"BLOODY SUNDAY"

TRAUMA IN TBILISI

THE EVENTS OF APRIL 9, 1989 AND THEIR AFTERMATH

Report of a Medical Mission
to Soviet Georgia
by
Physicians for Human Rights

February, 1990

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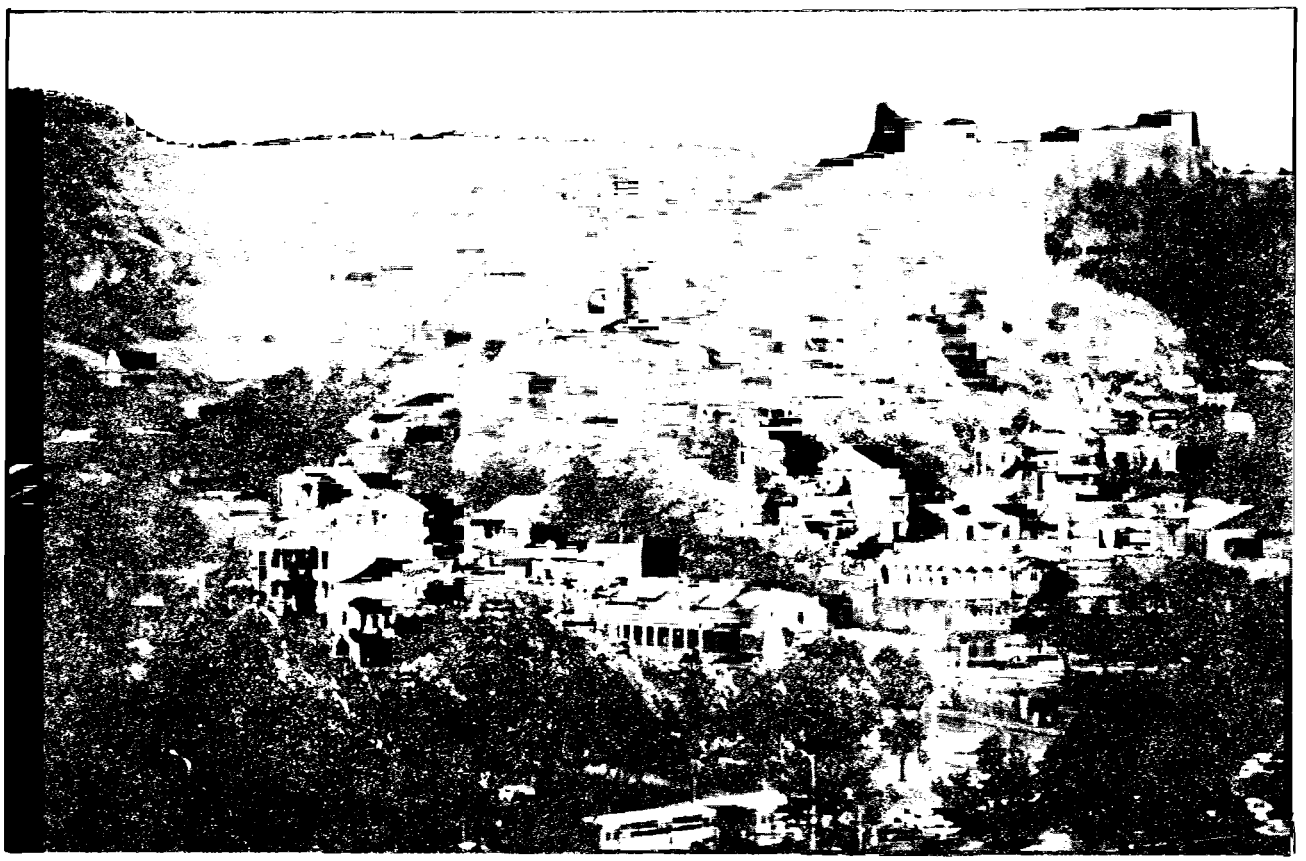

By

Jennifer Leaning, M.D., Ruth A. Barron, M.D.,
and Barry H. Rumack, M.D.

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PHYSICIANS FOR HUMAN RIGHTS

Physicians for Human Rights (PHR) is a national organization of health professionals whose goal is to bring the skills of the medical profession to the protection of human rights. PHR works to prevent the participation of doctors in torture, to defend imprisoned health professionals, to stop physical and psychological abuse of citizens by governments and to provide medical and humanitarian aid to victims of repression.

Since its founding in 1986, in addition to Soviet Georgia, PHR has conducted missions to Chile, Czechoslovakia, El Salvador, Haiti, Israel, the West Bank and Gaza Strip, Kenya, Malaysia, Panama, Paraguay, the Republic of Korea, Turkey, and Yugoslavia. PHR adheres to a policy of strict impartiality and is concerned with the medical consequences of human rights abuses regardless of the ideology of the offending government or group.

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Title page photo: View of the center of Tbilisi, Soviet Georgia.

Dedicated to the memory of
Dr. Andrei Dimitrievich Sakharov,
whose valiant efforts on behalf of human rights
gave voice and courage to us all.
He lives on as a conscience for the world.

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PREFACE

Physicians for Human Rights (PHR) has been concerned with the medical consequences of the use of toxic gas since the organization's founding in 1986. In recent years numerous governments have resorted to the use of toxic chemical agents - both in situations of international conflict, and in times of internal tension, against their own citizens.

Chemical weapons pose a unique threat to health and to our common sense of humanity. There is a particular abhorrence of the use of chemical weapons that is shared by those who have either studied or been exposed to their effects. Some chemical agents kill within seconds. Others cause horrible burns. Some persist in the environment and cause injury days or weeks later.

Chemical weapon agents, once released, are notoriously difficult to control, with dispersion greatly influenced by structural surroundings and by wind and other weather conditions. Infants, the elderly and the infirm are especially vulnerable to the agents.

These properties are shared by all chemical weapon agents including the lacrimating agents (tear gases) which are a subject of this report. Tear gas is used by police forces in many countries against civilians as a means of crowd control.

Physicians for Human Rights has sought to document in a precise and authoritative manner the physical and psychological consequences of the use of toxic agents in a variety of countries and settings.

In 1987, Physicians for Human Rights sent a medical delegation to South Korea to investigate the effects of use of massive quantities of CS gas (a form of tear gas) in the streets of Seoul. The team reported that even when used mainly on demonstrators, CS gas had an impact on the health of civilians at sites far from crowd gatherings. This toxic agent was found to have caused skin burns, eye injuries, and exacerbation of underlying heart and lung disease. In some cases, the physicians feared, chronic illness resulted from exposure.

In October 1988, Physicians for Human Rights sent a medical team to Turkish Kurdistan to gather documentation on the hundreds of deaths and injuries inflicted by the Government of Iraq when it used lethal toxic gas in attacks on Iraqi Kurdish villages in August 1988. These attacks resulted in the flight of 50,000 Kurds across the border into Turkey.

Physicians for Human Rights has also repeatedly documented and protested the excessive, indiscriminate and inappropriate use of force by governments against civilians. Missions to Panama in 1987, and Israel, Gaza and the West Bank in 1988 also focused on this subject.

The tragedy of the events of Sunday, April 9, 1989 in Tbilisi, Soviet Georgia, demonstrates yet again the serious physical and psychological damage caused by the unwarranted use of force, including toxic chemical agents, against a civilian population. PHR's team shed new light on the toxic chemicals used in Tbilisi, concluding for the first time that military units probably used chloropicrin along with CN and CS gases. The violent dispersal of a large, peaceful demonstration with toxic gases, truncheons and shovels has now been stamped in the memory of the Georgian people as "Bloody Sunday". The panic and fear that continued to affect residents of the city for weeks and months after the incident was exacerbated by the failure of Soviet authorities to disclose immediately the identities of the chemicals used on the population.

In publishing this report of a fact-finding delegation to Tbilisi, Physicians for Human Rights hopes to help deter not only the Soviet Government, but all others from resorting to the excessive use of force and the use of toxic gas as a means of crowd control and the suppression of dissent.

Susannah Sirkin
Associate Director
February 1990

ACKNOWLEDGEMENTS

The authors would like to acknowledge with deep appreciation and gratitude the following people who were instrumental in the conduct of the mission and/or the preparation of this report. Their encouragement and help have been invaluable.

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For extensive and careful review of the report prior to publication: Paul Blanc, M.D., Carola Eisenberg, M.D., Jonathan Fine, M.D., Cathy Fitzpatrick, H. Jack Geiger, M.D., Lewis Goldfrank, M.D., Howard Hu, M.D., Matthew Meselson, Ph.D., Richard Mollica, M.D., Julian Perry Robinson, Ph.D., Jane Schaller, M.D., Victor Sidel, M.D., and Eric Stover. For planning for the mission and assistance in preparation and editing of the report: Susannah Sirkin, Rosemary Curran, and Mimi Brubeck.

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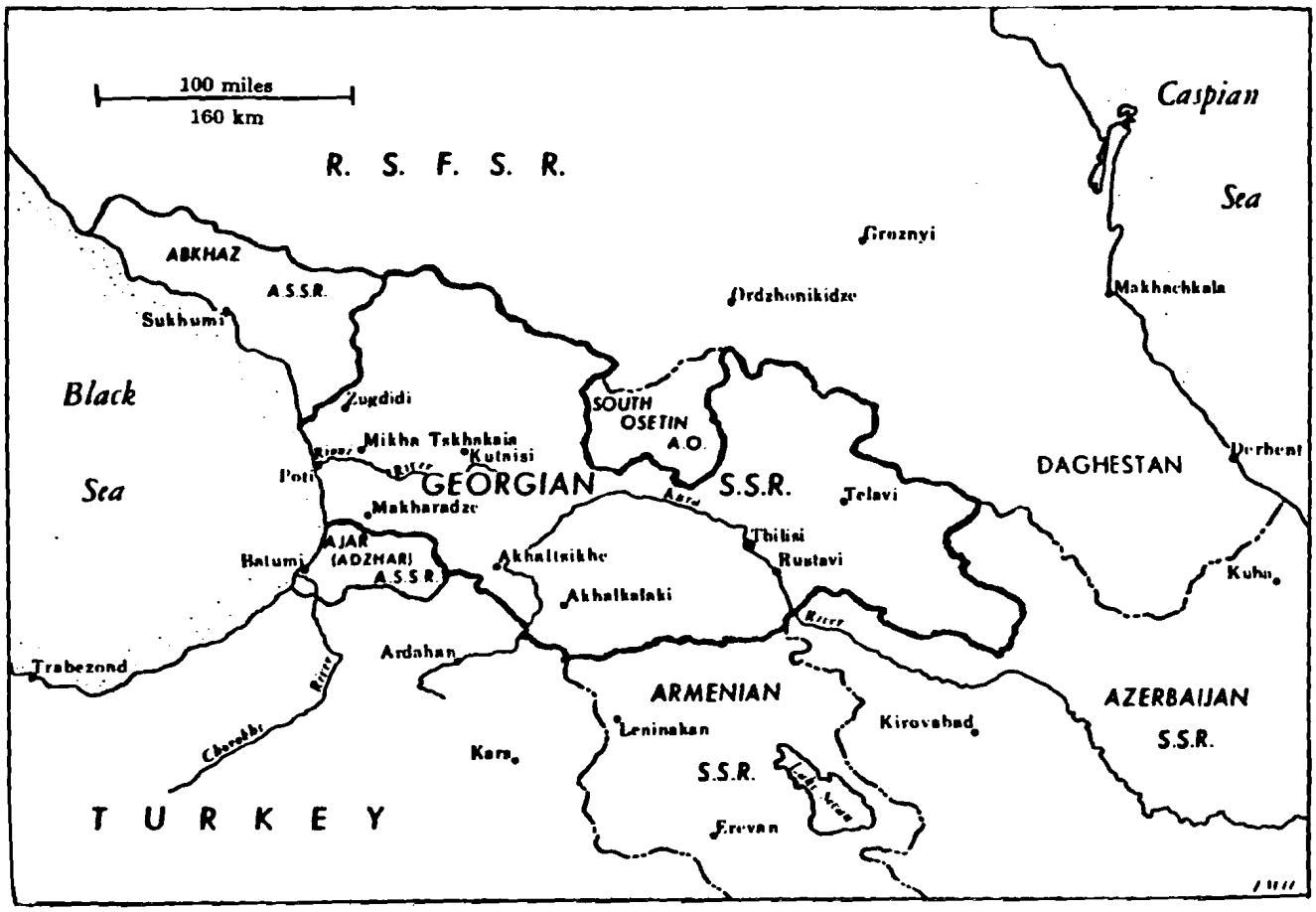


MAP 1

SOVIET GEORGIA

SUMMARY

On April 9, 1989, troops from the Soviet Ministries of Defense and Interior used entrenching spades and, it was alleged, toxic gas, to break up a peaceful demonstration of 8,000 to 10,000 people in Tbilisi, Soviet Georgia. Sixteen people were known to have been killed on the scene. Another four people later died from injuries sustained on that day. Hundreds of people were injured and admitted to hospitals. On April 10, in protest of the event, the city of Tbilisi went out on strike and a 40-day period of mourning was declared.

In the first few days after the demonstration, hundreds more people sought medical attention complaining of headache, difficulty breathing, chest discomfort, nausea, abdominal pain, and eye and skin problems. The Georgian medical community began to suspect that in addition to entrenching tools the troops had used toxic agents against the demonstrators. Soviet authorities at first denied that toxic gas had been used and then, one week after the event, acknowledged the use of choloracetophenone (CN), a form of tear gas.

The people of the city expressed their outrage and grief at the events of April 9 by bringing flowers to Government Plaza, the site of the demonstration. On April 28, Soviet authorities ordered the city's residents to move the massive collection of flowers to the courtyard of a nearby church. Beginning on April 28, and continuing for several days thereafter, hundreds and then thousands of people involved in moving the flowers began to experience symptoms similar to those felt by people exposed to toxic gas on April 9. Another wave of patients was admitted to the city's hospitals.

In early May, Dr. Andrei Sakharov and the International Committee of the Red Cross came to Tbilisi on an investigative mission. They reported that they had been told another gas (2-chlorobenzylidene malononitrile, or CS) had also been used on April 9.

Physicians for Human Rights (PHR) was asked by Dr. Andrei Sakharov and Dr. Irakli Menagarishvili, Minister of Public Health for Soviet Georgia, to provide technical expertise in assessing the possibility that toxic gas or gases had been used against the crowd. After weeks of attempting to obtain travel visas, on May 17, 1989, a team of three PHR physicians arrived in Tbilisi. That day, which also coincided with the end of the 40-day mourning period, scores and then hundreds of school children from around the city began complaining of symptoms attributed to a new wave of toxic exposure. The Georgian Ministry of Health asked the PHR team to assist in assessing the children who were hospitalized.

The members of the PHR team were Dr. Jennifer Leaning, an emergency physician and internist at Harvard Medical School and a member of the PHR Board of Directors, Dr. Barry Rumack, professor of pediatrics at the University of Colorado School of Medicine and Director of the Rocky Mountain Poison Center, Denver General Hospital, and Dr. Ruth A. Barron, a general psychiatrist at Harvard Medical School with expertise in both psychopharmacology and psychodynamics.

Methods

During the five-day mission, the team met with officials of the Georgian Ministry of Health, members of the Georgian Committee of Investigation, directors and department heads of the major hospitals, officials from the state departments of pathology, toxicology, and pharmacology, physicians present at the demonstration and physicians responsible for the direct care of patients who had been injured. The team reviewed the pathology and toxicologic evidence that was available and two videotapes that had been taken at the scene on April 9. One member of the team (Dr. Rumack) visited the state toxicology and pharmacology laboratories and one of the main analytic chemical laboratories of the University of Tbilisi, where he was provided access to a gas chromotography-mass spectrometer.

Of the several hundred people who were sufficiently symptomatic from the events of April 9 or April 28 still to be hospitalized in one of the 44 hospitals throughout the city, the PHR team (with the help of the Georgian physicians) administered a questionnaire to 113 and interviewed and examined 22 who, in the view of the Georgian physicians, were considered to be the most seriously ill. The PHR team also interviewed and examined two or three times, on at least two separate days, a total of 43 children who were hospitalized on May 17 through 22 for symptoms resulting from another possible exposure to toxic gas.

Findings

1) On the basis of clinical and toxicologic evidence available, the PHR team concluded that in addition to the use of one or two lacrimator (tearing) agents (CN and CS), the Soviet troops most probably used a third toxic agent, called chloropicrin. This gas was identified on the basis of mass spectroscopy in a cannister allegedly recovered on the scene. Chloropicrin, known for its unpredictable toxicities in crowd use, can cause skin and mucosal blisters, bronchoconstriction, and pulmonary edema, all of which were reported among the casualties of the April 9 demonstration.

2) The cause of death for the initial 16 victims of the demonstration could not be precisely determined on the basis of the evidence made available to the PHR team. In the absence of signs of external trauma, sudden death could have resulted from suffocation in the midst of crowd flight, asphyxiation from exposure to high concentrations at close range of a lacrimator, such as CN or CS, or a more toxic agent,

such as chloropicrin, or from direct exposure at close range to Freon, the propellant used in the CN cannisters.

3) Arriving three weeks after the event, it was not possible for the PHR team to establish the etiology of the symptoms people attributed to moving flowers on April 28 and thereafter. Although exposure to persistent toxic residues from the April 9 demonstration was the explanation most frequently advanced, in the view of the PHR team it is equally, if not more likely that a range of psychological reactions could explain these patient presentations.

4) On the basis of in-depth interviews and examination of all 43 children hospitalized from May 17 to May 22, the PHR team concluded that none were suffering from exposure to a toxic agent. Although a few presented with the characteristic signs and symptoms of common pediatric illnesses, the great majority were expressing psychological reactions to communal trauma.

5) The refusal of the Soviet military authorities to release to the Georgian medical community any information about the use of toxic agents against the demonstrators of April 9 hindered the physicians who were attempting to treat the thousands of people who complained of a confusing array of symptoms. Despite the absence of information, the Georgian physicians rendered compassionate care and managed throughout this extraordinarily difficult time to maintain an orderly and supportive medical environment.

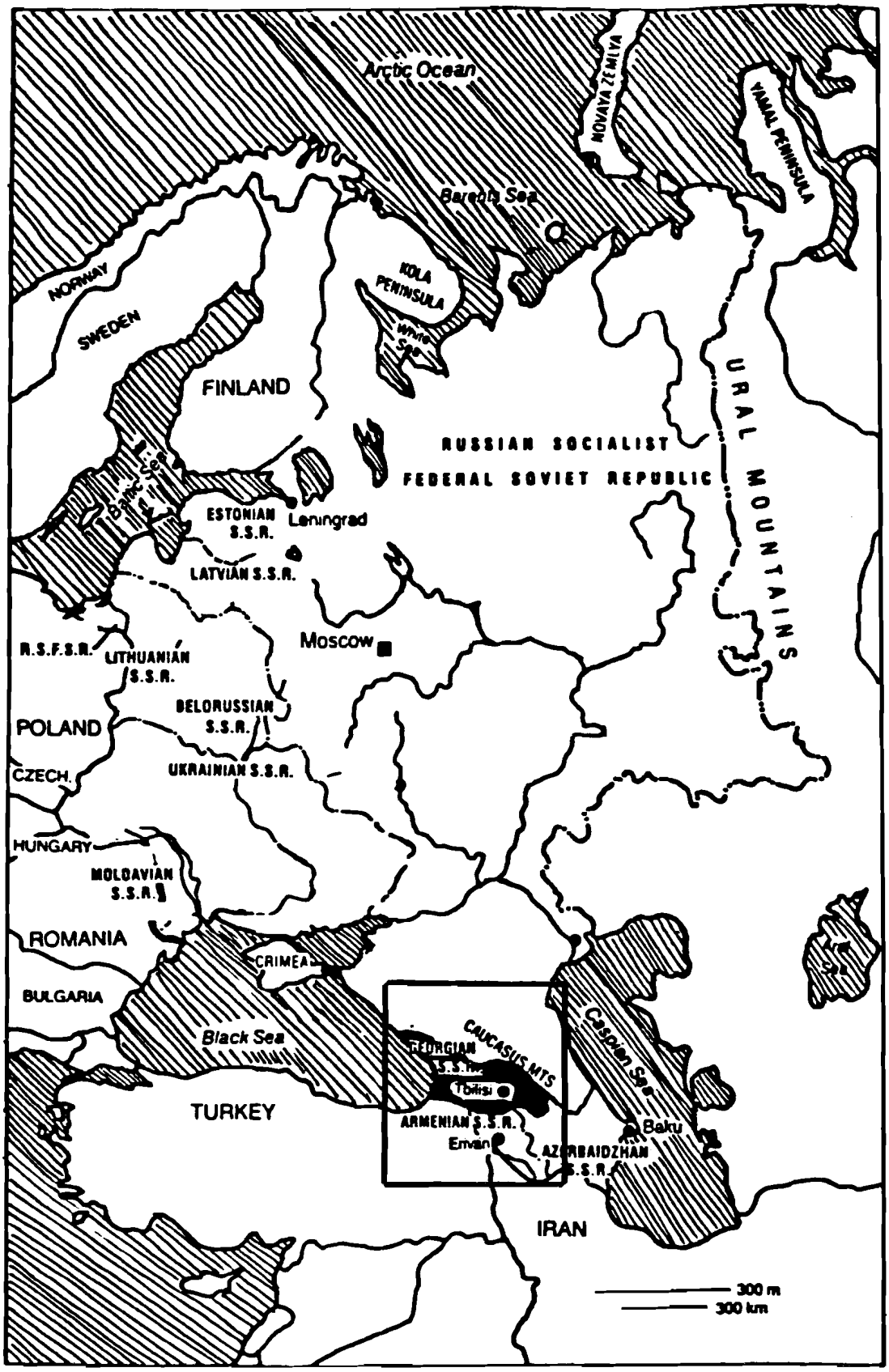
Recommendations

The PHR team recommended:

1) an extension of the Geneva Protocol of 1925 to a ban on peacetime use of chemical agents by a government as a means of crowd control;

2) the use of lacrimators to control crowds only as a last resort and only according to strict protocols to safeguard against serious effects;

3) the prompt provision of all information regarding this use as described in Recommendation 2, to the responsible medical authorities.



MAP 2

SOVIET GEORGIA IN THE CONTEXT OF THE WESTERN SOVIET UNION

INTRODUCTION

Early in the morning of April 9, 1989, in the city of Tbilisi, capital of Soviet Georgia, thousands of people participating in a demonstration were dispersed by Soviet troops. Initial press reports said that at least 16 people had died and several hundred were injured and that toxic chemical agents were used against the crowd.

Although these early details in the Western press were fragmentary, they were sufficient to raise substantial questions regarding violations of human rights and abuses of medical care. On April 11, Physicians for Human Rights (PHR) sent cables to the Embassy of the USSR in Washington and to General Secretary Gorbachev and the Minister of Health of Georgia, requesting permission to send a team of medical experts to examine patients and investigate allegations of the use of chemical gas. In subsequent weeks, PHR sent follow-up cables to these officials and to the Foreign Ministry, and telephoned the Soviet Embassy seeking a response. In early May, in following news reports that large numbers of patients were still hospitalized, PHR also telephoned the Georgian Minister of Health, offering assistance.

On May 8, PHR received word from Dr. Andrei Sakharov, requesting that an expert medical delegation help the State Investigative Commission, of which he was a member, to untangle the facts surrounding the reports of Soviet use of chemical gas. That week, Georgian authorities and health officials forwarded an invitation to Soviet Foreign Minister Shevardnadze for PHR physicians to come to Tbilisi. On May 16, at 4 am EST, the Soviet Consulate in Washington, D.C. called the office of PHR to say that visas had been granted. By mid-day, the PHR team was en route to Tbilisi.

The team was comprised of Dr. Jennifer Leaning, an emergency physician and internist at Harvard Medical School and a member of the PHR Board of Directors, Dr. Barry Rumack, a professor of pediatrics at the University of Colorado School of Medicine and Director of the Rocky Mountain Poison Center, Denver General Hospital; and Dr. Ruth A. Barron, a psychiatrist at Harvard Medical School with expertise in psychopharmacology and psychodynamics; Dr. Paul Blanc, an internist and clinical toxicologist at the University of California at San Francisco with a specialty in occupational medicine, participated in the planning of the mission and in the preparation and analysis of the survey instrument.

The PHR team worked through interpreters provided by the Georgian Ministry of Health and The Oriental Institute of the Georgian Academy of Sciences. A few of the Georgian physicians also spoke some English.

The Goals of the Mission

PHR is a national organization of health professionals whose goal is to bring the skills of the medical profession to the protection of human rights. PHR works to prevent the participation of doctors in torture, to defend imprisoned health professionals, to stop physical and psychological abuse of citizens by governments, and to provide medical and humanitarian aid to victims of repression.

Since its founding in 1986, PHR has conducted missions to Chile, Czechoslovakia, El Salvador, Haiti, Israel, the West Bank and Gaza Strip, Kenya, Malaysia, Panama, Paraguay, the Republic of Korea, Turkey, the U.S.S.R., and Yugoslavia. PHR adheres to a policy of strict impartiality and is concerned with the medical consequences of human rights abuses regardless of the ideology of the offending government or group.

The goals of the PHR mission to Tbilisi were three-fold:

1) To ascertain whether toxic gases had been used against the citizens of Tbilisi on April 9, 1989.

2) To identify the nature of any toxic gases that had been used.

3) To evaluate the medical consequences of the tactics used to disperse the crowd gathered on April 9, 1989. Such an evaluation would include an analysis of the injuries and deaths that had occurred as a result of the action, an assessment of the physical and psychological state of those still hospitalized, and an exploration of the effects of this event on the population of Tbilisi as a whole.

The Mission's Scope

The delegation arrived in Tbilisi on May 17, 1989. That evening, and for the next two days, the team focused on the events of April 9, interviewing patients and reviewing autopsy findings. They also reviewed the events of April 28th, when another large group of people became ill after moving flowers from the site of the April 9 demonstration.

At the same time, another phenomenon was in the process of unfolding. During this third week in May, the city was marking the end of the 40-day period of mourning called after the events of April 9. On May 17, two days before the offical close of this mourning period, children around the city began to complain of symptoms that raised the question of a new wave of exposure to toxic gas. On Friday, May 19, the Georgian Ministry of Health asked the PHR delegation to help evaluate the children and determine the cause for their symptoms. A similar request was made of Medecins Sans Frontieres (MSF), which had sent a team of French and Belgian physicians and nurses

to Tbilisi on a fact-finding mission relating to the events of April 9. For the next three days, from May 19 through May 21, the foreign medical delegations worked first independently and then in mixed U.S.-European teams to examine and interview all of the hospitalized children exhibiting these symptoms.

The report that follows first gives a chronology of events and then, in six separate sections, presents the findings of the mission.

1) Chronology of events.

2) Examination of the events of April 9 and their immediate consequences, in terms of deaths, injuries, and hospitalizations.

3) Description of the second wave of illnesses and hospitalizations that occurred following exposure to the flowers on April 28 and 29.

4) Discussion of the treatment regimens used by the Georgian physicians for both groups of patients.

5) PHR medical and psychiatric assessment of these two groups of patients, including report of results of PHR questionnaire administered to hospitalized patients.

6) PHR assessment of the toxicological findings.

7) Description and PHR analysis of the third wave, the events of May 17-22, when hundreds of school children sought medical attention with complaints of symptoms of toxic exposure.

Much attention is given in the report to discussion of the results of the investigative aspect of this mission. By providing additional information about the methods used by the Soviet troops to disperse the crowd on April 9 and by detailing the medical effects of this action on the population of Tbilisi, this report also serves to document what is a matter of open record and widespread public outcry: that the events of April 9, in which death, injury, and enduring fear were inflicted by a government upon a civilian community, constituted a significant violation of human rights.

In attempting to uncover and understand the medical consequences of these actions, the PHR team found that the refusal of the Soviet authorities to release information about the nature of the toxic agents they had used contributed to conditions of uncertainty and fear that greatly augmented the social turmoil resulting from the deaths and injuries incurred on April 9.

Definition of Terms

The Toxic Agent

Throughout this report, the term "toxic gas" is used interchangeably with "toxic chemical agent." The name "tear gas" is given to those agents classifed as lacrimators in military terminology. Lacrimators are a subset of a category of toxic chemical agents called riot control or "harrassing" agents.[1]

Within Soviet Georgia, in addition to the words mentioned above, the terms "poison gas," "poisoning," or "toxicity" were frequently used by health officials, physicians, and the press to refer to the toxic gas or its effects.

The Soviet Troops

Accounts in the press and from local residents report that at least two different kinds of Soviet troops were deployed in the city of Tbilisi in the days immediately before April 9 and during the 10-day curfew period thereafter. The troops of the U.S.S.R. Ministry of the Interior (MVD) were said to have been present at the demonstration on April 9, as well as units of the Soviet Red Army from the Ministry of Defense. In the discussion that follows, the term Soviet "troops" refers to the regular Army units, unless otherwise specified.

References

A range of U.S., European, Soviet, and Georgian newspapers and periodicals have been used in the preparation of this report.[2] In addition, the PHR team has drawn upon the expertise of several sources with knowledge of the Soviet Union or human rights issues. For facts or interpretation of facts about which there is little dispute, no separate references are given. Whenever a fact or interpretation has several versions, the references have been provided.

CHRONOLOGY OF EVENTS

Historical Background

The republic of Georgia, one of the 15 republics comprising the Union of Soviet Socialist Republics, lies south of the Caucasus mountains and north of the Soviet republic of Armenia. A mountainous and agriculturally bountiful area, nestled between the Black and Caspian Seas, Georgia has for centuries served as a major crossroads for trade between Asia and Europe. Successive invasions by the Arabs, the Mongols, the Turks, and the Persians fostered among the Georgian kingdoms and principalities a tolerance for ethnic diversity and a tradition of resistance to outside rule. In 1801, Czar Alexander I annexed the Georgian state, beginning the region's long and restless association with Russia. From 1801 until the turmoil of the Russian Revolution, Georgians lived under the rule of the czars. In 1918, local Georgian leaders sided with the Mensheviks and declared their independence from Bolshevik rule. The state came under Soviet control in 1921 and a local rebellion in 1924 was suppressed by force.

As in many of the Soviet republics, the population of Georgia has retained a strong sense of ethnic identity, expressed in language, custom, and culture. Antagonism to Soviet rule has surfaced in periods of overt political action in the past, particularly in 1956 against Khrushchev and in 1978, during the Brezhnev era, when the Soviet government tried unsuccessfully to revise the Georgian constitution and eliminate Georgian as the official language of the republic. The principal demonstrations during both these periods took place in Tbilisi.

The new era of greater public expression initiated by glasnost has also presented the Soviet government with the challenge of how to respond to an accelerating clamor for greater local autonomy. In the fall of 1988, General Secretary Gorbachev proposed an amendment to the U.S.S.R. constitution that has been interpreted by some as limiting the right of secession. A mass demonstration in Tbilisi in November, 1988, followed by a hunger strike, expressed Georgian opposition to this proposal. The strike was ended only after the proposed constitutional amendment was withdrawn.[3]

Beginning in February, 1989, the pace of local political unrest quickened. Demonstrations in Tbilisi on February 9 and 18 (the first calling for the release of three opposition leaders arrested in earlier actions, the second expressing ecological concerns about proposed dam construction projects)[4] were followed by mass gatherings in Tbilisi and other cities of Georgia on February 25, to commemorate the 68th anniversary of the occupation of Georgia by the Soviet Red Army. Local police and Soviet troops arrested leaders of the Tbilisi demonstration and attempted to break up a crowd of approximately 30,000 people who had gathered between the Kvashveti Church and the

Government House in the central part of the city. The crowd dispersed only when the leaders were released late that evening.

In late March the political situation was complicated by the decision of the leaders of the Abkhaz Autonomous Republic, located within the republic of Georgia, to seek secession from Georgia and be directly governed from Moscow. The Georgian government intervened by dismissing several Abkhazian leaders. Protests in Abkhazia led to plans for a counter-demonstration by Georgians in Abkhazia on April 9. Georgians involved in protests against a range of aspects of Soviet authority decided to pre-empt this demonstration by staging an all-Georgian action in Tbilisi on April 4, moving up an event previously scheduled for April 14.

The chronology of events was as follows:

April and May, 1989

April 4: Demonstrators at the University of Tbilisi march to the national soccer stadium. The crowd, swelled by those from the stadium, then marches to the Government House.

April 5-8: Hunger strike begins on steps of the Government House.

Hunger strikes initiated at University of Tbilisi, the Polytechnic Institute, the Rustani metallurgy factory, and the television studios.

Demonstrations in support of the hunger strikers take place nightly.

April 8: Soviet troops, including those from the Ministry of the Interior, are flown in to Tbilisi.

Presidium of the Supreme Soviet passes a decree defining "criminal responsibilities for crimes against the state," including "public calls to overthrow the Soviet government or social order. . . ."[5]

The First Wave

April 9: 2 am — Soviet troops and local police attack hunger strikers at the television studios and then move into Lenin Square.

3 am — Approximately 230 hunger strikers and 8-10,000 supporters demonstrate during the night on the steps and street (Rustaveli Avenue) between the Government House and the Kvashveti Church, one half-mile from Lenin Square.

Soviet troops stationed in Tbilisi during the ten-day military curfew, April 1989.

3:30 am	The Patriarch of the Georgian Orthodox Church appears on the steps of Government House and urges the crowd to disband.
4 am	Soviet troops and tanks advance from Lenin Square and disperse the crowd.
5 am	Ambulances bring casualties to local hospitals. 16 dead and over 200 injured.
6:15 pm	Gunfire from Soviet troops hits children in the streets, wounding one child in the leg and another in the buttocks.
10:55 pm	Announcement of curfew from 11 pm to 6 am, to go into effect that evening.
	Just before 11 pm 25 year-old man is killed by Soviet troops for curfew violation.

April 10: The city of Tbilisi goes on strike.

City closed to foreign journalists.[6]

National period of mourning declared.

April 11: Foreign Minister Shevardnadze (a Georgian) meets with Georgian officials in Tbilisi.

April 12: Georgian Minister of Health states that some of the hospitalized patients exhibited signs of poisoning and that the Soviet soldiers had also used sharp-edged trenching tools (referred to as sapper shovels) against the demonstrators.

Leaflets containing copies of the April 8 decree of the Supreme Soviet are dropped over Tbilisi by helicopter.[7]

April 13: A 25 year-old man, hospitalized since April 9th, dies from head injuries sustained during the demonstration.[8]

April 14: The Soviet military acknowledges that a tear gas agent, CN (chloracetophenone), was used to break up the demonstration on April 9.

Three top officials in the Georgian government resign (the first secretary of the Georgian Communist Party, the Prime Minister of Georgia, and the President of the Republic).

April 10-17: During this first week after April 9, an expert toxicologist from Moscow, Dr. Lushnikov, visits hospitals in Tbilisi and makes recommendations for treatment. (See later discussion for details.)

April 17: The public schools in Tbilisi re-open for the first time since April 9.

April 18: Military curfew lifted in Tbilisi.

A 16 year-old girl, hospitalized since April 9, dies from injuries.

April 19: The Georgian Minister of Health states that an agent with "atropine-like properties" was also employed by the troops. This statement is seconded by the new first secretary of the Georgian Communist Party.

Fact-finding mission of six newly elected members of the U.S.S.R. Congress of Peoples Deputies visits Tbilisi and issues a report sharply critical of Georgian and Soviet authorities in the liberal weekly, Moscow News.

April 21-23: Fourteen children are admitted to the hospital complaining of symptoms of toxic exposures. All are from the First School immediately adjacent to the Government House.

April 24: Ban on visits by foreign journalists is lifted.

Scene at church where pictures of victims of the April 9 demonstration were displayed.

The Second Wave

April 28-29: In response to Soviet military order, the people of Tbilisi move the thousands of flowers placed at the site of the April 9 demonstration on Rustaveli Avenue, to the grounds of a nearby cathedral.

April 28-May 6: Over 100 people involved in moving the flowers are admitted to hospitals, complaining of symptoms attributed to toxic exposure.

May 5-12: At the invitation of Dr. Sakharov, an independent delegation from the International Committee of the Red Cross comes to Tbilisi.

May 5: Dr. Sakharov reports from Tbilisi that officials had revealed the identity of a second gas used against the demonstrators to be CS (2-chlorobenzylidene malononitrile, a form of tear gas).

May 16: At the invitation of the Georgian Minister of Health, a team from Medecins Sans Frontieres (MSF) arrives in Tbilisi.

The Third Wave

May 17: At the invitation of Dr. Sakharov and his wife, Dr. Elena Bonner, and Dr. Irakli Menagarshivili, the Georgian Minister of Health, the PHR team arrives in Tbilisi. Drs. Sakharov and Bonner extend the invitation on behalf of some victims of April 9, who had staged a hunger strike in the hospital where they were being treated. The hunger strikers had demanded that independent foreign observers to be allowed to take part in the investigation.

Children from schools located in different parts of the city begin to seek medical attention, complaining of a constellation of symptoms initially attributed to toxic exposure.

May 18: The state toxicologist of Georgia reports finding CN in a sample of soil taken from one school playground.

May 19: The end of the traditional 40-day period of mourning for the victims of April 9.

Officially sanctioned demonstrations take place throughout the city.

The PHR and MSF teams, responding to a request of the Georgian Ministry of Health, begin to interview and examine the children hospitalized during the previous two-day period.

May 20: The PHR and MSF teams continue their examination of the children.

On the basis of mass spectroscopy, the gas chloropicrin is identified in a cannister allegedly recovered from the scene of the demonstration on April 9.

The joint teams report their preliminary findings to Dr. Nino Uznadze, the Deputy Minister of Health, the directors of the Tbilisi hospitals, and the heads of major clinical departments.

Five leaders of the April 9 demonstration are released from prison.

May 21: The PHR and MSF teams re-interview and re-examine several hospitalized children.

The joint teams report their findings to the Minister of Health, the heads of the state toxicology laboratories, the senior health officials of the Republic, and the leaders of the Georgian medical profession.

This group then rehearses a comprehensive report on the events of April 9 and April 28 and the new wave of illness among the children, beginning May 17. In the late afternoon this report is taped in Tbilisi television studios for evening broadcast to the citizens of Georgia.

THE EVENTS OF APRIL 9 (THE "FIRST WAVE" OF ILLNESS)

Methods of PHR Investigation

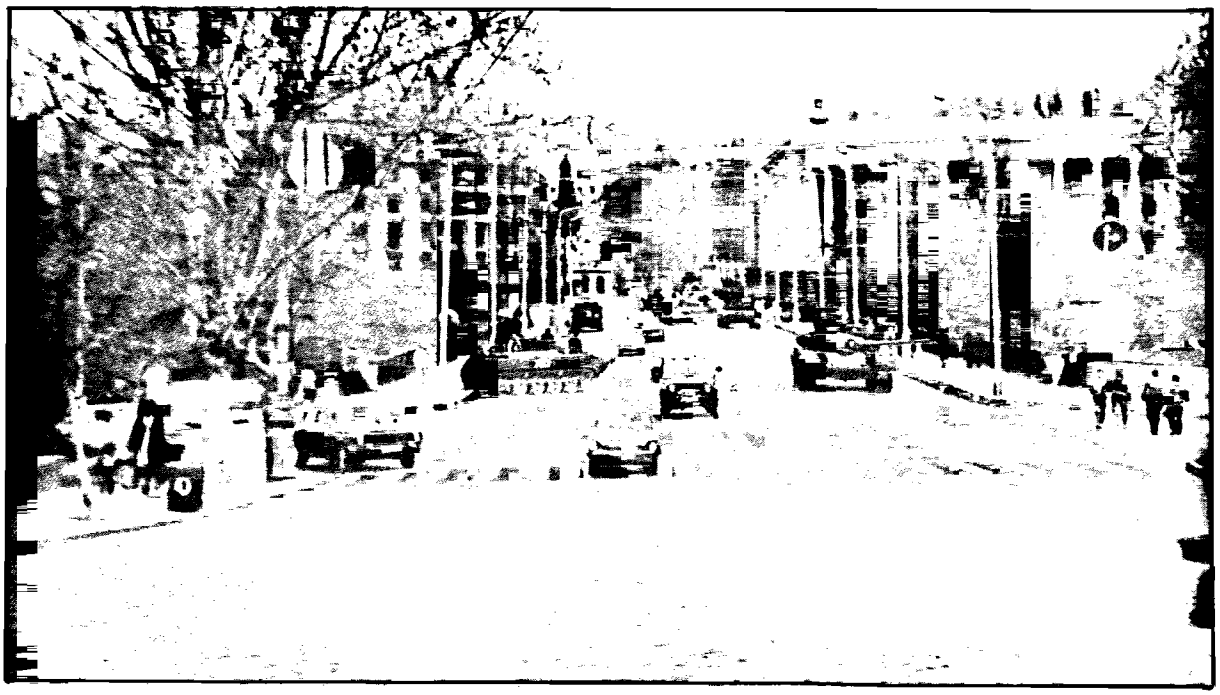
To arrive at a comprehensive assessment of deaths, injuries, and morbidity from the events of April 9, 1989, the PHR team relied on a variety of sources of information. For information about deaths, the PHR team sought out physicians present at the scene or at the hospitals on April 9; newspaper reports and articles (both Soviet and international, official and unofficial); officials in the Ministry of Health; videotape evidence; and testimony of the state pathologists. For injuries, these sources were used as well as interviews with hospital directors and clinical department chiefs. To assess morbidity, the team interviewed and examined patients, reviewed medical charts, and surveyed as many patients as possible by means of a Georgian-English questionnaire prepared in advance. (See Appendix 1.) In addition, one member of the team (Dr. Rumack) visited the state toxicology laboratory, the state pharmaceutical laboratory, and the chemical analysis laboratory of the University of Tbilisi.

Description of the Demonstration of April 9, 1989

The description that follows is based on two videotapes viewed by the PHR team while in Tbilisi.[9] The audio narratives and dialogues were translated simultaneously from the Georgian and/or Russian for the PHR team.

In the early morning of April 9, 1989, a crowd of 8-10,000 Georgians filled the Government Plaza on Rustaveli Avenue, surrounding and supporting a group of 300 hunger strikers positioned on the steps of Government House. Videos taken at the scene, using ambient light from the numerous large standing streetlights, document the mood of the crowd, showing them singing and dancing to Georgian folk music.

Shortly before 4 am, the Patriarch of the Georgian Orthodox Church appeared on the steps facing the crowd and over the public address system urged the demonstrators to disperse immediately, informing them that he had just been told that they were in imminent danger if they did not leave the Plaza at once. The crowd called back its resolution to stay, shouting various expressions of loyalty and devotion to the Republic of Georgia. After several attempts to persuade the demonstrators to leave, the Patriarch stopped pleading with the crowd and stood silent. The thousands of people, also silent, faced him expectantly. After several minutes of complete silence throughout the Plaza, another voice came over the loud speaker, leading the demonstrators in the words of the Pater Noster (Lord's Prayer). Many people in the crowd kneeled during the prayer.



Soviet tanks and armored personnel carriers stationed in the city during the ten day military curfew, April 1989.

Shortly after the close of the prayer, the crowd's attention was drawn to the slow progression of Soviet armoured military vehicles, advancing slowly, three abreast, down the broad concourse of Rustaveli Avenue, towards the Government Plaza. Behind the armoured vehicles could be seen rows of helmeted Soviet soldiers, whose plastic shields, sapper shovels, and truncheons glittered in the lights of the Plaza. Instructions from leaders of the demonstration could be heard rippling through the crowd: "Let them pass! Don't resist! Sit down!" Georgian militiamen, who had been disarmed the day before by the Soviet authorities, could be seen standing in blue uniforms among the protestors. Also visible in white coats were several medical volunteers, positioned throughout the crowd.

Within seconds of these first admonitions from the leaders of the demonstration, a phalanx of Soviet soldiers could be seen encircling a group of demonstrators and beginning to beat them with truncheons and shovels. Some demonstrators could not get to their feet. Many soldiers wore long coats and carried shoulderbags. The cameras recorded screams and moans from people as they tried to escape from the advancing soldiers and showed soldiers pursuing and beating people as they ran. Members of the Georgian militia helped demonstrators form an escape corridor through which many fled. An outer group of soldiers stood at attention with shields raised, to some extent obscuring from crowd and camera view the beatings taking place behind them. Four launches of grenades spewing an opaque gas could be seen arching across the crowd.

Three ambulances drove slowly towards the melee and as they came into camera view it could be seen that Soviet soldiers were attacking the vehicles with clubs, bringing them to a halt and breaking their windows.

Within forty minutes, the Plaza was quiet. The crowd of thousands had dispersed, the Soviet soldiers had withdrawn to the periphery, and ambulances were picking up people and driving away. A large yellow bus entered the area where the ambulances were, stayed for several minutes, and then drove off.

Casualties

Deaths

In all, 20 people are known to have died during and in the aftermath of the demonstration. Sixteen of these 20 were women. (A so-called "informal" organization in Georgia believes that there were more deaths than officially reported but this point could not be confirmed by the PHR team.)

By 5 am on the morning of April 9, 16 people who were dead or dying (14 of these were women) and many who were injured had been brought by ambulances from the scene of the demonstration to hospitals in the city. Within the next several days, four other people died: three from injuries sustained on April 9, one shot in an alleged curfew violation.

Natela Bashaleishvili, 16 years of age, during her hospitalization in the First Clinical Hospital. She died of pulmonary edema on April 18, 1989.

Both the First and Second Clinical Hospitals were on duty that night and received the majority of the casualties. The Adult Hospital of the Republic also received casualties. The following description of the dead and injured are based on information furnished by physicians and medical directors of these three hospitals and from discussions with the Ministry of Health.

a) Reports from Physicians:

Uncertainty remains as to the precise cause of death for the sixteen initial victims, who, according to all witnesses, died within a matter of minutes to one-half hour of the event. The PHR team interviewed four physicians who had been at the demonstration as part of a volunteer medical cadre. These physicians had helped load bodies on ambulances, had accompanied moribund patients to the hospital, had participated in resuscitative efforts, and/or worked on the autopsy subcommittee of the local official investigative commission that was set up immediately after the event. According to these physicians, the majority of the dead lacked external signs of injury. However, one physician said that one victim had blood coming from her mouth, and some of her teeth were broken; another had blood trickling from her nose. One physician said that in attempting mouth-to-mouth resuscitation of some of the victims, he had smelled and tasted something on the victims' mouths that reminded him of bitter, rotten figs.

According to the hospital director, the Adult Hospital of the Republic received two bodies, both women, whom the hospital physicians at the scene described as "still warm." So warm, in fact, that the physicians were unable to decide immediately if the women were, in fact, dead. In acknowledging their confusion to the PHR team, the physicians noted two contributing factors: the absence of external signs of injury and a general sense of disbelief that such a thing could have happened. The women were placed in a single room and three other physicians were summoned "to certify death." One victim was employed as a nurse at this very hospital, and was known to be pregnant.

Details on the cause of death are somewhat sketchy for the four people who died after these initial 16 known deaths. Three late deaths are attributed to injuries sustained in the early morning military attack on the demonstrators. One 16 year-old girl, admitted on the morning of April 9th, died nine days later in the First Clinical Hospital. She was intubated, bloated, and her death was said to have been due to pulmonary edema. A male patient was admitted to the Adult Hospital of the Republic on April 9, unconscious, with skull fracture said to be documented on x-ray. Despite two operations, he did not recover and died several days after admission. Information was not available regarding the third death of a patient admitted with injuries dating from the morning of April 9. The fourth casualty was a man who was said to have been shot by Soviet soldiers in the late evening of April 9 for an alleged violation of curfew.

b) Newspaper Accounts:

Newspaper accounts during the first two or three days after the event reported that the dead had been "bludgeoned" and "hacked." Officials at the Ministry of Health told the PHR team that for the first two or three days after the event, before the question of toxic gas had been raised, it was assumed that all deaths had resulted from external trauma or from "asphyxiation" from the crush of the crowd. Not until April 11 and 12, when large numbers of people began to present to hospitals complaining of a range of symptoms suggestive of toxic exposure, did the medical community as a whole begin to entertain the idea that some of the dead might have died from causes other than blunt trauma or crowd crush.

See Appendix 2 for the list of dead, including brief autobiographical details, printed in the weekly Georgian newspaper, Samshoblo.

c) Videotape Evidence:

No explanation has been offered or given for the fact that the majority of the dead were women. The videotape edited by Georgian filmmaker Eldar Shengelaya showed a crowd in which the proportion of men and women appeared approximately equal. At the time of the attack of the Soviet soldiers, many people were kneeling or sitting down, in response to instructions from local leaders to avoid confronting the troops. The assault on individuals in the crowd took place at close range.

The videotape included scenes from hospital emergency rooms (including the First Clinical Hospital) and the morgue. The bodies are bloated, a few red and purple discolorations on the limbs and face are evident, a few victims had blood trailing from the nose or mouth. The bodies are clothed and the shots move quickly, not affording a systematic view of all sixteen victims.

d) Pathology Reports:

Upon arrival in Tbilisi, the PHR team had requested access to the pathology slides and written post-mortem reports. The team was told by officials at the Ministry of Health that much of this evidence had been impounded by the Soviet military and that what was available was locked in the office of the state pathologist who was away at a conference in Abkhazia.

The pathology evidence made available to the PHR team during this investigation was insufficient to determine the precise cause of death in any of the cases. The state pathologists had performed autopsies on 18 of the 20 who had died immediately or within days of the event. (The families of two of the victims refused permission for post-mortem examination.)

The PHR team was shown a videotape of the presentation that the pathologists had given to the International Commission of the Red Cross (ICRC). This video consisted of slides of lung and brain tissue from a number of the victims, with narration

by the state pathologist. The team saw the video with the deputy state pathologist and questioned him in some detail about the state findings. (The four-member team from MSF was also present at this briefing.)

The autopsy slides as seen on videotape were displayed in an unsystematic and fragmentary fashion and the conclusions drawn by the Georgian pathologists lacked physiological specificity. The discussion that follows summarizes the verbatim presentation as contained in the notes of the PHR team. Terms in quotation marks represent the most precise translations the PHR team could obtain, despite repeated attempts for clarification. Since much of the information received through translation during this entire investigation was entirely clear and understandable to those trained in U.S. medicine, the relative opacity and obscurity of these pathological findings is a matter of concern which cannot be easily explained.

According to the videotape and to the deputy state pathologist, the official results of the autopsies suggested that although none of the 16 initial victims showed signs that were clearcut evidence of poisoning from toxic chemical gas, 12 of the 16 demonstrated marked changes in lung and brain compatible with a "combustion of tissues" "caused by toxic chemicals." Slides of tissue from trachea, bronchi, and bronchioles were described as demonstrating "marked necrosis," "exudative changes," (both general terms to describe forms of tissue injury and death) and "muscular spasm." Slides from brain tissue were presented as showing "edema" (tissue swelling from excess fluid) and "glial proliferation" (abnormal increase in a particular cell type).

When asked about pathological findings from kidney and adrenals, the deputy state pathologist said that only preliminary findings from the first 16 victims had been presented and review of these organs had not yet been accomplished. He said that pathologic evidence relating to the four victims who had died later was in the hands of the Soviet military. With regard to a question about liver pathology among these 16 victims, the deputy state pathologist said that 12 of the 16 had findings consistent with hepatitis. His response was unclear to a question seeking definition of the kind of hepatitis observed. He said all 20 victims, including the four whose slides were held by the military, had evidence of some kind of liver pathology. In the near future, he said, the state pathology office, along with the autopsy committee and forensic lawyers, would perform a careful analysis of the bank of tissues from all 20 patients now in storage.

In response to a question regarding the mix of traumatic and toxic injury among these 16 victims, the deputy state pathologist said, "It is my preliminary opinion that all suffered from chemical or toxic exposure but that maybe traumatic injury contributed as well to concurrent death." He added that all sixteen had evidence of toxic injury to the lungs, indicating to him that all had been breathing, at least briefly, some form of toxic gas. When asked to describe the gross findings of the lungs, he said that they were all surprisingly normal, considering the amount of exudate and necrosis evident on microscopic exam. In his view, this absence of significant gross pathology reinforced the interpretation that all might have died from laryngospasm (constricting spasm of the muscles and structures of the most upper airway) brought on from toxic gas exposure.

Injuries

According to the chronology of presentation, the first group of patients to seek medical care were those present during the demonstration break-up on April 9 and who were brought or came to the hospitals of their own accord during the hours immediately thereafter. Then, from April 10 to approximately April 14, the second large group of patients, many of them present at the break-up of the demonstration on April 9, began to come to the hospitals. This second group of patients were complaining of a range of symptoms they dated from the morning of April 9.

a) Data from the Georgian Ministry of Health:

Approximately 150 to 200 patients were hospitalized in the immediate aftermath of the early morning attack. A number of Georgian militia were among the injured and a few reported to have been hospitalized.

According to the Ministry of Health, by mid-day on April 9, 150 patients were listed as hospitalized; 56 of these were women, 8 children. During the remainder of that day, approximately 50 other patients were hospitalized throughout the city. The majority of injuries were described as traumatic, presumably inflicted by the truncheons and sapper shovels the soldiers had carried. About 10 of these 150 initially exhibited signs of exposure to a "lacrimating" agent and possibly some other agent as well. (Symptoms were described as including dry throat, disturbance of respiration, scleral hemorrhages, transient capillary dilation, allergic and contact dermatitis.) Of these 150-200 patients, health officials said that approximately 30 were still hospitalized in various wards of the 44 general and specialty hospitals throughout the city.

Another group of patients sought medical care in the days thereafter, and many were hospitalized. In the first few days after April 9, hundreds came to area hospitals complaining of a range of symptoms. Many of these people were initially quite ill, some with pulmonary symptoms that required respirator support. They presented what the Georgian physicians called a "polymorphous" picture: mydriasis (dilated pupils), lacrimation (tearing), laryngospasm, bronchospasm, pulmonary edema, hematuria (blood in the urine) in the absence of external trauma, skin rashes, including blisters and vesicles around the mouth and oropharynx, gastrointestinal complaints, and a wide range of psychomotor disturbances, including extrapyramidal, Parkinsonian-like findings, several patterns of memory impairment, mood and behavior alterations, and waxing and waning orientation and consciousness. According to the Georgian health officials, most of these patients had been discharged by May 17.

b) News Sources:

News sources additionally reported that one man was injured on the morning of April 9 by a gunshot wound to the head, causing loss of vision in both eyes. Scenes of this man in the hospital are contained in the videotape edited by Eldar Shengelaya.

c) Hospital Reports:

The director of the Second Clinical Hospital reported that 94 patients had been admitted in the first day after the event. Many of these were comatose or stuporous and were treated as cases of head trauma or asphyxiation secondary to external compression from the crowd. Two or three days after April 9, when hundreds of people began to seek medical attention for this complex mix of "polymorphous" symptoms, the physicians began to entertain the diagnosis of toxic exposure.

Physicians at the Adult Hospital of the Republic stated that 86 people presented for treatment to the hospital on April 9, and that 55 were admitted. Of these 55, three were among the 20 officially listed as dead (the two women described earlier who were determined to be dead on arrival and one man, also mentioned earlier, who died later from head injuries). Most of these 55 patients suffered from traumatic wounds and recovered uneventfully. Only one or two patients from the group admitted on April 9 were still in the hospital as of May 18. From the hundreds who sought care in the first few days after April 9, however, a number of patients were still hospitalized. In the view of the director, the majority of those still hospitalized were "not sick" but were showing signs of "emotional stress" and the "psychological effects" of exposure to toxic gas (emphasizing, however, that by this statement he meant the biological effects of the toxic gas on the central nervous system, not that patients were suffering from a "functional," non-organic set of symptoms).

At the Pediatric Hospital of the Republic, it was reported that students at the First School next to the demonstration site began to be feel ill in the week the schools re-opened on April 17. On April 21, the child of a physician who works at the Pediatric Hospital was admitted with the question of poisoning from toxic gas. On April 22, another child from the same school was admitted. A peak in admissions occurred on April 23, when 14 children from that school were admitted, and several children from other schools were treated and released.

The symptoms of these children were described as: frontal and temporal headache, dizziness, lacrimation, burning of eyes and throat, abdominal pain, nausea, vomiting (among a few), moderate nose bleeds, constipation or diarrhea, general weakness, cough, difficulty breathing, unpleasant sensation in chest, sense of feeling one's heart beat.

Bank of flowers heaped at mourning scene where pictures of victims of April 9 were displayed. Hundreds who helped move the flowers on April 28, on the orders of authorities, began to experience symptoms that they attributed to toxic exposure on that day.

THE EVENTS OF APRIL 28 AND 29 (THE "SECOND WAVE" OF ILLNESS)

As of mid-May, all medical and official accounts of the aftermath of April 9 contained descriptions of two main peaks of patients: approximately 200 people who were hospitalized immediately after April 9 with signs and symptoms of serious blunt and sharp trauma as well as symptoms suggestive of a toxic exposure; and then, on April 28 and for several days thereafter, over 400 patients who also described symptoms compatible with some form of toxic exposure. There was also a minor peak of approximately 40 school children, of whom 14 were hospitalized, who complained of symptoms of toxic exposure when they returned to the First School, adjacent to Government Plaza, after April 17.

All of the patients in this second major group date their symptoms from the time they helped move the masses of flowers which had been placed in Government Plaza during the first week after April 9. On orders of the Soviet authorities, these flowers were moved on April 28. From April 28 through approximately May 6, patients presented to hospitals complaining of a range of symptoms: headache, nausea and vomiting, itchy eyelids, fluctuating temperature, abdominal pain, muscle pain, mood disorders, problems with memory and concentration.

The majority of people still in area hospitals at the time of the PHR visit had been admitted as part of this second episode of exposure. As of May 17, official health statistics listed 4,000 people as having sought medical attention for morbidity related to the events of April 9 and/or April 28, 543 people admitted, and 340 people still in the city hospitals.

THE GEORGIAN MEDICAL RESPONSE

In treating the patients admitted on and around April 9 and then again during the period from April 28-29, the Georgian physicians relied on advice from outside experts: Dr. Lushnikov, a toxicologist from Moscow; a Swiss neurologist, Dr. Mummenthaler, who was part of the delegation sent by the ICRC; and a group of homeopathic physicians from West Germany.

The Moscow specialist thought the patients evinced symptoms of anticholinergic poisoning and recommended the use of physostigmine or a similar drug, galantamine, as both a diagnostic tool and, if necessary, an antidote to severe symptoms. Dr. Mummenthaler classified the patients into eight categories of symptoms and signs: cerebral changes; pathological reflexes; gastrointestinal symptoms; respiratory symptoms; cardiovascular disturbances; asthenic, musculo-skeletal symptoms; psychosomatic disturbances; and labile blood pressure. According to Dr. Mummenthaler, 90 percent of the patients showed organic changes compatible with exposure to a toxic agent and 10 percent were not poisoned but were suffering from shock and psychogenic conditions. Many patients, in the view of the Georgian physicians, displayed symptoms and signs from several categories. The West German physicians prescribed hot baths and intensive vitamin therapy.

By the time of the PHR visit, the Georgian physicians had evolved a standard treatment regimen that they gave to patients with serious mental disturbances (changes in consciousness, disorientation, severe memory fluctuation, aggression) or cardiovascular changes (hypertension, tachycardia, or tachyarrhythmias). The protocol is described with terms in quotations to signify the best translation from the Georgian that could be obtained. The protocol does not derive from a standard set of interventions known to the PHR team.

The protocol consisted of the following: low molecular weight Dextran at 10 ml/kg; forced diuresis with Lasix; an intravenous solution of vitamin B complex and vitamin C considered to be a "hepatic membrane stabilizer;" an intravenous infusion of a GABA-derivative; sedatives (benzodiazepines) and "cardiovascular" drugs as needed. In addition, the physician in charge of the intensive care unit at the Adult Hospital of the Republic reported success in treating 38 of the most seriously ill patients with plasmapheresis (1.5 liters exchanged 1 to 3 times), activated charcoal hemoperfusion for 3 to 10 cycles, and forced diuresis. (These are all techniques used in serious poisonings or overdoses to remove toxins from the blood.)

Many of the patients on whom this range of therapies had been performed had been discharged prior to the arrival of the PHR team and their medical records (with the exception of one) were not available.[10] For those still in the hospital (and for the one patient whose record was still on the hospital floor) there was insufficient documentation in the medical record to allow the PHR team to determine whether any of these interventions had produced either a positive or negative effect.

PHR ASSESSMENT OF PATIENTS FROM FIRST TWO WAVES

The PHR team conducted in-depth interviews and examinations on a total of 22 patients in the Second Clinical Hospital and the Adult and Pediatric Hospitals of the Republic. Eleven of these patients also underwent a psychiatric interview (two patients were examined by the non-psychiatric physicians on the PHR team, nine by the psychiatrist on the team). The psychiatric interview consisted of a review of the experience which caused them to be hospitalized, symptoms, hospital course, previous level of function, previous psychiatric history, family history of psychiatric illness, and a current mental status examination.

Of these 22 patients, nine had been admitted because of symptoms ascribed to exposure on April 9 or shortly thereafter, 11 because of symptoms dating from April 28 or shortly thereafter, and two had been exposed on both dates (See Table I for details). Fifteen (68 percent) of these patients were female; eight (36 percent) had symptoms that in the assessment of the PHR team were predominantly physical; seven had symptoms that were assessed to be predominantly psychological; and the remainder some combination of both (See Table 1).

Documentation of the clinical course of these patients was somewhat complicated by the fact that many had been transferred from their place of initial admission or had discharged themselves and then sought readmission to another hospital. The physicians also said that conditions had been sufficiently chaotic during the first few days after April 9 that not all information had been systematically recorded (See Appendix 3 for six case histories that illustrate the range of patient presentations and the treatment received).

Medical Evaluation

At the time of the PHR mission, all those who had been hospitalized with contusions and lacerations inflicted by beatings sustained during the April 9 events had recovered from their injuries and had been discharged long before the PHR team arrived. Of the 30 patients from April 9 who remained hospitalized in mid-May, the PHR team examined eight, identified to the team by the Georgian physicians as those who were the most ill. Physical complaints predominated in all of these patients, who had subtle and minor objective findings which could be explained as lingering effects of exposure to toxic agents, as variations in physical exam within the normal range of observation, or as symptoms of psychological origin. These patients had been hospitalized for several days to weeks and said they were well on the path to recovery.

Psychiatric Evaluation

Most of the patients still hospitalized by the time of the PHR visit showed some evidence of psychological reaction to trauma. But it was those patients who were in the hospital for what the Georgian physicians said were psychiatric reasons who gave the greatest form and structure to the specific set of reactions described below.

In seven of the 22 patients, psychiatric complaints and symptoms were paramount. (One of these seven was a 15 year-old girl with signs of psychosis on current mental status examination, a history of psychosis herself and a history of chronic pyschosis in her father. Acordingly, she was considered by the PHR team to be a case of intercurrent psychiatric illness and was not grouped with the other patients hospitalized from the events of April 9 and 28.[11])

Among the remaining six patients with predominantly psychiatric signs and symptoms, only two patients had been present at the demonstration on April 9 and one of them had been well enough to have transported flowers on April 28 as well. The remaining patients all became ill only on or after April 28. On the basis of patient interviews, in both sets of these patients, two main categories of illness stood out: 1) severe symptoms of acute post-traumatic stress disorder (PTSD),[12] including dissociative phenomena and conversion symptoms;[13] and 2) psychosomatic symptoms.

These patients had no prior psychiatric history and clearly linked their disturbance to the events of April 9 or April 28. In each case, patients identified the events as the most distressing of their lives and were able to describe direct fear for their own safety and/or strong identification with those who were killed or injured. They described situations in which intense fear and helplessness were paramount. In the telling, all of these patients displayed a significant constriction of affect. They complained of a combination of feelings which were out of character for them. They described feeling emotionally distant from others, particularly those to whom they were usually most close, and described periods of blurred or absent memory. On the other hand, as is typical of PTSD, many patients described uncontrollably strong emotions in other contexts, including periods of hyperarousal with outbursts of anger and feelings of hate, suicidal feelings, persistent nightmares, and/or daytime episodes of acute physical distress repeating symptoms experienced during the original event.[14] These daytime episodes appeared most consistent with dissociative phenomena[15], as did the blunting of emotion and memory. There were also frequent examples among the patients of suspected conversion symptoms.[16] In some, initially organically-based physical symptoms appeared to be sustained on a psychological basis, long after their expected physical resolution.[17] In others, conversion symptoms were more clearcut. (For example, among these patients there were several cases of obvious pseudoseizures observed either by the Georgian physicians or by members of the PHR team.) Psychosomatic symptoms were suspected in several patients who showed stress-related exacerbations of previously diagnosed medical illness, such as ulcer disease, irritable bowel syndrome, migraine headache, and nervous tics.

When asked about their course of recovery, these patients all reported that they had made little progress in the hospital and were not yet ready for discharge.

Patient Questionnaires

Prior to the departure of the PHR team from the U.S., a patient survey instrument was developed by Paul Blanc, M.D., with the assistance of Howard Hu, M.D., a specialist in internal medicine, occupational medicine, and epidemiology. The instrument was translated into Georgian by a native Georgian speaker now resident in Boston, Massachusetts. In Tbilisi, this questionnaire was administered by Georgian physicians to patients in the Second Clinical Hospital and the Adult and Pediatric Hospitals of the Republic over a three-day period from May 18 through May 20. (No children hospitalized in the third wave of illness were included). The physicians were oriented to the survey instrument by the PHR team.

Responses were obtained from 113 patients. Multiple missing data points required the exclusion of 24 questionnaires, resulting in 89 (74%) available for full analysis (See Tables 2-4 for details). No significant difference was found between patients hospitalized from the events of April 9 and those hospitalized after exposure to the flowers on April 28. There was no significant difference between the responses of males and females. The prevalence of asthma in most populations ranges from 7 to 10%; in this population it was somewhat higher, at 17%. The relative youth of the survey population (median age 21) may explain the comparatively low prevalence of smoking (36% smokers).

The bias in these self-reported symptoms is the tendency to over-report any symptom. Therefore, it is useful to compare the frequency of symptoms relative to one another rather than the absolute percentage. For example, 8 persons reported "seizures," although there was no medical confirmation of such an effect. This discrepancy may derive from the patients' interpretation of a symptom but it may also reflect a "baseline" positive response rate, regardless of symptom reported.

The pattern of responses indicates that irritant reactions are the most prevalent (82 of 89, or 92%, complained of at least upper respiratory irritant and 85 of 89, or 96%, complained of one or more symptoms of lower respiratory tract irritation). Non-specific symptoms (headache, dizziness, weakness) were also common. Less frequent symptoms (between 20 and 39%) were productive cough, hallucinations, fasciculations (muscle tremors), numbness, diarrhea, constipation, rash, or blisters. Rare symptoms (under 20% of patient reports) were hemoptysis (coughing up blood), seizure, fecal incontinence, urinary incontinence, or urinary retention.

Symptoms of atropinization (toxicity deriving from a drug that affects the central nervous system) were uncommon: no one reported the full constellation (4/4) of hallucination, fever, dry skin (absence of increased sweating) and urinary difficulty. Only 11 of 89 persons reported three of these four symptoms.

Similarly, no one reported the full anticholinesterase complex (4/4) of sweating, fecal or urinary incontinence, and fasciculations. Five of 89 persons reported three of these four symptoms.

Although nausea was common and vomiting reported by 40%, the symptom was not as common as to suggest a gas whose predominant effect is to induce vomiting (such as DM) but rather the effect of CS and CN or perhaps chloropicrin, all of which are known to cause nausea and vomiting to some degree in those persons exposed. Nor did the pattern of response suggest a blistering agent.

The question of "smell" was not asked of all persons. Of the 45 patients who responded to this question, (50% of the total), 19 reported a "bitter" smell; 10 "rotten;" 6 "pepper;" and 5 "sweet," and 5 "no smell." Because there was no consistent pattern to these responses, the results are difficult to interpret.

EVIDENCE OF THE USE OF TOXIC GAS

The Georgian physicians stated that the medical community was thrown into a state of marked confusion during the first week after April 9. As noted, the first group of dead and injured appeared to the physicians on duty at the hospitals to be victims of trauma or asphyxiation. They were treated as such, although it is evident from talking with physicians and reviewing charts that even on April 9 there began to arise clinical suspicion that some of these patients were suffering from some kind of toxic exposure. When within a few days several hundred people sought attention for the wide range of symptoms described above, physicians and health officials became increasingly concerned that one or more toxic gases had been used against the crowd on April 9.

In discussions with Georgian physicians, it was clear to the PHR team that many of these physicians were familiar with the signs and symptoms of tear gas exposure. Several pointed out that the release of gas had occurred before sunrise, in a night with little wind (thus trapping in the ground-level layer of air whatever gases might have been used) and that the Government Plaza, bounded by comparatively tall buildings on either side of the wide avenue, constituted a relatively enclosed space. They also noted that there had been no rainfall in the city between April 9 and April 29.

In a press interview on April 12, the Minister of Health of the Republic of Georgia, Dr. Irakli Menagarishvili, said that he thought some form of toxic gas had been used against the demonstrators. This remark was deleted from the interview when it was re-broadcast from Moscow[18], but was cited in international press reports. In response to repeated questions from officials and the press, the Soviet authorities denied that any agents (lacrimator or other) had been used.[19] It was a week after the incident on April 9 when the Soviets admitted to the use of CN gas.[20] It was 20 days after the event when Dr. Sakharov and the ICRC announced, without subsequent Soviet denial, that the authorities had also used CS gas. Dr. Sakharov relied on information supplied to him by officials within the Soviet Politburo and the Soviet military.[21]

CS and CN

Both of these gases belong to a class of chemical agents called "lacrimators" because of their intensely irritating effects on the eyes and mucus membranes of the nose, trachea, and lungs. Chloracetophenone (CN) was developed during World War I and became the most widely employed crowd control agent until the 1950's, when it was supplanted by 2-chlorobenzylidene malononitrile (CS), another lacrimator with more predictable effects.[22] Both agents have been used in recent years in the U.S., U.K., Northern Ireland, the Republic of Korea, the West Bank and Gaza, and

elsewhere in a range of military and civilian riot control situations.[23] Questions of short and longer-term toxicities caused by CN and CS have been raised. It is well established that high dose exposures can cause severe respiratory effects, including laryngospasm, bronchospasm, and pulmonary edema.[24] There is also some evidence to suggest that these agents may cause significant and lasting physical impairment to those exposed to high doses.[25] It has been noted that panic or other intense psychological reactions can be provoked in people who for the first time are acutely exposed to a chemical gas with respiratory effects, such as a lacrimator.[26]

Clinical Evidence

Despite lack of specific information during the peak time of admissions, the Georgian physicians examined and treated large numbers of patients and documented physical exams with great care. This attention to detail, while ultimately very helpful in untangling the mysteries of various presentations, initially presented a confused picture, since the physicians recorded what appeared to be contradictory signs and symptoms, first implicating an agent that affected the central and peripheral nervous system in one set of ways (cholinergic) and then an agent with directly opposing effects (anti-cholinergic).

The primary contradiction the physicians recorded was the lacrimation and eye irritation (which they expected to find if lacrimating agents had been used) and the dry mouth, mild or severe pulmonary edema, mydriasis (dilated pupils), and decreased to absent bowel sounds (some of which seemed to be anticholinergic findings and all of which seemed unrelated to a lacrimator agent). Some patients experienced diarrhea, which further confused the clinical picture, adding cholinergic to anticholinergic findings, in addition to lacrimation. It was this combination of lacrimating, cholinergic, and anticholinergic effects which the physicians labelled "polymorphic."

The time course for presentation of these varied symptoms also contributed to the lack of clarity. During the days of April 9 and April 10, the attention of the physicians was focused on those patients suffering from traumatic injury. Although some of the patients were complaining of the symptoms described above, these complaints were initially attributed to the normal physiological response of human beings to high levels of stress and "crowd crush" (dry mouth, dilated pupils, difficulty breathing). However, as these symptoms continued in those who were initially hospitalized and were found in the scores of people who came to the hospitals on April 11, 12, and 13, the physicians began to explore other explanations. In their view it became less likely that these symptoms, persisting for several days after the event, could be caused by standard human reactions to stress.

A "Third" Gas?

The Georgian physicians began to call what they were seeing a "cholineolytic" syndrome (i.e. an anti-cholinergic syndrome) and hypothesized that an additional toxic

agent was involved. The question of the "third gas" (separate from either CN or CS) became within the first week after April 9th a very real and debated issue. Specific observations made in patients which were attributed to anticholinergic effects included: mydriasis (dilated pupils), amnesia, memory disturbances, pyramidal effects, agitation, and depression. The physicians said that some patients reported having "seizures" but in their view these could not be distinguished from "pseudoseizures," i.e. hysterical conversion presentations. They also said that some patients complained of hallucinations. Although there was a question of temperature elevation in many of these patients (in the range of 37.5 to 38 degrees centigrade), no one was called "hot and dry," as in true atropinic poisoning. Urinary retention was not noted.

The Moscow toxicology expert, Dr. Lushnikov, proposed the use of galantamin (similar to physostigmine) as a diagnostic antagonist to the anticholinergic findings. The Georgian physicians told the PHR team that approximately ten patients had been tested with this drug shortly after their admission to the hospital and had shown resolution of their anticholinergic symptoms, including abatement of tachycardia and clearing of sensorium. Since the visit of the PHR team occurred 40 days after the event, nine of the ten patients had been discharged. The records of only two patients tested in this way were still available for review (one patient was still in the hospital and the chart of the other, who had just been discharged, was still on the floor).[27] Neither contained sufficient documentation to confirm a change in before and after-treatment findings. Time did not permit the retrieval of the other medical charts from the medical records departments of these two different hospitals or the review, with the help of translators and Georgian physicians, of whatever documentation of clinical course these records might have revealed.

Eyewitness Evidence

Independent lines of evidence pointed consistently to the use of chemical agents by the Soviet troops when they broke up the demonstration on the morning of April 9. The video taken by Eldar Shengelaya on the scene showed four separate arcs of smoke shot across the crowd, compatible with grenade-launched cannisters of gas. Some of the soldiers in this video wore long coats and carried closed shoulder pouches, consistent with what is known of the garb and equipment of Soviet troops when using chemical agents. However, contrary to what might be expected if chemical gas had been employed, none of the soldiers that could be seen clearly in this video appeared to be wearing gas masks. Another video was taken of the event from a second or third story window overlooking Rustaveli Avenue and facing the Government House. It was reviewed by the PHR team and carried out of the Soviet Union. In this video, the troops could be seen more clearly. Again, none were wearing gas masks.

Several of the patients who said they had been exposed to gas on April 9 described the soldiers as carrying hand-held cannisters with white shafts and red nozzles which they sprayed directly into the faces of demonstrators. Those who had been sprayed described the sensation as one of cold liquid, which then burned, and smelled of rotten fruit. One man (a neurosurgeon on volunteer duty at the demonstration) said

the spray in his face had an oily consistency that lingered on his moustache. All who were sprayed said the distance from spray can to their faces was approximately one to three feet.

Preliminary Assessment

Given the confused clinical picture and the evidence from videotape and from witnesses, and given the known properties of CS and CN gas, it appeared reasonable to explore the possibility that an additional toxic agent had been used.

A matrix was developed, listing the known agents considered possible against the range of observations and findings. The initial list of agents was:

CN - Chloracetophenone
CS - 2-chlorobenzylidene malononitrile
CR - Dibenz 1:4 oxazepine
Chloropicrin - trichlornitromethane
ethyl bromoacetate
Capsaicin
CG - Phosgene
CX - Phosgene oxime
DM - Adamsite 10-chloro-5,10-dihydrophenarasazine
BZ 3 - 3-Quinuclidinyl benzilate
GA - Tabun
GB - Sarin
GD - Soman
L - Lewisite - dichloro-2-chlorovinyl arsine
HN - nitrogen mustards

The absence of reports of blistering (other than vesicles around the mouth) and the absence of clinical findings associated with nerve agents or arsenicals reduced the list of possibilities to:

CN
CS
CR
Chloropicrin

The use of CN gas was admitted by the Soviet military authorities and the use of CS gas was not denied. No direct analytic confirmation of these two agents was attempted by the PHR team. The hand-held spray cans and the grenades were examined by one of the PHR team and the reports of their contents, furnished by the state toxicologist, were consistent with CN and CS, respectively.

The grenade was reported to contain:

chlorobenzylidene malonitrile (CS)
nitrites and nitrates in the form of explosives

The hand-held spray can was reported to contain:

chloracetophenone (CN)	0.32%
isopropyl alcohol	15.8%
olive oil	1.0%
Freon - trichloroflouro methane	
- dichlorordoflouro methane	

The use of Freon in high and direct concentrations could explain the reported incidence of sudden death among the victims on April 9. Freon is known to produce intense laryngospasm and ventricular arrhythmias in people who inhale high concentrations at very close range from aerosol cannisters. Sudden death has been reported from such exposures.[28] Freon is often used as a propellant with CN.[29]

The findings that could not be explained by the use of CS and CN included mydriasis; dry mouth; the range of skin lesions, including oral vesicles; the widespread, diverse, and persistent gastrointestinal complaints; the mental status and psychomotor changes; and the several reported cases of pulmonary edema. (Only in very high dose concentrations would CS or CN cause pulmonary edema and such exposures did not seem likely from all evidence presented.)

CR is an irritant agent that falls in the general class of lacrimator. In this context, its effects would be similar to CS or CN.[30]

Chloropicrin, when used as a fumigant, has been described as producing spotty discoloration of the skin, mydriasis, vesicles and burns in the orophyarynx, pulmonary edema, and bronchoconstriction.[31] This chemical was first used in World War I by the Germans, and then subsequently by the British and French. It is also known as war gas, vomiting gas, and pepper gas. Subsequently used as a riot control agent, it is known to have variable and unpredictable toxicity. Chloropicrin is now available in the U.S. only as a fumigant, and released only to licensed users. Both the U.S. and the U.S.S.R. are known to have had stockpiles of chloropicrin. CN and CS have been available in combination, and either one, in combination with chloropicrin, have purportedly been used as a training agent in the U.S.S.R.[32] The extent to which chloropicrin has been used in the U.S.S.R. as a riot control agent is not known.[33]

A recent report of "homicidal" use in Japan details the death of a 17 year-old girl from pulmonary edema after inhalation of chloropicrin spray. Post-mortem findings attributed to the effects of the chemical exposure included mydriasis, dark purple spotty discolorations of the skin, yellow-fluid filled vesicles in the oropharynx, trachea, and bronchioles, and edematous lungs.[34]

The duration of effects of chloropicrin is not well established. The possibility that abdominal complaints can persist for weeks after exposure[35] could be due to unrelated or intervening complications in the clinical course of patients observed.

The unexplained symptoms and findings in the clinical picture described by the Georgian physicians could be resolved by invoking chloropicrin as the additional toxic agent. The eyewitness reports of a gas smelling of rotten fruit and an oily texture to the liquid also fit the properties of this chemical and its propellant base, especially if delivered via the spray cannisters also used to deliver CN gas. The fact that the troops did not appear to be wearing gas masks could be partly accounted for by their use at close range of a directed chemical spray.

Reasoning on the basis of these lines of evidence, the PHR team concluded by Saturday afternoon, May 20, that the additional agent used by the Soviet troops on the morning of April 9 had probably been chloropicrin, delivered by hand-held spray cannister.

Laboratory Evidence

No blood, serum, or urine samples from patients admitted after April 9 or 28 were available for analysis at the time of the PHR visit. According to physicians and health officials, no samples were collected and saved.

During the early evening of May 20, the PHR team learned that chemists at the University of Tbilisi had a gas chromatography-mass spectroscopy unit which for reasons that are not clear to the PHR team had not been employed as a possible means of identifying the gases. That evening, with the permission of the state toxicologist, a spray cannister reportedly held since the demonstration of April 9 in the state toxicology lab was taken by the state toxicologist to the chemical analytic laboratory at the University.

One of the PHR team was present at the analysis and, in the company of several Georgian scientists and physicians, observed the process in its entirety. A standard gas chromotography-mass spectroscopy peak ratio for CN, shown on a xerox from a Soviet military formulary, was used for comparison. The contents of the spray cannister were shown to yield a pattern of mass peaks unique for chloropicrin and distinct from CN. No standard was available for CS. Although the PHR team had not witnessed and thus could not confirm the chain of evidence linking the particular cannister used in the May 20 analysis to the April 9 demonstration, the evidence derived from gas chromatography-mass spectroscopy was entirely consistent with the independently derived proposition that chloropicrin had probably been one of the gases used.

Conclusion Based on Synthesis of All Lines of Evidence

The testimony from eyewitnesses, the clinical presentation of the patients and their subsequent course, the post-mortem findings, and the results of the laboratory

analysis were reviewed in detail with the French team from MSF. Their clinical impressions were the same as those of the PHR team and they agreed with the assessment that chloropicrin was the most probable additional toxic agent.

Remaining Uncertainties

Despite consensus on this important point, there remained several questions about the events of April 9 which the PHR team could not successfully resolve.

1) The cause of death of the first 16 victims could not, on the basis of the autopsy evidence available, be definitively established. Certainly all evidence pointed to the fact that these 16 people were killed during the military action to break up the April 9 demonstration. Whether any of the 16 died of toxic gas exposure cannot be said with certainty. The PHR team could not review medical records or autopsy records of the four people who died later. The team was told that one of the three who had been injured on the morning of April 9 died from head trauma and another died from pulmonary edema. No information was available on the cause of death of the third victim.[36]

2) The evidence available from autopsy findings from the first 16 victims and from official toxicological investigation was fragmentary and inconclusive. In terms of post-mortem evidence, the PHR team was told on different occasions that the Soviet military had confiscated the evidence (the gross material, the written reports, and the slides); that only preliminary studies had been done on some of the lung and brain tissue of the first sixteen victims; and that further investigation of other tissues and the other victims was planned in the future. The PHR team was further informed that the Georgian state pathologist was away at a conference in Abkhazia and that only she had the key to the office where all the slides and written reports were stored.

With regard to toxicological investigation, the PHR team was variously told that the Soviet military had confiscated all samples; that without standards for any of the toxic agents (obtainable only from the Soviet military) no tests could be run on the samples that were available; that the state laboratories were allowed to run only certain kinds of tests.

It was impossible for the PHR team to ascertain the extent to which the difficulties experienced in trying to obtain better data could be traced to inadvertent errors on the part of local authorities or actual suppression of information. If the latter explanation is to be entertained at all, it is the view of the PHR team that the Georgian health officials and physicians had no role in such an effort.

3) The number of deaths is still a matter of dispute. Initial press reports stated that at least 40 people were killed; later press reports cited 37 deaths; the official records listed 20 dead. An unofficial organization states that more than 20 people were killed in the events of April 9 but there is no confirmation of this claim available to PHR. The formal mourning ceremonies, which engaged virtually the entire population

of Tbilisi, centered on these 20 people and another woman, who was rumored to have died some time after April 9 from causes attributed to toxic gas. It was also rumored that a yellow bus arrived at the scene of the demonstration shortly after the violence and picked up some of the corpses, taking them to an undisclosed destination. This rumor was denied by the Soviet military authorities. A yellow bus was visible for a brief period in one of the April 9 videotapes reviewed by the PHR team. The PHR team was told by unofficial sources that at least three additional people were known to be missing and presumed dead and further questions would cause further difficulty to the families involved.

4) The fact that the some of the Soviet troops were wearing long waterproof coats but not gas masks (although they carried gas mask pouches) is not easily explained. It is possible either that most of the troops did not know that toxic agents were being used or that since the gases used were not the usual "war" gases protective materials were not provided. Videotape evidence shows the launching of a few grenade cannisters and these went far into the crowd away from the soldiers. According to eyewitness testimony the toxic gas was delivered by hand-held cannisters, whose spray could be controlled and directed away from the troops who were using it.

5) Although the use of CN gas was acknowledged by the Soviet authorities, there was no formal statement in response to the statement by Dr. Sakharov that CS gas had also been used. The PHR team could not establish with certainty whether CS gas had been used. The lacrimator effects that were described could have resulted from either one of these gases.

6) In the last week of April, hundreds of people reported falling ill as they walked by or helped move the massive bank of flowers placed on Rustaveli Avenue. The majority of patients still in the hospitals at the time of the PHR arrival dated the onset of symptoms to apparent toxic exposures during this last week in April. Whether a residue of CN, CS, and/or chloropicrin gas could still have been exerting a toxic effect, 20 days or so after April 9, was a question the PHR team chose, at the time, not to engage. The Georgian physicians and populace were convinced that these complaints had their origin in the physical effects of exposure to a toxic agent. There have been documented instances where residues from lacrimating agents have been found to be active in closed spaces and in certain materials for several weeks after actual delivery of the gas.[37] Furthermore, the PHR team had not been present to examine the patients at time of their admission and to challenge the assessment of those who had been present would have required more evidence and data than were available.

However, it is the view of the PHR team that most if not all of the symptoms and findings observed in the patients still in the hospital on May 17-21 who dated the onset of their symptoms from April 28 or 29 could well be explained on psychological grounds alone.

THE EVENTS OF MAY 17-22 (THE "THIRD WAVE" OF ILLNESS)

Description of Events

On May 18, during the first briefing with the Ministry of Health, the PHR team was told that "a new wave of intoxications" was spreading among school children. Beginning the previous day, several children at different schools throughout the city began to complain of symptoms of poisoning. The state toxicologist reported to the press that "large amounts" of CS and CN had been found in air and soil samples taken at several schools. This news was broadcast over Tbilisi television. By May 19, parents were taking their children out of school and preparing to leave the city. Three to four hundred children, according to the Ministry of Health, were seeking medical attention. Forty had been hospitalized in the Pediatric Hospital of the Republic. In an attempt to forestall further anxiety, the Ministry of Health had ordered all the schools in Tbilisi to be closed one week early for the summer break.

By the afternoon of May 19, a sense of crisis pervaded the offices of the Ministry of Health and the offices and lobby of the Pediatric Hospital. In a meeting that included the French team from MSF, the Georgian health officials asked the members of both foreign medical delegations to help them assess the nature of the children's complaints. Were they suffering from the effects of a toxic exposure? If so, was it a new exposure, or a residual from April 9? (See Figure 1)

Decision to Expand the Scope of the Mission

The PHR team had been asked initially to investigate the possible use of toxic gas against the demonstrators of April 9. The new request of the Georgian Ministry of Health was to lend assistance in assessing another possible wave of toxic exposures that was beginning to constitute an apparent public health emergency. The PHR team decided that it was consistent with its independent, investigative stance to help solve the current dilemma.

Methods

All children admitted to the Pediatric Hospital of the Republic from May 17 through May 20 were interviewed and examined by one or more members of the PHR or MSF teams. At least one translator was also present at all times. During the afternoon and early evening of May 19, the PHR team and the MSF team each interviewed patients in different sections of the hospital. In a late night meeting, the two teams exchanged preliminary findings and found complete agreement on the basis

of their independent observations.

On the basis of the information both teams had already acquired, it was decided at this meeting to develop a formal set of questions and a standard approach to each patient, which would be used in all subsequent patient interviews. All patients would be asked to volunteer their symptoms; to report how they were feeling with respect to the day before; to describe what they knew about the events of April 9 and April 28 and to relate how they had acquired this information; and to identify the school they attended. All patients would then be given a complete physical exam, with particular attention to eyes, skin, lungs, and abdomen.

To enhance efficiency and yet reduce interviewer variability, it was decided to merge forces for the next day and divide into three teams, mixed French and American. This procedure was followed throughout the day of May 20 and the morning of May 21.

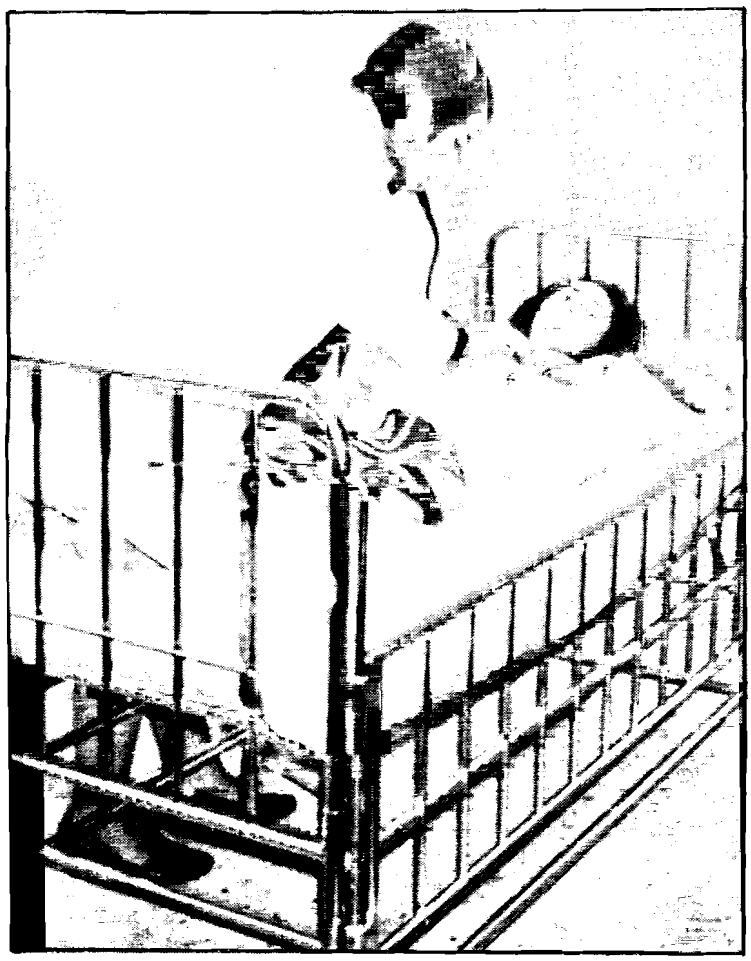
The data gathered by the three teams were aggregated in two joint discussions of all members of both the PHR and MSF delegations during another late night session on May 20 and a mid-day session on May 21. In another meeting late at night on May 21, one physician from PHR and another from MSF reviewed notebook entries to confirm details and include all observations made by individual team members.

Results

A total of 43 children were interviewed and examined by the PHR and MSF teams (See Table 5). The age range was seven to 15; 32 (74 percent) were female. With one exception, all of the children came from the same five schools or one particular orphanage. (No adults, either family members or teachers, complained of symptoms.) Of the 43, 41 children described one or more of the following: an elder sibling or friend who had been exposed and rendered symptomatic either on April 9 or April 28; close attention to television stories relating to the events of April 9, April 28, and/or the ceremonies marking the end of the 40-day period of mourning; knowledge that their parents or teachers were upset about the events of April 9; awareness that other children in their school had become ill between May 17 and May 20.

All 43 children were seen on at least two different days by one or more of the PHR or MSF team members. A common symptom complex was spontaneously described by 39 children (91 percent; 31 of the 32 girls and 8 of the 11 boys): headache, dizziness, red or itchy eyes, blurred vision, dry mouth, nausea, abdominal pain, muscle aches. Two of these patients, both 15 year-old girls from the same school, additionally mentioned "heart ache," which, upon closer questioning, appeared to be a non-specific complaint.

None of these 39 patients had physical or laboratory findings of objective illness. Some of the girls, examined at the time of their admission, were flushed and hyperventilating. A few had slightly reddened eyes. Others, examined within 12 to 24 hours of admission, were quiet and somewhat wary of the foreign medical presence.



Dr. Jennifer Leaning, a member of the delegation, examines an adolescent girl in the Pediatric Hospital of the Republic on May 19, 1989.

Several of these children appeared mildly dehydrated (dry lips, decreased tongue moisture). When pressed, they said they had not been eating or drinking much since admission. A number of these children had also been treated by "tissue washing," a technique developed during the first wave of toxic exposure, whereby low molecular weight Dextran is infused in a one-time bolus of 10 ml/kg intravenously.

By the time of the second examination, 24 to 36 hours later, these 39 children all appeared more relaxed with the foreign medical teams and all reported feeling much better. They were up and about in the hospital, although when examined they were assigned to bed, at the instruction of the Georgian physicians who wished to expedite the process.

Three case histories will illustrate the presentation of these 39 children.

Cases Number One and Number Two: Pediatric Hospital of the Republic

Two girls, both 14 years old, had become sick at school on the afternoon of May 19. They sat in the triage room of the hospital waiting to be evaluated, each with her head on the other's shoulder. Their eyes were closed. They were both hyperventilating significantly (respiratory rate in the 40s). There were no other objective findings on examination. One girl made it difficult to listen to her lungs as she stopped breathing entirely when asked to take a deep breath. These two girls were then seen an hour later on the ward, after they had been admitted. They were tucked into beds next to each other, alert, oriented, calm, and breathing normally. They were each receiving a special IV infusion for "tissue washing." They had joined several other girls from their school on the ward and said, in fact, that the "whole school" was there at the hospital. They said that they had all watched the news closely and knew about the demonstration--how people had smelled bad smells, gotten dizzy, and then become unconscious.

Case Number Three: Pediatric Hospital of the Republic

A 12 year-old boy was sent in by his school doctor on May 19 and complained that his throat hurt, his mouth was dry, and he felt dizzy. He knew that a schoolmate of his had been poisoned and he was very worried about him. His own 18 year-old brother had been at the demonstration but his family would not let him join the older members when they discussed details. They were afraid he would get too excited. He felt angry that his family had kept him out of the discussions. His physical exam, on two occasions, 24 hours apart, was normal.

Other Cases

Four children (three boys and one girl) described symptoms and evinced findings that differed from the common complex noted above. One seven year-old boy (the only child that age) was admitted on May 17 for evaluation of microhematuria and proteinuria. His parents had been preoccupied during the previous several weeks by the illness of his younger brother and he had been left at home, near the site of the demonstration, with relatives. When he began to behave in a very excited way he was brought to the hospital, because of fear of poisoning from toxic gas. His initial evaluation revealed abnormalities in his urine and he was scheduled for an IVP on May 22. His illness appeared to the PHR team to be quite separate from that of the others although he was grouped among the victims of "poisoning."

Another boy, eight years old (also the only child that age) was admitted on May 19 with a fever of 39 degrees Centigrade and persistent vomiting. He was treated as a case of poisoning and given tissue washing but was also noted to have a cough. When examined on May 19 and 20, he was slightly dehydrated, afebrile, with ronchi at the left posterior lung base. The conclusion of the Georgian, American, and French physicians was that the child had pneumonia.

A third boy, age 15, felt feverish, sleepy, and dizzy on May 15 and 16, went to a

soccer game on May 17 and felt better, and on May 18 felt worse and was brought to the hospital, where he was admitted. His temperature was recorded as 37.7 degrees Centigrade on May 18. When seen on May 19 and again on May 20, he reported feeling better and his exam was normal. His illness seemed most consistent with a brief flu-like syndrome.

A 12 year-old girl was admitted on May 19 complaining of dizziness, burning and redness in her eyes, and rash. When examined on May 19 and May 20, she was afebrile, with normal exam except for a maculo-papular pink rash, extending over her face, trunk, and limbs, most compatible with a viral exanthem.

Toxicology

To explore the report that traces of CN and CS had been found in soil and air samples taken from several schools, one of the PHR team (Dr. Rumack) visited the state toxicology laboratory and the main pharmaceutical laboratory. At the toxicology lab, only one sample of soil from one school had been analyzed. A colorometric technique was used that in Dr. Rumack's opinion was very non-specific and would react with many chemicals. It was not sufficient to identify CN. No other test had been performed and no other samples were in evidence.

The state pharmaceutical lab had earlier analyzed the clothing of the first 18 victims of the April 9 demonstration by a technique called "ironing," according to which a solution extracted from soaking the clothes in a solvent was run three times through a gas chromatograph and yielded results called "unique to CN." The lab did not have a standard CN chromatograph for comparison. Final analysis was with a thin layer chromatograph sprayed with a non-specific solvent. Since no standard was on the plate, no conclusion as to identification of CN could be made.

On the basis of this review of available evidence, the PHR team concluded that there were insufficient grounds to say that CN had been found in the schools during the period of May 17-May 20.

Discussion

None of the children examined showed objective medical findings consistent with toxic exposure. A few children had signs of typical pediatric illnesses, which would be expected to occur on an intercurrent basis in any population of children. The remaining children, who constituted the great majority of those admitted to the Pediatric Hospital from May 17 through May 21, complained of vague constitutional symptoms, (some also displayed signs and symptoms often associated with anxiety); lacked objective medical findings; and showed marked improvement in their symptoms within hours. On the basis of these observations, the PHR team considered the possibility of epidemic illness of psychogenic origin.

Subsequent examination of these children yielded more data consistent with this diagnosis and no data opposed to it. None of the children had major abnormalities in their mental status examination that would demonstrate diagnostic criteria for major psychiatric disorder.[38] Each child had knowledge of the events of April 9 and April 28 and expressed both interest and fear in the effects of toxic gas. Each child had heard either from family members, via television, or from peers that children were suffering a new wave of poisonings. The children were all from the same five schools or one orphanage. It was the impression of the PHR team, confirmed by the Georgian physicians and translators, that within each institution the children knew each other, fell ill together, and, in general, had entered the hospital together and presented their symptoms alongside their peers. They had all ended up together on the same hospital ward. Once settled in bed and receiving care, they all were improving at a similar rate in similar ways.

In the assessment of the PHR team, (with which the MSF team concurred) the children were giving somatic expression to the heightened anxiety and fear felt throughout the community as a result of the traumatic events of April 9 and April 28.[39] The actual form this expression took was as a range of constitutional symptoms[40] reminiscent of those suffered by the victims of toxic gas.[41]

Mass hysteria has traditionally been seen as a diagnosis of exclusion rather than one with specific criteria. The epidemiology of the phenomena described as characterizing mass hysteria is consistent with the features of this case.[42] In other settings, it has been observed that adolescent girls[43] and children with early parental loss[44] are particularly vulnerable to this type of symptomatology. More recently, specific features of mass hysteria have been described in an effort to make epidemic hysteria a positive diagnosis rather than one of exclusion. Underlying this effort is the growing perception in the field that an extensive search for organic etiologies serves to prolong the hysterical symptoms among those suffering from this disorder.[45]

Eight specific features of mass hysteria have been identified: 1) absence of laboratory results and physical findings that confirm a specific organic cause; 2) preponderance of illness in girls or women; 3) apparent transmission of illness by sight, sound, or both; 4) presence of hyperventilation or syncope; 5) preponderance of illness in adolescents or preadolescents; 6) benign clinical course, often with rapid spread followed by rapid remission of symptoms; 7) relapses of illnesses in the (psychological or actual) setting of the original outbreak; and 8) evidence of unusual physical or psychological stress.[46]

The PHR team was also aware that the events of April 9, already embedded in public consciousness, were receiving renewed attention in the week leading up to Friday, May 19, the formal termination of the 40-day period of official mourning. People were once again recounting their personal experiences at the time of the demonstrations and thereafter; extensive newspaper and television coverage contained details of planned ceremonies and marches; and pictures and biographical statements about each of the victims were prominently displayed throughout the city. The entire community of Tbilisi, deeply upset by what had occurred in early April, was re-living

this trauma as the mourning period drew to a close.

In this emotionally charged time, confronted with hundreds of children whose symptoms overlapped with those of people who had been exposed to toxic gas or gases in early April, the Georgian physicians reported that they found it prudent on social as well as medical grounds to admit the children to the hospital for a brief period of observation and symptomatic treatment. The physicians were well aware that the community was upset about the delays in diagnosing toxic gas during the days immediately following April 9. Although the physicians knew that the delays stemmed from the refusal of the authorities to provide information regarding whether or not toxic gas of any sort had been used, they also knew that the general public had found it difficult to distinguish who was to blame for the absence of explanation for the strange symptoms prevailing after April 9. As a consequence of official silence on a matter of key medical importance, the physicians now faced a situation where, in the words of the Georgian Deputy Minister of Health, Dr. Uznadze, "the people don't trust the doctors anymore." Even prior to this new wave of illness, in conversations with the PHR team, the Georgian physicians had frequently referred to this loss of public confidence as one of the major troubling consequences, for them, of the April 9 events.

Thus, in late May, although many of the physicians acknowledged that in their view the children were not physically ill, they sought to respond to the fears of the parents and children (and, for some, to their own sense of disquiet about what might be going on). Some specialists were more convinced than others that signs of toxicity were present. Their certainty made it more difficult for those who did not elicit these signs to act on their own clinical impression that no organic illness could be found. The traumatic events of April 9 had affected the medical community, as well as the general public, and required an approach that would help restore the mutual trust and confidence that prior to April 9 had characterized the relationship between the Georgian public and their physicians.

The Georgian physicians were familiar with signs of hysteria but, trained in the pattern of Soviet medicine, did not welcome a diagnosis phrased in Freudian terms. Nor, in the view of the U.S. and European teams, could this diagnosis be considered adequate to explain the full range of physical and psychological effects on the population inflicted by the actual deeply traumatic events of April 9. After much discussion the members of the PHR and MSF teams decided to seek a diagnostic term that would take into account elements of conversion symptoms and post-traumatic stress disorder. It was also evident that the term would have to sound compelling when translated into Georgian.

The PHR and MSF teams settled on the term "Catastrophe Reaction Syndrome," which translated phonetically into Georgian as "Catastroph Reactzia Syndromi."

In introducing this term and the concepts behind it, the American and French teams emphasized that the children were suffering physical symptoms as a response to the community catastrophe. The children sensed the heightened anxiety, tension, and fear throughout the community and identified with the experience reported by the

victims of the toxic gases. The symptoms reported by the children were truly felt but were self-limiting, as evidenced by the fact that already all were responding with rapid improvement to the attention, observation, and symptomatic treatment they had been given.

Both medical delegations also pointed out that the epidemiology of this syndrome, as noted elsewhere in the world, matched the picture in Tbilisi: symptoms expressed primarily by adolescent girls in a setting that had recently experienced serious trauma or disaster. It was suggested that the timing of these symptoms, occurring at the culmination of the 40-day period of mourning, was related to the grieving process in the community at large. The PHR team suggested that these young women had a particular capacity to resonate with the feeling states of others and were expressing the fact that for many people there remained much unresolved sorrow, anger, and fear.

In terms of the future, the PHR and MSF teams recommended that the children should be brought more explicitly into the community discussion of these events. It would be especially important to give children an active and structured role at anniversary times. Finally, it was noted that as long as the adult population remained fearful of the Soviet authorities and insecure about the capacities of their own local leadership to give them full and accurate information and protect them from harm, the medical community might expect to see further cases of this symptom complex among the children of the city.

Intervention

On Saturday afternoon, May 20, the American and French teams discussed these findings in a large, formal meeting with the directors of the main hospitals in Tbilisi, the heads of the clinical departments within the hospitals, the state toxicologist and his deputies, the deputy state pathologist, and the senior officials from the Georgian Ministry of Health. All present agreed that the weight of evidence led to the conclusion that the presence of chloropicrin as one of the toxic agents used on April 9 could be asserted with a high degree of certainty. With the exception of two physicians, all present also agreed that the children seeking medical attention from May 17 on were suffering from the Catastrophe Reaction Syndrome as proposed by the two foreign medical teams.

On Sunday morning, the PHR and MSF teams met with the two Georgian physicians to see seven children they considered most seriously affected by the possible new exposure to toxic agents. These children were described as having objective neurological abnormalities (nystagmus, nerve root signs, pathological reflexes). Three members of the PHR and MSF teams interviewed and examined these children (all of whom had been examined twice before on the two previous days) and explained their findings at length with the Georgian physicians. The nystagmus (10 beats at endstage gaze, abating) was within the range of normal; the nerve root findings were more consistent with tight muscles; and the reflexes were also within the range of normal. As a result of this discussion, the two physicians concurred with the conclusions of the

foreign medical teams.

Later that morning, all physicians and officials present at the meeting Saturday afternoon reconvened at the offices of the Ministry of Health for a formal discussion led by Dr. Irakli Menagarishvili, the Minister of Health. This was the first time the PHR team (and the MSF team) had met with him. Also present were the chief pathologist, returned from Abkhazia, and the chief toxicologist. Again the PHR and MSF teams reviewed their conclusions about the gas used on April 9 and the cause for the illness currently occurring among the school children.

Dr. Menagarishvili appeared to have been well briefed by the Dr. Uznadze, the Deputy Minister of Health. He said that incipient panic faced the city and it was essential for the local authorities to be able to tell the people what was actually going on. He informed the meeting that if consensus could be reached among everyone in the room about the nature of the gas used on April 9 and about the current events causing such fear among parents and children that a television statement could be taped that afternoon for an all-Georgia broadcast that evening.

PHR team members, Dr. Ruth Barron (second from left), Dr. Jennifer Leaning (center) and Dr. Barry Rumack (second from right), seated with translators and Georgian colleagues during the televised briefing to the population of Soviet Georgia on May 21, 1989. At far right is Dr. Irakli Menagarashvili, Minister of Health of the Republic of Georgia.

The chief toxicologist for the state argued that the presence of chloropicrin in the cannisters used on April 9 had not been confirmed by his lab and asked that the Minister of Health delay specific identification of this additional toxic agent until he had been able to run independent analyses the next day. In the ensuing discussion, Dr. Menagarishvili pressed hard for closure on this point and pointed out that scientists at the University of Tbilisi had participated, with Dr. Rumack, in identifying the agent in a cannister obtained from the safe of the state toxicology lab. The chief toxicologist did not persist in his objection.

With regard to the school children, everyone agreed that the findings could best be explained by the Catastrophe Reaction Syndrome. Dr. Menagarishvili then displayed several items that the city police had found scattered in city parks and school yards during the previous three days: syringes of atropine (carried by civil defense volunteers, as well as chemical warfare troops, as an antidote to chemical weapons); a paper packet of a powdered agricultural fumigant; and small vials of chemicals used as analytic reagents. He said that the police were investigating the possibility that "subversive elements" were throwing these items in public places in an attempt to foment further public anxiety.

The formal meeting was adjourned by Dr. Menagarishvili and the group made its way to the Tbilisi television studios. In addition to testimony from the senior physicians and health officials for the state of Tbilisi and reports from the seven members of the PHR and MSF teams, a lawyer from the Ministry of Justice and a senior police investigator also delivered statements about the materials found in school yards and public parks. The Minister of Health introduced and closed the session, which lasted two full hours, with a plea to the people of Georgia to remain calm, listen to the facts as presented by independent experts, and to pay attention to their conclusions and the conclusions of the local authorities charged with their welfare.

CONCLUSIONS

On the basis of evidence acquired during the five-day mission to Soviet Georgia, the PHR team came to the following main conclusions regarding the events that transpired in Tbilisi during April and May, 1989.

1) The demonstration on April 9, 1989 was by videotape evidence a peaceful gathering of unarmed citizens expressing a range of political opinion.

2) To break up this demonstration, the Soviet soldiers relied on several forms of force. In addition to the use of clubs and sapper shovels and one or possibly two lacrimator agents (CN and perhaps CS), all of which were either acknowledged or uncontested, another toxic agent was most probably employed.

3) The clinical and toxicologic evidence independently support the hypothesis that in all likelihood the identity of this toxic agent is chloropicrin, a chemical gas that since the 1950's has been banned for use in riot control in the U.S. because of its unpredictably severe effects. Its current status in the U.S.S.R. is not known.

4) The evidence made available to the PHR team was insufficient to permit a definitive statement regarding the cause of death of the initial 16 victims. It is possible that sudden death (in the absence of external signs of injury) could have occurred as the result of suffocation in the midst of a panicked crowd, asphyxiation on the basis of severe exposure to a lacrimator agent, or as a result of direct exposure to Freon gas, a propellant used in the cannisters containing CN gas.

5) The PHR team could not draw firm conclusions regarding the etiology of symptoms reported by hundreds of people who, on April 28 and 29, were involved in transporting the flowers from Government Plaza to the churchyard nearby. One explanation, plausible although unlikely, is that a residue of toxicants remaining from April 9 had coated the flowers and remained in sufficient concentration to produce such symptoms. It is also clear that pyschological reactions could produce these symptoms. Since the PHR team was not present to examine patients at the time they became ill or to test the flowers for a toxic residue, the question of etiology could not be pursued to resolution.

6) The great majority of children admitted to the Pediatric Hospital of the Republic from May 17 to May 20 were suffering not from a new exposure to a toxic agent but from a constellation of symptoms induced by psychological reactions to group trauma. The remainder of the pediatric patients admitted in this time frame were suffering from intercurrent pediatric illnesses.

7) Despite the fact that for several days the physicians and public health officials of Tbilisi were denied access to the knowledge that toxic agents had been used against the demonstrators, they rendered competent, humane, and appropriate care to the hundreds of people who presented for help and treatment in the immediate aftermath of the events of April 9.

8) During the weeks that followed, responding to the thousands who ultimately sought medical attention, the physicians and public health officials continued to sustain a remarkable level of professional performance. The PHR team notes with respect and commendation the extent to which the medical establishment of Tbilisi supported the medical and pyschological needs of the community with great compassion, devotion to detail, and quest for clinical certainty.

9) In the short term, the violence inflicted upon the demonstrators has engendered great anxiety, anger, and sorrow among many people throughout the city. It can be expected that in the longer term these feelings will continue to find expression, in a variety of individual or communal forms.

10) Because the boundaries of physical effects are especially difficult to ascertain, the use of toxic gas against a population creates a uniquely pervasive penumbra of psychological reactions throughout the community.

11) By instructing the Soviet soldiers to use potentially lethal weapons and toxic agents to disperse a peaceful crowd, the Soviet authorities are responsible for committing a major violation of human rights against the citizens of Tbilisi.

12) The refusal of the Soviet authorities to release or offer information to the medical community responsible for the care of the people of the city supplied a further dimension of persistent uncertainty and fear. The physicians felt constrained by lack of definite knowledge and the population became hostage to rumor and manipulation. By withholding essential information, the Soviet authorities contributed to the ongoing psychological distress that has continued to afflict many members of the community to date. This behavior of the Soviet authorities, when seen as interference with provision of medical care and infliction of psychological harm, should be considered to constitute another serious abuse of human rights.

RECOMMENDATIONS

These recommendations reflect the particular observations of the PHR team engaged in this mission to Tbilisi. They are also expressed with attention to the underlying general obligation of such missions to investigate the medical implications of alleged abuses of human rights.

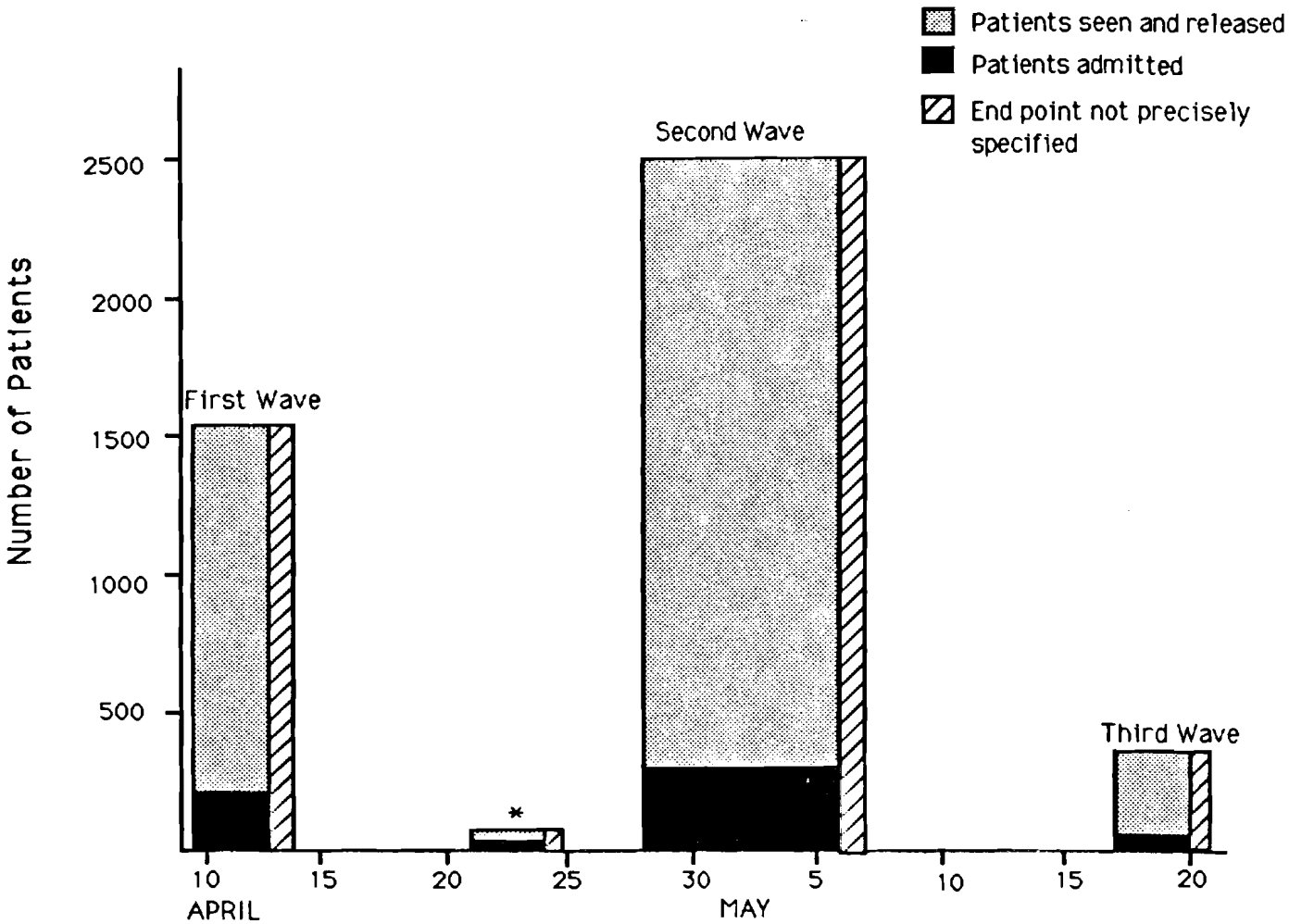
1) The terms of the Geneva Protocol of 1925, banning the use of all chemical agents in situations of war between nations, should be extended to a peace-time ban on the use of toxic chemical agents by governments as methods of crowd control.

2) Those toxic chemical agents which are classified as lacrimators should not be used to control crowds or break up demonstrations except in last resort, as an alternative to deadly force, and then only according to protocols regarding concentration and geography which provide safeguards against potentially serious effects.

3) In the context defined by recommendation number two, above, any government, agency, or institution that uses a chemical agent such as a lacrimator against an individual or a group should at once make available to the responsible medical personnel all information necessary to ensure appropriate and comprehensive care of those exposed. Any deliberate witholding of information or negligence in the handling of essential data should be deplored as interference with the delivery of emergency medical attention.

FIGURE I

Episodes of Illness Related to the April 9th Demonstration as Reflected in Hospital Based Data as of May 22, 1989



Numbers and dates of presentation are approximate and based on data collected from the Georgian Ministry of Public Health and reports of individual hospitals.

* Children from First School

TABLE 1

FIRST AND SECOND WAVES

Patients in Hospitals as of May 19, 1989 (N=22)

AGE	SEX		EXPOSURE EVENT (month/day)			HOSPITAL		
	Female	Male	4/9	4/28	4/9 & 4/28	Second Clinical Hosp.	Adult Hosp. of the Repub.	Pediatric Hosp.
0-14	3	1	3	1	0	0	0	4
15-19	2	1	2	1	0	1	0	2
20-24	5	2	1	5	1	5	1	0
25-29	2	3	2	2	1	3	3	0
30-34	1	0	1	0	0	0	1	0
35-39	1	0	0	1	0	1	0	0
40-44	0	0	0	0	0	0	0	0
45-49	0	0	0	0	0	0	0	0
50-54	0	0	0	0	0	0	0	0
55-59	1	0	0	1	0	1	0	0
60- >	0	0	0	0	0	0	0	0
Totals	15	7	9	11	2	11	5	6

TABLE 2
Results of Patient Questionnaire

DESCRIPTIVE DATA

Gender	
Male	32 (36%)
Female	54 (61%)
Not Stated	3 (3%)
Median Age (Years)	21
Age Range (Years)	11 - 60
Age < = 17 Years	33 (37%)
Date of Exposure	
April 9 - 11, 1989	56 (63%)
Later or Unstated	33 (37%)
Direct Skin Contact	37 (42%)
Direct Eye Contact	45 (51%)
Use of Any Cloth on Face	9 (10%)

PREVALENCE OF REPORTED UNDERLYING LUNG DISEASE

Condition	%
Any lung condition	30
Asthma	19
Bronchitis	6
Hay fever	24
History of wheezing in past	18
History of dyspnea	15
Ever smoked cigarettes	36

TABLE 3
Results of Patient Questionnaire

ACUTE SYMPTOMS (within one half hour of exposure)

Symptom	%
Headache	88
Dizziness	81
Eye irritation	81
Dyspnea with exercise	80
Nausea or stomach ache	80
Cough	78
Confusion/memory disturbance	76
Muscle weakness	75
Burning of lips	73
Sore throat	70
Excessive sweating	64
Dyspnea at rest	63
Palpitations	57
Chest pain/burning	57
Double/blurred vision	57
Pleuritic chest pain	54
Nasal irritation	51
Wheezing	43
Vomiting	40

TABLE 4
Results of Patient Questionnaire

SYMPTOMS AT 12-24 HOURS POST-EXPOSURE

Symptom	%
Dyspnea with exercise	76
Cough	71
Dyspnea at rest	62
Wheezing	36
Skin rash or redness	30
Skin blisters	21

CHRONIC SYMPTOMS
(At time of interview, several weeks after exposure)

Symptom	%
Headache	92
Confusion/memory disturbance	84
Dizziness	82
Nausea or stomach ache	73
Eye irritation	72
Dyspnea with exercise	72
Sore throat	72
Excessive sweating	66
Cough	65
Palpitations	61
Dyspnea at rest	60

TABLE 5

THIRD WAVE

Patients Admitted to the Pediatric Hospital of the Republic of Georgia from May 17, 1989 to May 20, 1989. (N=43)

Age	Female		Male		School[a]		Number of times seen	
	Symptom complex [b]	Other Disease	Symptom complex[b]	Other Disease	Yes	No	Two	Three
7	0	0	0	1	0	1	1	0
8	0	0	0	1	1	0	0	1
9	0	0	0	0	0	0	0	0
10	1	0	0	0	1	0	1	0
11	2	0	1	0	3	0	2	1
12	3	1	5	0	9	0	5	4
13	2	0	0	0	2	0	1	1
14	15	0	0	0	15	0	15	0
15	8	0	2	1	11	0	11	0
Subtotals	31	1	8	3	42	1	36	7
Totals				43		43		43

[a] Attended schools #101, #149, #169, #161, #147 or live at Orphanage.

[b] Symptom complex: Headache, dizziness, red or itchy eyes, blurred vision, dry mouth, nausea, abdominal pain, muscle aches.

APPENDIX I: Questionnaire

EXPOSURE STUDY INTERVIEW SCHEDULE

INTERVIEW NUMBER ___ ___ ___

INTERVIEWER NAME _____ ___ ___

DATE OF INTERVIEW [DAY/MTH] ___ ___ / ___ ___

RESPONDENT:

AGE [YEARS] ___ ___

SEX [MALE=1; FEMALE=2] ___

HEIGHT [CENTIMETERS] ___ ___ ___

WEIGHT [KILOGRAMS] ___ ___ ___

WHAT DATE AND TIME OF DAY DID YOUR EXPOSURE OCCUR ?

DATE [/DAY/MTH/YR] ___ ___ /___ ___ / ___ ___

TIME [MILITARY] ___ ___ : ___ ___

HOW LONG DID YOUR EXPOSURE LAST IN TOTAL? [MINUTE] ___ ___ ___

THE FOLLOWING QUESTIONS CONCERN THE CHEMICAL SUBSTANCE TO WHICH YOU WERE EXPOSED AND HOW THE EXPOSURE OCCURRED. [YES=1; NO=2]

DID YOU EXPERIENCE ANY DIRECT SKIN CONTACT ? YES NO ___

DID YOU EXPERIENCE ANY DIRECT EYE CONTACT? YES NO ___

DID YOU INGEST ANY OF THE SUBSTANCE ? YES NO ___

WAS THE EXPOSURE IN A CLOSED ROOM OR SPACE WITHOUT SPECIFIC VENTILATION SUCH AS AN OPENED WINDOW, FAN, OR AIR SYSTEM? YES NO ___

WAS THE EXPOSURE OUTDOORS? YES NO ___

HOW CLOSE IN METERS WERE YOU TO THE SOURCE OF EXPOSURE ___ ___

WERE YOU WEARING ANY KIND OF MASK? [CIRCLE CORRECT ANSWER]

1.NONE 2.WET CLOTH 3.DRY CLOTH 4.GAS MASK ___

BECAUSE OF THE EXPOSURE. IMMEDIATELY FOLLOWING THE EXPOSURE OR STARTING WITHIN ONE HALF HOUR, DID YOU EXPERIENCE ANY OF THE FOLLOWING: [YES=1; NO=2]

IRRITATED RED BURNING OR TEARING EYES	YES	NO	___
BURNING OF THE MOUTH OR LIPS	YES	NO	___
RUNNY NOSE OR STUFFED UP NOSE	YES	NO	___
SORE THROAT	YES	NO	___
COUGH	YES	NO	___
PHLEGM OR PRODUCTIVE COUGH	YES	NO	___
COUGHING UP BLOOD OR PINK SPUTUM	YES	NO	___
SHORTNESS OF BREATH WHILE SITTING AT REST	YES	NO	___
SHORTNESS OF BREATH WITH FAST WALKING	YES	NO	___
WHEEZING OR WHISTLING IN THE LUNGS	YES	NO	___
CHEST PAIN WITH DEEP BREATH	YES	NO	___
OTHER CHEST PAIN OR CHEST BURNING	YES	NO	___
PALPITATIONS	YES	NO	___
DIZZINESS OR PASSING OUT	YES	NO	___
HEADACHE	YES	NO	___
CONFUSION OR MEMORY LOSS	YES	NO	___
HALLUCINATIONS	YES	NO	___
DOUBLE OR BLURRED VISION	YES	NO	___
EPILEPTIC SEIZURE	YES	NO	___
MUSCLE TWITCHING OR SPASM	YES	NO	___
NUMBNESS OR CHANGE OF SENSATION TO TOUCH	YES	NO	___
MUSCLE WEAKNESS OR LOSS OF STRENGTH	YES	NO	___
NAUSEA OR STOMACH ACHE OR STOMACH CRAMP	YES	NO	___
VOMITING	YES	NO	___
DIARRHEA OR LOOSE STOOLS	YES	NO	___
CONSTIPATION	YES	NO	___
INCONTINENT OF OR SOILED PANTS WITH STOOL	YES	NO	___
INCONTINENT OF OR SOILED PANTS WITH URINE	YES	NO	___
DIFFICULTY URINATING OR STARTING STREAM	YES	NO	___
EXCESSIVE SWEATING	YES	NO	___
SKIN REDNESS OR BURNS	YES	NO	___
SKIN BLISTERS	YES	NO	___
OTHER SYMPTOMS _____			___
_____			___

DURING THE TIME PERIOD OF TWELVE TO TWENTY FOUR HOURS AFTER THE EXPOSURE, DID YOU EXPERIENCE ANY OF THE FOLLOWING: [YES=1; NO=2]

IRRITATED RED BURNING OR TEARING EYES	YES	NO	___
BURNING OF THE MOUTH OR LIPS	YES	NO	___
RUNNY NOSE OR STUFFED UP NOSE	YES	NO	___
SORE THROAT	YES	NO	___
COUGH	YES	NO	___
PHLEGM OR PRODUCTIVE COUGH	YES	NO	___
COUGHING UP BLOOD OR PINK SPUTUM	YES	NO	___
SHORTNESS OF BREATH WHILE SITTING AT REST	YES	NO	___
SHORTNESS OF BREATH WITH FAST WALKING	YES	NO	___
WHEEZING OR WHISTLING IN THE LUNGS	YES	NO	___
CHEST PAIN WITH DEEP BREATH	YES	NO	___
OTHER CHEST PAIN OR CHEST BURNING	YES	NO	___
PALPITATIONS	YES	NO	___
DIZZINESS OR PASSING OUT	YES	NO	___
HEADACHE	YES	NO	___
CONFUSION OR MEMORY LOSS	YES	NO	___
HALLUCINATIONS	YES	NO	___
DOUBLE OR BLURRED VISION	YES	NO	___
EPILEPTIC SEIZURE	YES	NO	___
MUSCLE TWITCHING OR SPASM	YES	NO	___
NUMBNESS OR CHANGE OF SENSATION TO TOUCH	YES	NO	___
MUSCLE WEAKNESS OR LOSS OF STRENGTH	YES	NO	___
NAUSEA OR STOMACH ACHE OR STOMACH CRAMP	YES	NO	___
VOMITING	YES	NO	___
DIARRHEA OR LOOSE STOOLS	YES	NO	___

INCONTINENT OF OR SOILED PANTS WITH STOOL	YES	NO	___
INCONTINENT OF OR SOILED PANTS WITH URINE	YES	NO	___
DIFFICULTY URINATING OR STARTING STREAM	YES	NO	___
EXCESSIVE SWEATING	YES	NO	___
HOT, DRY SKIN OR FEELING FEVER	YES	NO	___
SKIN REDNESS OR BURNS	YES	NO	___
SKIN BLISTERS	YES	NO	___
OTHER SYMPTOMS _____			___
_____			___

IN THE LAST 24 HOURS HAVE YOU EXPERIENCED ANY OF THE FOLLOWING:

IRRITATED RED BURNING OR TEARING EYES	YES	NO	___
BURNING OF THE MOUTH OR LIPS	YES	NO	___
RUNNY NOSE OR STUFFED UP NOSE	YES	NO	___
SORE THROAT	YES	NO	___
COUGH	YES	NO	___
PHLEGM OR PRODUCTIVE COUGH	YES	NO	___
COUGHING UP BLOOD OR PINK SPUTUM	YES	NO	___
SHORTNESS OF BREATH WHILE SITTING AT REST	YES	NO	___
SHORTNESS OF BREATH WITH FAST WALKING	YES	NO	___
WHEEZING OR WHISTLING IN THE LUNGS	YES	NO	___
CHEST PAIN WITH DEEP BREATH	YES	NO	___
OTHER CHEST PAIN OR CHEST BURNING	YES	NO	___
PALPITATIONS	YES	NO	___
DIZZINESS OR PASSING OUT	YES	NO	___
HEADACHE	YES	NO	___
CONFUSION OR MEMORY LOSS	YES	NO	___
HALLUCINATIONS	YES	NO	___
DOUBLE OR BLURRED VISION	YES	NO	___
EPILEPTIC SEIZURE	YES	NO	___
MUSCLE TWITCHING OR SPASM	YES	NO	___
NUMBNESS OR CHANGE OF SENSATION TO TOUCH	YES	NO	___

NAUSEA OR STOMACH ACHE OR STOMACH CRAMP	YES	NO	___
VOMITING	YES	NO	___
DIARRHEA OR LOOSE STOOLS	YES	NO	___
CONSTIPATION	YES	NO	___
INCONTINENT OF OR SOILED PANTS WITH STOOL	YES	NO	___
INCONTINENT OF OR SOILED PANTS WITH URINE	YES	NO	___
DIFFICULTY URINATING OR STARTING STREAM	YES	NO	___
EXCESSIVE SWEATING	YES	NO	___
HOT, DRY SKIN OR FEELING FEVER	YES	NO	___
SKIN REDNESS OR BURNS	YES	NO	___
SKIN BLISTERS	YES	NO	___
OTHER SYMPTOMS _____			___
_____			___

HOW MANY DAYS DID IT TAKE FOR YOU TO FEEL IN AT LEAST AS GOOD A STATE OF HEALTH AS BEFORE THE EXPOSURE? [DAYS] ___ ___

HOW MANY FULL DAYS OF WORK DID YOU MISS BECAUSE OF THE EXPOSURE? [DAYS; "N A" = NOT EMPLOYED] ___ ___

FOR HOW MANY DAYS WERE YOU LIMITED FROM ANY OF YOUR NORMAL ACTIVITIES BECAUSE OF THE EXPOSURE? NORMAL ACTIVITIES INCLUDE FULL JOB DUTIES, SPORTS, HOUSEHOLD CHORES, OR HOBBIES ___ ___

THE FOLLOWING QUESTIONS REFER TO YOUR GENERAL HEALTH BEFORE THE EXPOSURE. BEFORE THE EXPOSURE, HAD A MEDICAL DOCTOR EVER TOLD YOU THAT YOU HAD ANY OF THE FOLLOWING HEALTH CONDITIONS: [YES=1; NO=2]

ASTHMA	YES	NO	___
EMPHYSEMA	YES	NO	___
CHRONIC BRONCHITIS	YES	NO	___
CHRONIC OBSTRUCTIVE LUNG DISEASE	YES	NO	___
OTHER LUNG DISEASE [SPECIFY] _____	YES	NO	___
HAY FEVER, SINUSITIS, OR POST NASAL DRIP	YES	NO	___
HEART ATTACK OR HEART DISEASE	YES	NO	___
HIGH BLOOD PRESSURE	YES	NO	___
BEFORE THE EXPOSURE, HAD YOU EVER HAD WHEEZING THAT MADE YOU SHORT OF BREATH?	YES	NO	___
BEFORE THE EXPOSURE, DID YOU HAVE TO WALK SLOWER THAN PEOPLE OF YOUR AGE BECAUSE OF SHORTNESS OF BREATH?	YES	NO	___

HAVE YOU EVER REGULARLY SMOKED CIGAR/PIPE YES NO ___

HAVE YOU SMOKED AT LEAST 20 PACKS OF YOU CIGARETTES IN YOUR ENTIRE LIFE? YES NO ___

M IF YES:
O

HOW MANY PACKS PER DAY ON AVERAGE DID YOU SMOKE? ___ ___

FOR HOW MANY YEARS DID YOU SMOKE? ___ ___

ARE YOU A CURRENT CIGARETTE SMOKER? YES NO ___

WERE YOU A CURRENT SMOKER AT THE TIME OF THE EXPOSURE? YES NO ___

IF YES: HOW MANY DAYS IF ANY DID YOU REDUCE YOUR CIGARETTE SMOKING BECAUSE OF THE EXPOSURE [DAYS] ___ ___

-> THE FINAL QUESTIONS CONCERN THE TREATMENTS YOU MAY HAVE RECEIVED BECAUSE OF THE EXPOSURE.

WERE YOU DIRECTLY EXAMINED OR TREATED BY A MEDICAL DOCTOR BECAUSE OF THE EXPOSURE? YES NO ___

WERE YOU ADMITTED TO A HOSPITAL OVERNIGHT OR LONGER? YES NO ___

DATA FROM MEDICAL RECORD [IF AVAILABLE]:

HOURS SINCE EXPOSURE AT TIME OF EXAM ___ ___

TEMPERATURE [CENTIGRADE] ___ ___ . ___

SYSTOLIC BLOOD PRESSURE ___ ___ ___

DIASTOLIC BLOOD PRESSURE ___ ___ ___

RESPIRATORY RATE [BREATHS PER MINUTE] ___ ___

HEART RATE ___ ___

PUPIL SIZE 1.SMALL 2.MID 3.LARGE 4.NOT NOTED ___

CONJUNCTIVA INJECTED YES NO ___

STRIDOR YES NO ___

WHEEZING YES NO ___

[NL= NORMAL]

BOWEL SOUNDS 1.DECREASED 2.NL 3.INCREASED 4.NOT NOTED ___

CHEST XRAY 1. PULMONARY EDEMA 2.NL 3.NOT AVAILABLE ___

ELECTROCARDIOGRAM 1.ABNORMAL 2.NL 3.NOT AVAILABLE ___

DESCRIBE ABNORMALITY _____ ___

WHITE BLOOD CELL COUNT / CUBIC MM ___ ___ , ___ ___ ___

OTHER COMMENTS _____

Is there anything else you experienced, or any other symptoms you have had that have not been asked about?

For interviewer to complete at end of interview.

1. Does the patient appear mentally unstable or mentally ill? [circle one]
   a. not at all unstable/mentally ill
   b. somewhat unstable/mentally ill
   c. very unstable/mentally ill

2. Does the patient appear credible? [circle one]
   a. yes
   b. questionable
   c. not credible

PHYSICAL EXAM NL=NORMAL ABN=ABNORMAL

	NL	ABN
1.SKIN Rashes Scars Lesions Other _____		
2.EYES E.O.M. Pupils Fundi Conjuctivae Sclera Other _____		
3.EARS Tympanic Membrane Canals		
4.NOSE Septum Membrane		
5.THROAT Mucous Membranes Teeth Tongue		
6.NECK ROM Thyroid		
7.LYMPH NODES Submaxillary Cervical Axillary Inguinal		
8.HEART Gallops Murmurs Rhythm		

	NL	ABN
9. PULSES Carotid Radial Inguinal Dorsalis Pedis		
10.EXTREMITIES Edema Varicosities Other _____		
11.BREASTS Masses Discharge Other _____		
12.ABDOMEN Masses Tenderness-- Liver Spleen		
13.RECTAL Masses Hemorrhoids		
14.MUSCULOSKELETAL Back Upper Extremities Lower Extremities		
15.NEUROLOGIC Reflexes Motor Sensory Cerebellar		
16.PULMONARY Rales Rhonchi Wheezes		

PEFR (Pre B.D.) _____ L/M

PEFR (Post B.D.) _____ L/M

COMMENTS _____

APPENDIX II: List of the Dead*

Died April 9, 1989:

Aza Razhdenis Asuli Adamia (female, age 22)
Eka Tamazis Asuli Bezhanishvili, (female, age 16)
Nato Alexis Asuli Giorgadze (female, age 23)
Tamuna Grigolis Asuli Dolidze (female, age 28)
Tina Severianis Asuli Enukidze (female, age 70)
Nino Shukris Asuli Toidze (female, age 25)
Zaira Abelis Asuli Kikvidze (female, age 61)
Manana Levanis Asuli Loladze (female, age 33)
Tamar Ivanes Asuli Mamulashvili (female, age 50)
Mamuka Givis Dze Nozadze (male, age 22)
Nana Alendris Asuli Samarguliani (female, age 30)
Marina Tristanis Samarguliani-Tchkonia (female, age 35)
Eliso Giorgis Asuli Tchipashvili (female, age 25, nurse in Republic Hospital)
Tamar Arkadis Asuli Tchovelidze (female, age 16)
Nodar Shota Dze Djangirashvili (male, age 40, athletics teacher)
Mziya Mikhailis Asuli Djincharadze (female, age 43, psychiatrist at the Institute of Psychiatry)

Died April 11, 1989 as a result of trauma received during April 9 demonstration:

Manana Amiranis Asuli Melkhadze (female, age 23)
Gia Georgis Dze Karseladze (male, age 25)

Died April 18, 1989 as a result of trauma received during April 9 demonstration

Natiya Bashalenshvili (female, age 16)

Shot and killed by Soviet troops on April 9 for alleged curfew violation:

Georgy Karseladze (male, age 25)

*First 18 names are from official list published by the Georgian Minister of Health in the Georgian press.

APPENDIX III

Patient Histories

Case Number One: Second Clinical Hospital

26 year-old male admitted April 9 after declared direct contact with a gas in liquid form, sprayed at him by soldiers in the demonstration. He complained of difficulty breathing, difficulty moving his arms, and then losing consciousness. Next recalls awakening in hospital at 6 pm. Said he felt as if he had been "absolutely switched off." Admission data from 5 am April 9 include heart rate of 92, blood pressure of 120/80, and mental status alert. On April 11, noted to have horizontal nystagmus. Rash on face and feet appeared. On April 12, record notes "labile hypertension, mydriasis, back pain." On April 12, following advice of Moscow toxicology consultant, patient given IV physostigmine (dose unknown). Mydriasis abated, heart rate slowed, consciousness improved. (These results relayed to us by physicians; medical chart did not contain this documentation.) After one hour, according to the physicians, his symptoms returned but in milder form, so physostigmine was not repeated. He had what was described as a low grade fever without signs of infection, fluctuating between 37 and 38 degrees Centigrade and normal (37 degrees) since April 27. His neurologic exam included, at various times during his hospitalization, what was recorded and reported as: vertigo, variably sustained horizontal nystagmus, decreased lower extremity reflexes, cogwheel rigidity, and blurring of optic discs.

Diagnostic and laboratory tests included an erythrocyte cholinesterase level of 275 (their normal range is 283-320); EEG with sharp waves in the occipital region stimulated by hyperventilation; a head CT scan reported as showing atrophy of the cortex of the frontal lobe, particularly the medial side, and mild hydrocephalus; and an EMG reported to show signs of axonal degeneration.

When interviewed by the PHR team, the patient was asymptomatic. By exam, he was composed and alert, with normal neurological reflexes and normal vital signs. His skin was clear. His left optic disc was slightly blurred along the nasal border according to two different PHR examiners.

Case Number Two: Second Clinical Hospital

33 year-old female allegedly beaten by soldiers during the April 9 demonstration and sprayed in the face by a hand-held cannister. Noticed a bitter smell and taste and then lost consciousness. Admitted to a hospital where she received treatment (name of

hospital and type of treatment unknown). Left that hospital and admitted herself to the Second Clinical on April 26. Complained of persistent nausea, vomiting after meals, and midepigastric abdominal pain. Reported a weight loss of 14 kg (from 58 kg to 44 kg) in the last six weeks since the event. On UGI marked pylorospasm was noted with no passage of contrast material into the duodenum after 5 hours. A trial of an atropinic-like drug two weeks prior had resulted in reflux and vomiting within one half hour of administering the drug. On May 17, the day before her interview with the PHR team, a second UGI had demonstrated partial passage of contrast material, although on a 24-hour delayed film there was still contrast in the stomach.

The patient's previous history included an operation six years prior for ulcer (oversewing of the duodenum), after which she gained 16 kg and held her weight until the events of April 9. There was no history suggestive of underlying anorexia or bulemia. In addition to her gastrointestinal symptoms, the patient reported black spots on a vesicular base that had developed on her face, legs and back at time of first admission. During her stay at the other hospital she had also experienced temperature spikes to 38.8 degrees Centigrade.

At the time of the PHR interview, the patient had normal vital signs and said she was feeling better but still could eat only a little bit at a time.

Case Number Three: Adult Hospital of the Republic

22 year-old female who said that she inhaled a sample of the toxic gas on April 20 at the laboratory where she worked and developed symptoms of headache, stomach ache, nausea. She also reported being exposed to toxic fumes when she helped to move the flowers on April 29. Presented to the hospital and was admitted on that day. Was 16 weeks pregnant (G3P1, one previous miscarriage) and discussion ensued about management of this pregnancy in view of her history of exposures. The consultant from Moscow advised abortion; the ICRC said as long as the baby was moving as it had before there was no need to abort. Ultrasound was normal for gestational age. The patient decided the baby's movements were different and had ended the pregnancy one week prior to the PHR interview.

The patient described feeling weak, very hot, with burning of her eyes and easy tearing. She said she could not see very well and could not concentrate to read. She asked the PHR team whether it had been the right decision to abort the baby and whether she had suffered any internal and/or genetic damage that would affect her ability to conceive and bear a normal child in the future.

Case Number Four: Adult Hospital of the Republic

23 year-old female participating in the hunger strike leading up to April 9 had been beaten by soldiers that morning when the demonstration was broken up. She reported running into the square with some kind of powder on her head and shoulders that had settled from the air. When she touched her hand to her mouth she noticed

that the powder at first tasted bitter, then sweet, and left a burning feeling in her throat. Four days later she went to the Second Clinical Hospital because she was not feeling well. After several days there as an inpatient, she left and was admitted to the Adult Hospital of the Republic. She reported that there were too many patients in the other hospital and too much hysteria. For three days after her admission to the Adult Hospital she felt fine and then the next day noticed a burning in her eyes and drooping of her R eyelid with blurring of vision. She also reported a generalized feeling of weakness and difficulty standing on her legs.

On exam, she had normal vital signs and an evident conjunctivitis of her R eye with mild swelling of the conjunctiva and periorbital tissues. After the PHR team suggested this diagnosis, the physicians accompanying the team said that the opthamology consult had also come to that conclusion.

Case Number Five:

23 year-old female injured during the demonstration on April 9, who described the soldiers as carrying shovels and something in their hands. She reported being exposed to "smoke" from capsules lying on the ground and being sprayed in the face with a burning liquid by a soldier holding a spray cannisteer. She also said she was hit on the head twice as she ran from the Government Plaza, and thinks the second blow left her unconscious. She cannot recall how she arrived at the hospital. Although she felt pain in her nose, abdomen, and eyes, she refused hospital admission that morning. At home, she continued to experience symptoms: severe headaches, eye pain with tearing, nausea and vomiting after nearly every meal, difficulty sleeping, and terrible nightmares. She returned to the hospital on April 22 and was admitted. Medical findings included vertebral tenderness and a slightly enlarged liver (by 1.5 cm.), with normal liver chemistries.

On psychiatric interview, the patient said she had improved since her admission but not enough to go home. She was still, she said, in "a condition of shock." She added, "I've seen things I've never seen in my life before which are very difficult to describe now, things that should never happen." She described her most prominent ongoing problem as sleep disturbance, explaining that when she closed her eyes, "all I see is night and blood." "Every night" she expects she "will always see night and blood."

Case Number Six: Adult Hospital of the Republic

A 23 year-old woman nurse smelled a sharp smell on April 28 as she passed the Government Plaza when workmen were sweeping the area. When she passed the same place on April 29, she felt a dryness in her throat, her nose began to run, her eyes burned, her legs felt weak, and she felt nauseated. The following day she felt a "terrible itching" and the night was interrupted by "terrible vomiting." Nonetheless, she worked all week and on May 6 was brought to the hospital because she developed "sudden heart problems, then dizziness, then fainting." She was later told that she had had "a seizure."

At the time of the psychiatric interview, the patient had been hospitalized for 13 days. She noted that since this initial episode of fainting she had fainted several times a day, unable to move but able to hear and be aware that "something is happening." During these episodes, events occur "as if from a distance." She related a "great wish to jump out the window" that lasted for five minutes and came upon her three days prior to the interview. She called it "a very pleasant desire." In the past two days she expressed wanting to "crash or break something." She added that many people around her were having these same symptoms and stated, "We have suicidal feelings when we feel bad." When asked if she hears voices, she replied that she hears an excruciatingly loud voice when she is lying in bed that says, "You are ill!" She complained of difficulty falling asleep and nightmares, as well as tremendous hate for people she usually loves. She admitted, "Even my mother, I hate."

NOTES

1. World Health Organization, Health Aspects of Chemical and Biological Weapons, (Geneva, 1970).

2. The Boston Globe, Center for Democracy in the USSR Glasnost and press updates, The Christian Science Monitor, Congress of Peoples Deputies' Stenographic Record of Proceedings (June 22, 1989, pp. 48-53, June 30, 1989, pp. 2-15), Human Rights Watch Updates, The International Herald Tribune, International Red Cross Newsletter, Izvestia, The Los Angeles Times, Reuters News Service, Moscow News, The New York Times, News from Helsinki Watch, Samshlobo (Soviet Georgia), Soviet American Review, Tass, USSR News Brief-Human Rights (Munich), The Washington Post.

3. Alexander Amerisov, "The Georgian Massacre," Soviet American Review (April 1989) and Eduard Gudava, Information Brief on the Nationalist Movement in Georgia (New York: Center for Democracy in the USSR, April 1989).

4. Gudava, Information Brief.

5. Helsinki Watch News Update (May 1989), 11.

6. Robin Lodge, Reuters News Service, 24 April 1989, 4. (Obtained through Lexis, Mead Data Central).

7. Cronid Lubarsky, "Events in Georgia," USSR News Brief--Human Rights 7/8 (1989), 4. Amerisov lists the date as April 9, 1989.

8. Hospital officials were the source for this date. However, the Georgian newspaper, Samshlobo cites the date as April 11, 1989.

9. Two videotapes of the demonstration and the action of the Soviet troops on April 9 were made available to the PHR team. The first was a film edited by Eldar Shengalaya, a well-known Georgian filmmaker, who had spliced together several videotapes taken by amateurs who that night were standing at street-level, with the crowd, on Rustaveli street. The PHR team saw this video in Mr. Shengalaya's house on the night of May 17. The second videotape was said to have been taken during the early morning of April 9, apparently from a second or third floor room overlooking Government Plaza. It was shown to the PHR team on an unofficial basis and the source of this videotape could not be established.

10. Case finding for medical record review posed significant difficulties, since the only entry to the records was through the hospital admission log (in Georgian). It was not possible in the time frame of the PHR mission to undertake a systematic review of the records of the scores to hundreds of patients hospitalized at each of the major hospitals during the

previous six weeks to identify those hospitalized with symptoms relating to the April 9 or April 28 events. Relying on the names recalled by some of the treating physicians, it might have been possible, had the events involving the children not intervened, to have scanned the hospital admission logs and retrieved the charts of this ad hoc subset of patients who had received the protocol described here.

11. This patient told an elaborate and unconvincing story about an encounter with soldiers who exposed her to a gas grenade in a park near her home (several miles from Government Plaza) on the afternoon of April 10.

12. American Psychiatric Association, The Diagnosis and Statistical Manual of Mental Disorders, DSM-III-R, 3rd edition, revised (Washington, D.C.: APA, 1987), 247-251.

13. Dissociative phenomena and conversion symptoms can be components of post-traumatic stress disorder but are also seen distinct from PTSD.

14. DSM-III-R, 248.

15. DSM-III-R, 269.

16. DSM-III-R, 257.

17. A. Freedman, H. Kaplan, B. Sadock, eds. Modern Synopsis of Comprehensive Textbook of Psychiatry/II (Baltimore: Williams and Wilkins, 1976), 614.

18. Peter Conradi, "Events in Georgia Show Limits of Soviet Media Glasnost," Reuters News Service, 24 April, 1989, 3. (Obtained through Lexis, Mead Data Central)

19. Michael Parks, "Toxic Gas Reportedly Used by Soviet Troops in Georgia." The Los Angeles Times. 20 April 1989, 1.

20. Lubarsky, p. 6.

21. Bill Keller, "Soviets Identify a 2nd Gas Used in Georgia Strife." The New York Times, 6 May 1989, 1, 4. Personal communication from Dr. Sakharov. See also statement to Congress of Peoples Deputies by Gamkrelidze, T.V., reported in Stenographic Record of Proceedings, 30 June 1989, 3. The Soviet military is reported to have acknowledged the use of both CN and CS in breaking up the demonstration on April 9. See interview with Major General of Justice, V. Vasilyev, Deputy Chief Military Prosecutor, by N. Belan, Sovetskaya Rossiya, 13 December 1989, 4.

22. H. Hu, J. Fine, P. Epstein, K. Kelsey, P. Reynolds, and B. Walker, "Tear Gas--Harassing Agent or Toxic Chemical Weapon?", JAMA 262 (1989): 660-663.

23. B. L. Danto, "Medical Problems and Criteria Regarding the Use of Tear Gas by Police," Am J Forensic Med Pathol 8 (1987): 317-22. See also Hu, 1989.

24. B. Ballantyne, S. Callaway, "Inhalation Toxicology and Pathology of Animals Exposed to o-chlorobenzylidene malonnonitrile (CS)," Med Sci Law 12 (1972): 43-65. A. J. Chapman, C. White, "Case Report: Death Resulting from Lacrimatory Agents," J Forensic Sci 23 (1978): 527-530. M. J. Rieder, "Lacrimators," Clinical Toxicology Review, 9, no. 10 (1987): 1-4

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26. Beeswick, Human Toxicology 2 (1983): 254-56.

27. See note #10.

28. M. Bass, "Sudden Sniffing Death," JAMA 212 (1970): 2075-79. J. Garriott, C. S. Petty, "Death from Inhalant Abuse: Toxicological and Pathological Evaluation of 34 Cases," Clinical Toxicology 16 (1980): 305-15. C. F. Reinhardt, A. Azar, M. E. Maxfield, P. E. Smith, L. S. Mullin, "Cardiac Arrhythmias and Aerosol 'Sniffing'", Arch Environ Health 22 (1971): 265-79.

29. P. K. Forberg, W. L. Byers, "Chemical Mace: A Non-Lethal Weapon," J of Trauma 9 (1969): 339-42.

30. K. C. Fine, R. H. Bassin, M. M. Stewart, "Emergency Care for Tear Gas Victims" JACEP 6 (1977): 144-46. J. L. Pinkus, "CR - A New Irritant Agent," Letter, NEJM 299 (1978): 901-2.

31. Department of the Army Technical Manual, Military Chemistry and Chemical Agents, TM 3-215 (Washington, D.C.: Department of the Army, December, 1963) 35.

32. Department of the Army, Army Field Manual, FM 3-9 (Washington, D.C.: Department of the Army, October, 1975).

33. In an interview Major General V. Vasilyev stated "Nor do the claims that the troops allegedly used chloropicrin correspond with reality. Neither the Soviet Army nor the MVD internal troops have products containing chloropicrin designed for such purposes." See note 21.

34. K. Gonmori, H. Muto, T. Yamamoto, K. Takahashi, "A Case of Homicidal Intoxication by Chloropicrin," Am J Forensic Medicine and Pathology 8 (1987): 135-38.

35. Department of the Army, Technical Manual (Washington, DC: Dept. of the Army, 1963) 35.

36. The Soviet military have stated that the cause of death for 18 of the victims was "mechanical asphyxiation as a result of crushed rib cages (two died in the hospital after 9 April), and one person, a man, died from serious craniocerebral injuries sustained from a blow with a hard, blunt instrument while he was attacking a serviceman, using karate." See note 21, interview with Major General V. Vasilyev.

37. G. Tesla, M. Kaiser, L. Biederman et al, "Chloropicrin Toxicity Involving Animal and Human Exposure," Vet Hum Toxicol 28 (1986): 323-324.

38. Freedman, et al., 617.

39. DSM-III-R, 258, 259.

40. DSM-III-R, 249.

41. Freedman, et al., 617.

42. R. Rothy, C. Aron, "Epidemic hysteria," J Emergency Med 1987: 38-41.

43. Freedman, et al., 616.

44. G. W. Small, A. M. Nicholi, Jr., "Mass Hysteria Among School Children: Early Loss as a Predisposing Factor," Arch Gen Psychiatry 39 (1982): 721-724.

45. B. S. Selden, "Adolescent Epidemic Hysteria Presenting as a Mass Casualty, Toxic Exposure Incident," Ann Em Med V 18 (1989): 892-95.

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