main concerns is whether this exposure to the oil spill might promote the development of a malignancy in the future. What do you anticipate to be possible malignancies or other chronic health effects?

Dr. Kapil: Questions about long-term human health effects are important and complex. Little research has been conducted to examine the long-term health consequences of oil spills and related human exposures, including cancer outcomes. Much of what we know is from our experience with occupational exposure to crude and refined oil among oil workers, and a few limited studies of previous oil spills that primarily focused on short-term health outcomes. Findings from these previous studies are difficult to extrapolate for the current situation because many differences exist in the nature of the exposures and other related circumstances.

We can also look at the limited toxicity data related to individual components of the oil or dispersants. Evaluation of the impact of exposures is complicated due to a number of factors, including weathering of oil components and the presence of complex mixtures of substances. In other kinds of exposure settings and in some toxicologic studies, some of these substances and degradation products have been associated with a variety of chronic and/or long-term health effects. Therefore, people should be advised to minimize exposures to oil and dispersants in general, with particular attention to vulnerable populations and those with existing comorbidities.

Although some components of oil are known human carcinogens (such as benzene), associated cancer risks are difficult to assess due to a number of factors that affect exposure and influence health outcomes, including:

Weathering and degradation of oil components;

Level of adherence to exposure prevention efforts;

Individual susceptibility;

Other common exposures to carcinogens;

The particular circumstances surrounding the exposure; and

Routes of exposure.

The CDC is working closely with the EPA and other partners to attempt to better assess potential exposures related to the oil spill among workers and the general public in the affected areas of the Gulf states.

To date, environmental assessments for various crude oil constituents in air, sediment, and water have revealed levels above the limit of detection in only 5%-15% of all samples. Environmental samples of oil constituents measured above the limits of detection have been at levels far below those associated with any long-term health effects. In conducting this assessment, the CDC is using the most conservative estimates of exposure possible, for example, 70 years of exposure even though the vast majority of exposures will occur over days, weeks, or months. On the basis of our current assessment and understanding of exposures, the likelihood of long-term health effects, including cancer, remains low, but scientific gaps exist in our knowledge. The CDC is working closely with many partners and stakeholders, including affected communities, to further evaluate and better understand the longer-term health effects.

At the request of the US Department of Health & Human Services, the IOM held a public workshop in June to draw upon the best scientific expertise available to examine a broad range of health issues resulting from the oil spill, including:

Reviewing the current knowledge about the effects on human health of exposure to oil, weathered oil products, and dispersants, and identifying gaps in this knowledge;

Reviewing and assessing ways to monitor the spill's potential negative effects on health in the short and long term; and

Exploring methods and strategies for gathering data to further our understanding of the risks to human health.

The report from this workshop (<http://www.iom.edu/Activities/PublicHealth/OilSpillHealth/2010-JUN-22.aspx>) is due in August 2010 and will be posted on the [IOM Website \(http://www.iom.edu/\)](http://www.iom.edu/).

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Medscape: Certain populations appear to be more sensitive to or at greater risk for adverse physical health effects. Pregnant women, infants and children, the elderly, and people with preexisting respiratory conditions or compromised immune systems have been identified as populations of concern. What might be the particular adverse health effects experienced by members of these special populations?

Dr. Kapil: The oil may contain some chemicals that could, under some conditions, cause harm to special populations, such as children, the elderly, and pregnant women or their babies. However, the CDC has reviewed and continues to review sampling data from the EPA and believes that the levels of these chemicals are well below the level that would generally cause harm to persons in these vulnerable groups. The effects that chemicals might have depend on many things: means of contact with the oil; duration and frequency of exposure; and the overall health of the person exposed.

People can be exposed to oil spill-related chemicals by inhalation from the air, by ingestion from water or food, or by skin contact. If possible, everyone should avoid the oil spill-affected areas. The EPA and CDC are working together to continue monitoring the levels of oil in the environment. If levels are more likely to become harmful, the public is informed. The [EPA Website \(http://www.epa.gov/\)](http://www.epa.gov/) has the most current information on monitoring data along the Gulf Coast.

Swimming in water contaminated with oil will be unpleasant and should be avoided. The public needs to be alert to local beach closings and advisories. Visitors to the Gulf of Mexico should stay away from cleanup activities and follow the advice and warnings from state and local health departments.

For now, those in populations of concern should avoid touching any oil, as well as any oil-stained water and sand. They also need to stay clear of areas where cleanup activities are under way. If some of the oil gets on their skin, they should wash it off as soon as possible with soap and water. If they notice a rash or other skin abnormalities even after washing the area of skin that came in contact with the oil, they need to consult a healthcare professional.

The amount and extent of seafood consumption by people could also potentially pose a health concern. As a general precaution, fishing areas affected by the spill are closed to fishing and oyster collection, for both personal and commercial use. Any seafood available in stores comes from waters open for fishing. Seafood that is unsafe will not be allowed in stores.

The US Food and Drug Administration (FDA) and the National Oceanic and Atmospheric Administration National Marine Fisheries Service are monitoring the oil spill and will alert the public if any problem is found with seafood from fishing areas in this area of the country. If harmful levels of chemicals are found in Gulf-area seafood, the CDC will work quickly with other federal agencies, such as the FDA and state agencies, to make sure that the public is notified.

The [FDA Website \(http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodbornepathogenscontaminants/methylmercury/ucm115662.htm\)](http://www.fda.gov/food/foodsafety/product-specificinformation/seafood/foodbornepathogenscontaminants/methylmercury/ucm115662.htm) has some general guidelines about eating seafood during pregnancy in case your pregnant patients are interested in more information on this topic.

Contact with dispersants is unlikely for the general public because they are applied subsea or under controlled conditions offshore. The use of dispersants is carefully controlled and monitored because some of the chemicals in the dispersants can cause harm to people under some conditions. Pregnant women and children should avoid contact with dispersants. For most people, brief contact with a small amount of oil spill dispersants will not cause harm. However, contact of longer duration can cause a rash, dry skin, and/or eye irritation. In the unlikely event of breathing in or swallowing dispersants, other health effects -- such as nausea, vomiting, and throat and lung

irritation -- are possible. Individuals concerned about oil spill dispersants should contact their local poison control center. The CDC Website also has more information on oil dispersants.

Medscape: How can healthcare providers adequately screen patients from various populations exposed to the Gulf of Mexico oil spill or a similar disaster? What other guidance would you recommend that providers offer or communicate to their patients?

Dr. Kapil: Because many environmental-associated diseases either manifest as common medical problems or have nonspecific symptoms, an exposure history is vital for correct diagnosis. By taking a thorough exposure history, clinicians and specialists in toxicology, neurology, emergency medicine, occupational medicine, and other specialties can play an important role in detecting, treating, and preventing disease due to a potential toxic exposure. More detailed information about taking an exposure history is available on the ATSDR Website.

Some people may have dermal reactions to crude oil. Depending on the amount and duration of exposure, skin contact with crude oil may be mildly to moderately irritating; in a sensitive individual, the skin effects may be more pronounced after a smaller or shorter exposure.

Prolonged skin contact with crude oil and petroleum products may cause skin erythema, edema, and burning. The skin effects can worsen by subsequent exposure to sunlight, because trace contaminants in the oil, such as PAHs, may be more damaging when exposed to light. Skin contact with these products can result in defatting of the skin, increasing the possibility of dermatitis and secondary skin infections.

For most people, an occasional brief contact with a small amount of oil, such as that found in a tar ball, will do no harm, but this type of exposure is not recommended. Individuals, however, may have idiosyncratic reactions to various chemicals, including the hydrocarbons found in crude oil and petroleum products. They may have an allergic reaction or develop dermatitis even from brief contact with oil.

In general, dermal contact with oil should be avoided. If contact occurs, washing the area with soap and water is the preferred method for cleaning the skin. Do not use solvents, gasoline, kerosene, diesel fuel, or similar products on the skin. These hydrocarbon-based products, when applied to the skin, may present a greater health hazard than the smeared tar ball itself.

Healthcare providers can obtain assistance with questions about the treatment and management of oil- or dispersant-exposed persons by calling their local poison control center.

If providers are managing the care of persons exposed to crude oil and/or oil dispersants, they can consider some general guidelines depending on the route of exposure.

If a patient presents with skin contamination, no major complications should be observed; the oil can be wiped off whenever convenient in the patient treatment process. Oil- and oxygen-enriched atmospheres are potentially explosive; oil-contaminated clothing removed from patients, and oily cloths or rags used to wipe off patients, represent a potential fire hazard due to the risk for spontaneous combustion.

If a patient presents with wound contamination, current occupational practices for external and superficial wound cleaning are being modified to include use of waterless hand cleaners, white petroleum, mineral oil, corn oil, or antibiotic ointments. These agents must also be removed as completely as possible from within the wound after efforts to remove the crude oil have been completed.

If a patient presents with ocular exposure, which can result in irritation and transient conjunctivitis, no serious injury should result if treatment is instituted rapidly. Immediate treatment should include flushing the eye with copious amounts of water for at least 15 minutes. If the person wears contact lenses, remove them prior to irrigation. Contaminated contact lenses need to be discarded.

If a patient presents with ingestional exposure to a small amount of crude oil, clinical signs of toxicity are generally limited to mild gastrointestinal disturbances. The main danger of swallowing crude oil is that it can cause a chemical pneumonia if ingested oil is vomited and subsequently aspirated into the lungs. To treat patients exposed via ingestion, do not induce vomiting because this may lead to aspiration of the crude oil into the lung. Healthcare providers can consult their local poison control center for consultation.

If a patient presents with inhalational exposure to fresh crude oil vapors, inhalation of associated volatile hydrocarbons can also result. Symptoms, including headache, dizziness, confusion, nausea, or vomiting, may occur from breathing vapors given off by crude oil. Inhalation of weathered crude oil vapors is of less concern because of the diminution of volatile hydrocarbon amounts. Relocate the patient to a clear area and provide supplemental oxygen if needed.

Guideline Highlights

Oil- and oxygen-enriched atmospheres are potentially explosive; oil-contaminated clothing removed from patients, and oily cloths or rags used to wipe off patients, represent a potential fire hazard due to the risk for spontaneous combustion.

Dermal contact with oil should be avoided. If contact occurs, however, wash the area with soap and water.

Immediate treatment of ocular exposure should include flushing the eye with copious amounts of water for at least 15 minutes. If the person wears contact lenses, these should be removed prior to irrigation. Contaminated contact lenses need to be discarded.

Patients exposed via ingestion should not be induced to vomit because this may lead to aspiration of the crude oil into the lung.

Oil spill workers may need to wear personal protective equipment on the basis of the particular cleanup duties that they perform. The NIOSH Website has more information about their particular ongoing efforts to protect the health and safety of response workers.

If any questions remain about the treatment and management of oil- or dispersant-exposed persons, call your local poison control center at 1-800-222-1222.

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Medscape: Many of our Medscape members may not be involved with the direct care of patients exposed to an oil spill or similar disaster. However, they may be interested in becoming involved in other ways. What can they do to assist with disaster relief, either at the local or federal level?

Dr. Kapil: The response to the Gulf Oil Spill is being managed by a Unified Command made up of many federal agencies as well as BP and Transocean, the 2 private companies involved in the spill. If you or someone you know is interested in volunteering, please call the Deepwater Horizon Response Volunteer Request Line at 1-866-448-5816. Interested individuals can also search the Internet for state-specific volunteer opportunities, including in the Gulf states directly affected by this oil spill:

Louisiana; <http://www.volunteerlouisiana.gov/>

Mississippi; <http://www.volunteermisississippi.org/1800Vol/OpenIndexAction.do>

Florida; <http://www.volunteerfloridadisaster.org/>

and Alabama <http://www.servealabama.gov/2010/default.aspx>

Medscape: Are there any final takeaway messages that clinicians and other healthcare professionals can keep in mind as we learn more about the health impact of this and similar disasters?

Dr. Kapil: Local poison control centers are an excellent resource for clinicians with questions about the evaluation, management, and treatment of persons exposed to both crude oil and oil spill dispersants.

The CDC recommends that people in the areas affected follow local and state public health guidelines and warnings related to the use of beaches and coastal water for recreational activities and fishing. The EPA is collecting samples

of water along the coast to estimate the effects on fish, wildlife, and human health. The most up-to-date information on water sampling results is available on the [EPA Website](http://www.epa.gov/bpspill/water.html) (<http://www.epa.gov/bpspill/water.html>).

Web Resources

Centers for Disease Control and Prevention. 2010 Gulf of Mexico Oil Spill. Available at: <http://emergency.cdc.gov/gulfoilspill2010> Accessed July 21, 2010.

Institute of Medicine. Assessing the Human Health Effects of the Gulf of Mexico Oil Spill: An Institute of Medicine Workshop. June 22-23, 2010. Available at: <http://www.iom.edu/Activities/PublicHealth/OilSpillHealth/2010-JUN-22.aspx> Accessed July 21, 2010.

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Disaster Preparedness and Aftermath Resource Center

(<http://www.medscape.com/resource/disastertrauma>)

Medscape's editors have put together this collection of news, notices, articles, and related links to provide healthcare professionals with the latest information and resources related to caring for those affected by volatile world events such as terrorist attacks, war and natural disasters. This information will be updated regularly.

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- Water Safety: Reducing the Infectious Disease Burden Due to Unsafe Water, Sanitation, and Hygiene

(<http://www.medscape.com/viewarticle/714383>) (see pages 6-11)

Omar Khan tells us why we all should care about clean water.



- The Role of Clinicians in Preparing Patients for Disasters (<http://www.medscape.com/viewarticle/709697>)

Patients need the encouragement and assistance of healthcare clinicians to develop disaster preparedness plans.

LATEST FROM THE LITERATURE



- Nurses' Contacts and Potential for Infectious Disease Transmission

(<http://www.medscape.com/viewarticle/713656>)

In this study, nurses' patterns of contact differed from those of the general population. These differences need to be considered when considering the spread of epidemics. from *Emerging Infectious Diseases*. 2009;15(9):1438-1444.

- Public Health Leaders Using Social Media to Convey Emergencies: New Tools a Boon from *Nations Health*. 2009;39(6).

(<http://www.medscape.com/viewarticle/710011>)