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Managing Severe Gas Mask Anxiety With a Cognitive–Behavioral Approach: An Illustrative Case Study and Treatment Protocol

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Gas mask–related anxiety can compromise job performance and threaten safety for military, police, and rescue personnel who may need to rely on a gas mask for protection. However, no intervention protocols have been published that specifically address gas mask–related anxiety. Multiple factors may contribute to gas mask anxiety, including physical sensations, cognitive and emotional reactions, behaviors, conditioning, and situational demands. Cognitive–behavioral interventions that address these variables can effectively decrease anxiety in a relatively brief time by using well-established anxiety treatment methods. This article presents a suggested intervention protocol and describes a successful case example.

Events over the past decade have demonstrated the threat of chemical and biological agents to both the civilian and military populations (e.g., the Persian Gulf War, the Tokyo subway Sarin attack). In the event of a terrorist or wartime attack with these weapons, personnel serving in the military, law enforcement community, rescue teams, and many other public service areas will require protective equipment to allow them to function in a contaminated or potentially contaminated environment. These professions constitute a large number of people who need to be capable of performing their jobs with the added burden of chemical protective clothing and
gas masks. The U.S. military forces alone make up 1.4 million active-duty personnel and 600,000 reservists, most of whom could be sent at any time into combat environments where chemical–biological protective equipment is needed.

Given the importance of protective technology in responding to chemical or biological threats, it is alarming to consider that effective functioning could be difficult for a large number of these people while wearing protective clothing and a gas mask. A review of the literature by Fullerton and Ursano (1990) revealed that 10% to 20% of military participants in chemical–biological warfare training exercises experienced moderate to severe psychological symptomatology, and 4% to 20% displayed behavioral or psychological responses that disrupted performance or increased safety risk. Carter and Cammermeyer (1985) reported that 69% of 100 military medics in a 2-hr exercise reported claustrophobia, anxiety, and tremors. Fourteen percent of these participants actually removed their protective clothing, which could have resulted in fatality in the event of a real attack. Brooks, Xenakis, Ebner, and Balston (1983) reported that 20% of 70 medics in a 1-hr drill displayed adverse reactions (hyperventilation and tremors). These last two studies involved medical personnel who may have less training and experience with protective clothing and gas masks than many other military career fields, which may indicate that individuals with less experience using protective suits and masks are at greater risk for compromising the chemical protective uniform. These studies (Brooks et al., 1983; Carter & Cammermeyer, 1985) also suggest that gas masks in particular can trigger hyperventilation and anxiety. In fact, Fullerton and Ursano’s reanalysis of three studies conducted during chemical–biological warfare exercises indicates that shortness of breath and rapid breathing were the most common symptoms experienced by participants.

The problems with extreme physical and emotional distress while wearing gas masks date back to the first use of gas masks in the early 20th century. In World War I, during which gas was used extensively, significant casualties were attributed to poor gas mask discipline. Contemporary accounts indicate that masks were removed prematurely due to physical discomfort, shame, and “gas hysteria” (Ritchie, 1992a).

Many individuals with significant anxiety problems related to chemical protective equipment are likely to be self-selected out or dismissed during initial job training (e.g., basic military training). Nevertheless, the previously cited studies indicate that people do continue to serve in the military services or other relevant professions while struggling with significant gas mask anxiety symptoms. The case study presented here is an example of one such individual that suggests that special training in managing these symptoms could help promote mission effectiveness and save careers.

Discomfort and mild anxiety while wearing a gas mask are common, and efforts should be made by leadership and training planners to prevent severe problems from developing (Ritchie, 1992a). Stress inoculation techniques can be
implemented in routine training by educating at-risk populations (i.e., military members, police, rescue teams, etc.) about the normal physical and emotional symptoms to expect when wearing a gas mask. Frequent wear of the gas mask is also essential for habituating personnel to the experience of functioning with the mask on. Stokes and Banderet (1997) suggested that military members wear gas masks daily for 1 hr while performing daily duties and recommended that personnel undertake structured recreational activities (e.g., cards, volleyball) while wearing the mask. These approaches can help with the normal, mild anxiety experienced by most people when wearing a gas mask as well as by those with more severe symptoms.

Focused training by a clinical specialist (e.g., a behavioral psychologist) may be required, however, for individuals who continue to experience gas mask anxiety severe enough to interfere with satisfactory job performance, who pose a safety risk to others because of their anxiety reactions, or who cannot tolerate leaving the mask on. Standard systematic desensitization procedures (Wolpe, 1990), which have been well established with other anxiety problems, can be applied successfully to gas mask anxiety. My personal experiences, as well as several published letters to the editors of a military medical journal (Deakins, 1993; Sandman, 1992; Took, 1992) suggest that these approaches are used by clinicians working with military, police, and other relevant populations. A recent review of the psychological literature, however, found only one article addressing interventions for gas mask anxiety in a clinical setting (Ritchie, 1992b) and none outlining a treatment protocol. The need for this type of protocol was discussed at a recent symposium of U.S. Air Force mental health professionals (Moe, 1998), specifically for the training of new military clinicians. This article is intended to fill that gap in the literature.

THEORETICAL CONCEPTUALIZATION

Individuals respond in unique ways to the stimulus of a gas mask, especially during training exercises when there is often no perceived risk of injury or death from breathing without the mask. The syndrome of anxiety or panic leading to removal of the gas mask, however, generally can be understood as an interaction of physical, cognitive, emotional, behavioral, and situational variables. Individual assessment and intervention planning should include each of these areas.

Physical Factors

The mechanism of a gas mask involves the wearer drawing air through a filter that, by design, restricts both inhalation and exhalation. Analysis shows that the M40 chemical–biological mask with a standard C₂ filter reduces maximal voluntary ven-
tiliation by 20% (Muza, Banderet, & Forte, 1996). The perception of limited airflow can naturally trigger an alarm reaction that, in turn, activates the sympathetic response of the autonomic nervous system (Everly, 1989). Breathing rate normally will increase, with breaths becoming shallower in the body’s attempt to obtain more oxygen. Furthermore, in a stressful situation such as this, the body prepares for action by increasing oxygen and decreasing carbon dioxide. Concurrent with these changes in respiration, heart rate increases, adrenaline is secreted, and muscles tighten as the body prepares to fight a perceived threat to life. This fight-or-flight response is, of course, a natural physiological reaction. It is uncomfortable and alarming for the individual, however, and can contribute to distressing cognitions about what is happening.

Cognitive and Emotional Factors

Whereas in actual combat environments, a person’s thoughts might be oriented toward the threats of the potential chemical agent, many training environments only simulate these environmental dangers. The perception of threat is therefore more likely to be focused on the sensation of inadequate airflow or difficulty catching one’s breath. Interpretations of the fight-or-flight response may be that something is terribly wrong (“I’m suffocating”) or that something bad is going to happen (“I’m going pass out or die”). A person may conclude he or she does not have the ability to tolerate the symptoms (“I can’t stand this”) or that unreasonable demands are being made (“I shouldn’t have to put up with this nonsense”). These cognitions can fuel feelings of fear or anger and are likely to maintain or exacerbate the physiological arousal. If a person convinces himself or herself that these beliefs are true, it becomes reasonable—in that person’s mind—to remove the mask or break the seal to allow more air in. Further complicating the scenario might be self-deprecating thoughts (“I’m a failure as a soldier”) or mind reading (“My peers would reject me if they knew how I feel”), which can lead to feelings of guilt and despair.

Behavioral Factors

A number of overt behaviors may contribute to a person removing a mask when experiencing an anxiety reaction. One important behavior may be whether the individual goes to a place where the mask can be removed without others observing or stays around peers and leaders where the social pressure to continue to wear the mask and opportunities for observing positive modeling are greater. In addition, discontinuing tasks that may help distract the person from the symptoms may increase cognitive focus on the anxiety, distress, and desire to remove
the mask. Operant conditioning is probably a significant factor in perpetuating escape responses across situations as well. Taking the mask off during an episode of anxiety (removing an unpleasant stimulus) represents a potentially strong negative reinforcer that may increase the likelihood of a person removing the mask in future aversive situations.

Situational Factors

The initial warning of a simulated gas attack can come at unexpected times, and the personnel in training must hold their breath, close their eyes, put on the gas mask, and dive for cover within seconds. The rapid activity and the environmental chaos make for a stressful environment even without the added stress of restricted breathing. In addition, limited field of vision due to the mask or to fogging on the transparent face shield decreases situational awareness and further contributes to stress. The “macho” culture still present with both sexes in the military and disaster response professions also can exacerbate anxiety if a person believes he or she should never feel vulnerable, frightened, or weak.

INTERVENTION PROTOCOL

The intervention protocol described here is based on well-established procedures for anxiety-related problems (Barlow, 1988; Wolpe, 1990) and is designed to teach individuals to manage adaptive reflexes and behaviors for military operations. The procedures, however, should be individually tailored to meet the needs of each individual based on a thorough assessment of the factors previously discussed. Duration will depend on the individual person and the complexity of the problem, but successful results often can be obtained in 6 to 10 sessions.

The intervention involves specialized training in self-regulation conducted in four phases (see Table 1). Phase 1 primarily focuses on education. Early sessions should include information about the human fear response, emphasizing that it is a normal and adaptive response to the perception of inadequate airflow. Anxiety symptoms can be reframed as a sign that the body’s “alert system” is fully functioning—the problem is only that the symptoms are occurring unnecessarily and at an inopportune time. Participants also should be informed that relaxation skills can be learned to improve their control of these symptoms.

Relaxation training begins with Phase 2. Teaching both a deep relaxation exercise, such as progressive muscle relaxation (PMR), and a briefer form of relaxation, such as diaphragmatic breathing, will provide the individual with the necessary tools for progressing in treatment (instructions for these techniques are readily available—see Blanchard & Andrasik, 1985; Everly, 1989; McGuigan,
PMR can bring about a deeper level of relaxation that allows the person to experience the sensations of thorough relaxation. Diaphragmatic breathing, on the other hand, is a quicker exercise that is more versatile for use during the exposure trials and when individuals are involved in field exercises using the gas mask. Some people are more skilled at relaxation initially than others. Care should be taken not to move into the next phase of training before the individual feels confident in his or her ability to relax by using these techniques.

Phase 3 involves systematic exposure to progressively more feared stimuli by using standard systematic desensitization techniques (for a more extended explanation of this procedure, see Wolpe, 1990). A hierarchy must be established, in collaboration with the participant, of stimuli that provoke varied levels of anxiety, from mild to severe. A 100-point subjective units of distress scale (SUDS) is used to rate items by asking the person, “On a 1- to 100-point scale, how much distress do you think you would feel when exposed to this item?” In accord with the recommendations of Wolpe, items should be selected that are approximately 10 SUDS units apart. The following case example illustrates the hierarchy selected by one individual. With gas mask phobia, stimulus items generally will involve progressively more restricted breathing (e.g., progressively narrow breathing tubes such as a snorkel, soda straw, gas mask) or progressively restricted visual field (costume mask, dive mask, gas mask). These items can also be endured for progressively longer duration and with differing ease of removal (e.g., holding the mask on with hands vs. using the straps).

The participant is then systematically exposed to the items on the hierarchy, starting with the least feared item. Following the exposure period, the person

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Phases of Gas Mask Anxiety Self-Regulation Training</th>
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<tbody>
<tr>
<td>1. Education</td>
<td></td>
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<tr>
<td>Normality of symptoms</td>
<td></td>
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<tr>
<td>Physiology of fear and anxiety</td>
<td></td>
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<tr>
<td>Effects of controlled breathing</td>
<td></td>
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<tr>
<td>2. Relaxation training</td>
<td></td>
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<tr>
<td>Diaphragmatic breathing</td>
<td></td>
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<tr>
<td>Progressive muscle relaxation</td>
<td></td>
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<tr>
<td>3. Exposure</td>
<td></td>
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<tr>
<td>Creation of hierarchy</td>
<td></td>
</tr>
<tr>
<td>Systematic exposure</td>
<td></td>
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<tr>
<td>4. Generalization</td>
<td></td>
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<tr>
<td>Home practice with sedentary activities</td>
<td></td>
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<tr>
<td>Home practice with moderate-intensity activities</td>
<td></td>
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<tr>
<td>Simulation of training activities</td>
<td></td>
</tr>
<tr>
<td>Home practice with high-intensity activities</td>
<td></td>
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<tr>
<td>Participation in a training exercise</td>
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</tbody>
</table>
will provide a SUDS rating (0–100). Exposure to the item will be repeated until the SUDS rating is sufficiently low that it does not trouble the individual (usually less than 10). If the SUDS rating does not diminish with exposure, the stimuli should be considered too anxiety provoking, and a lesser item should be found. The individual then will be exposed to the next item on the hierarchy, which if properly constructed, will be at a lower SUDS rating than it was initially. This procedure continues through all items on the hierarchy until the individual is able to wear the gas mask fully strapped on for an extended period of time in the training room.

When the participant is able to tolerate all items on the hierarchy with SUDS ratings below 10, it is important to generalize the effects to environments outside the training room. This final component of training, Phase 4, begins by instructing the individual to wear the gas mask daily for 30 min while doing sedentary activity (e.g., watching television). A specific time and place for this (usually in the privacy of the individual’s home) should be determined to increase compliance. Self-monitoring of exposure times, activities, and ratings of anxiety is important as well as monitoring of compliance and progress. When this is achieved, the level of activity can be increased systematically (e.g., doing housework, walking up stairs) until the individual is able to do moderate aerobic activity while wearing the mask. Aerobic activity will simulate the heavy breathing and heart pounding of autonomic arousal, proving to the individual his or her efficacy at tolerating these physical symptoms. Coaching from the trainer and practice in reassuring self-talk (“These are normal physical functions—they do not mean something is wrong” or “I’m uncomfortable but I can tolerate this”) may be useful to the individual in this step.

The final test of success will come only when the participant has an opportunity to wear the gas mask in a training exercise or actual deployment. For individuals who do not have frequent opportunity to wear a gas mask in their jobs, it may be important for them to continue regular exposure to maintain their confidence.

CASE EXAMPLE

Lieutenant Colonel S. was a 42-year-old married hospital officer with 19 years active-duty military service. He was informally referred to the mental health clinic by a physician friend due to anxiety reactions that were interfering with his ability to work while wearing his gas mask during military training exercises. He had always felt uncomfortable with the gas mask because of sensations that he was not getting enough oxygen. In the past, he had generally lifted the mask from his face, when no one was observing him, to reduce his discomfort. He had never been in a “real world” situation requiring use of a gas mask and had never been too concerned about the problem. He sought assistance at this time, however, because he was ex-
pecting to be in a leadership position during an upcoming training exercise and was anticipating that he would be more in the limelight. He predicted, therefore, he would have less opportunity to secretly remove his mask.

Evaluation consisted of a standard mental health assessment focusing on a functional analysis of his problem. He revealed no other history of anxiety problems or any other psychological symptoms, and he was functioning adequately in his job, social life, and family roles. He denied a history of prior mental health problems, did not have current medical problems, and was not taking medication of any type.

Session 1

Lieutenant Colonel S. was educated about the physiological stress response (increased heart rate, rapid shallow breathing, muscle tension, increased adrenaline, and hyperawareness to physical symptoms), and it was presented as a normal response to the perception of limited air flow (a “threat”). The education component was kept brief due to the participant’s training in the medical field. He was taught a diaphragmatic breathing exercise as a technique for controlling the stress response and was encouraged to practice this form of relaxation daily.

Session 2

PMR was introduced and practiced in session as a means increasing depth of relaxation. Lieutenant Colonel S. was instructed to practice PMR once daily.

Session 3

A hierarchy of feared stimuli was created by using a 100-point SUDS rating and is presented in Table 2. The session concluded with continued coaching in diaphragmatic breathing. Lieutenant Colonel S. rated himself at 0 on the SUDS after relaxation.

Session 4

The participant brought in a snorkel, dive mask, and gas mask with a detachable hood and was guided through a diaphragmatic breathing exercise for 5 min. Once relaxed, he was asked to give a SUDS rating, which he reported as 0. Systematic desensitization exposure trials then began. The initial exposure trial involved him
breathing through the snorkel for 60 sec. He reported a SUDS rating of 25. He was instructed to relax again and within 20 sec was able to reach a SUDS rating of 0. The exposure trial was repeated twice more (with relaxation in between), at which time he reported minimal anxiety while using the snorkel, with a rating of 5. Imagery of wearing a gas mask was added to the exposure, but he reported no increase in SUDS rating. The dive mask was therefore added, which increased his SUDS rating to 30. After two exposures of 10 sec, he reported a SUDS rating of 10.

Sessions 5 to 6

After starting each session with a brief relaxation exercise, Lieutenant Colonel S. was systematically exposed to the hierarchy items, starting with the least anxiety-provoking item and staying with one stimuli for as many times as was needed for a SUDS rating of 10 or below. In these two sessions, he was able to work through the entire hierarchy. A maximum of four exposures were required per item. After completion of the exposure trials, he was encouraged to begin generalizing his ability to wear the gas mask by keeping it on for 30 min per day while doing sedentary activities.

Session 7

He reported having no anxiety reactions while wearing the gas mask around the house and had, in fact, done a variety of moderate-intensity housework tasks (vacuuming, washing dishes) while wearing the mask. He was instructed to continue working on generalization by wearing the mask while doing aerobic exercise (he had a stationary bicycle at home) for 30 min per day.

TABLE 2
Gas Mask Exposure Hierarchy With Subjective Units of Distress Scale (SUDS) Ratings

<table>
<thead>
<tr>
<th>Feared Stimuli</th>
<th>SUDS Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearing gas mask with hood on for 60 sec</td>
<td>90</td>
</tr>
<tr>
<td>Wearing gas mask without hood for 60 sec</td>
<td>80</td>
</tr>
<tr>
<td>Holding gas mask to face without straps for 60 sec</td>
<td>70</td>
</tr>
<tr>
<td>Holding gas mask to face without straps for 10 sec</td>
<td>60</td>
</tr>
<tr>
<td>Wearing dive mask and breathing through snorkel for 60 sec</td>
<td>50</td>
</tr>
<tr>
<td>Wearing dive mask and breathing through snorkel for 10 sec</td>
<td>40</td>
</tr>
<tr>
<td>Breathing through snorkel—imagery of wearing gas mask for 60 sec</td>
<td>30</td>
</tr>
<tr>
<td>Breathing through snorkel without mask for 60 sec</td>
<td>20</td>
</tr>
</tbody>
</table>
Session 8

Lieutenant Colonel S. reported mild discomfort in wearing the mask while exercising but did not feel the urge to remove it, at which time the intervention was considered complete. Because the military field exercise was still 1 month away, he was encouraged to continue wearing the mask several times per week for at least 30 min to maintain progress.

Follow-Up

Lieutenant Colonel S. contacted the provider 2 months after the self-regulation training was completed to state that the field exercise had gone well and he had experienced no significant gas mask–related anxiety.

SUMMARY AND CONCLUSIONS

Severe gas mask anxiety is a problem for some military and disaster response personnel that can compromise personal protection and job performance. The problem can be addressed, however, by using well-established cognitive–behavioral techniques both as part of routine training and as a clinical intervention.

Obstacles may need to be addressed, such as hesitancy to admit anxiety reactions, fear of negative impact on one’s career, and stigma in receiving mental health services. Mental health providers working in military, police, and emergency services settings can make headway in these concerns, however, by normalizing anxiety symptoms, skillfully marketing the effectiveness of behavioral interventions, and taking services into the workplace and reframing them as “specialized training” (as opposed to “therapy”).

Another significant obstacle is the intensity and duration of the intervention. Although the eight sessions used in the case study would be considered “short-term” in the realm of psychotherapeutic interventions, this intervention may not be brief enough once a threat of chemical attack is imminent. People whose occupations require them to train using gas masks are more likely to have the extent of their anxiety surface before the occurrence of a real threat. People who rarely, if ever, wear the mask, however, might only recognize the extent of the problem when an actual threat arises. This would certainly be the case when gas masks need to be worn by civilians, as with Israel in 1991 (Golan, Arad, Atsmon, Shemer, & Nehama, 1992). Family members of the military or diplomatic personnel also might be vulnerable groups. More rapid interventions might include connecting an active air supply system to the gas mask for certain medically at-risk individuals (Golan et al., 1992), flooding procedures (i.e., extended wear of the gas mask until anxiety subsides), or mass relax-
ation training sessions for learning self-regulation conducted in auditoriums or via television. It is still likely that the more severe or refractory cases will require individualized interventions as previously described.

Although gas mask anxiety is being treated clinically in some settings (e.g., the military), the literature in this area is not well developed. Opportunities for research in this area include controlled studies evaluating the long-term effectiveness of cognitive–behavioral interventions with gas mask problems and the effectiveness of brief interventions targeting groups or populations. Furthermore, work is needed in developing and evaluating innovative approaches to treating gas mask anxiety in the workplace and field exercise setting where military members and disaster response personnel may be more open to receiving interventions.

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Mark S. Oordt is now at Brooks Air Force Base, San Antonio, TX.

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