Violent Storms and Violent People

How Meteorology Can Inform Risk Communication in Mental Health Law

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Meteorology is often thought of as a field with highly developed techniques for forecasting rare and severe events. Risk assessment of another type of rare and severe event—violence to others—occurs in mental health law. The analogy between these two forms of risk assessment is explored in this article. How meteorologists go about assessing the risk of harmful weather is described. Implications from the meteorological analogy are drawn for one aspect of violence prediction that is routinely ignored in mental health law: the communication of risk "forecasts."

Never was waves nor wind more violent.

—Shakespeare, *Pericles*

In its landmark report, *Improving Risk Communication* (1989), the National Research Council's Committee on Risk Perception and Communication pointed out weather forecasters as exemplary risk assessors: "When they predict a 70 percent chance of rain, there is measurable precipitation just about 70 percent of the time" (p. 46). The Committee listed five reasons why weather forecasters are so good at what they do:

1. Frequent practice: Weather forecasters "make numerous forecasts of the same kind" (p. 46).
2. Base-rate information: "Extensive statistical data are available on the average probability of the events they are estimating" (p. 46).
3. Actuarial support: Weather forecasters "receive computer-generated predictions for specific periods prior to making their forecasts" (p. 46).
4. Availability of feedback: "A readily verifiable criterion event allows for quick and unambiguous knowledge of results" (p. 46).
5. Educational programs. The weather forecasting profession "admits its imprecision and the need for training" (pp. 46–47).

At first glance, these meteorological assessments of the risk of harmful weather may seem to bear only semantic similarity to psychological and psychiatric assessments of the risk of harmful behavior—assessments that play a pivotal role in mental health law (Monahan & Shah, 1989). Yet there are indications that the conditions identified by the National Research Council as underlying the success of meteorologists as risk assessors of weather are coming to characterize, to an increasing degree, the task of mental health professionals in assessing risk of violence:

1. Frequent practice: Violent patients now make up a large and growing portion of the caseload of the public mental health system (Appelbaum, 1988). One recent study of three acute-care mental hospitals reported that 37% of all admissions had been physically violent within the two months prior to hospitalization (Steadman et al., 1994).
2. Base-rate information: Statistical information on the base rates of violence among given types of civil patients (Lidz, Mulvey, & Gardner, 1993) and forensic patients (Webster, Harris, Rice, Cormier, & Quinsey, 1994) has become available for the first time.
3. Actuarial support: Actuarial data to anchor clinical risk assessments have been reported both for inpatient violence (McNiel & Binder, 1994) and for violence in the open community (Harris, Rice, & Quinsey, 1993).
4. Availability of feedback: With drastically shortened lengths of hospital stays and the rise of outpatient commitment (Swartz et al., 1995) and other forms of supervised community treatment (Dennis & Monahan, 1996), the occurrence of violence in the community is much better documented than in the past.
5. Educational programs: Both training materials (Appelbaum & Gutheil, 1991; Monahan, 1993) and training programs in the risk assessment of violence are readily available throughout the mental health professions.

In this article, we propose that risk assessment in mental health law can learn some important things from risk assessment in meteorology. Thinking of violence prediction as analogous to weather prediction has a num-

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ber of heuristic implications for mental health law. For example, the temporal specificity of weather forecasts suggests the need for shorter term and more frequently updated risk assessments of violence. And the contextual specificity of weather forecasts, which are limited to a given forecast area, suggests the importance of context in behavioral prediction. The implication we wish to draw out here, however, does not have to do with the formation of risk assessments themselves, but with how risk forecasts, once arrived at, are communicated to those who need to know them (see Murphy & Daan, 1985; Murphy & Winkler, 1987, 1992).

We first pursue the analogy between meteorology and mental health law in greater depth. We then describe how meteorologists go about assessing the risk of harmful weather. Finally, implications from meteorology are drawn for one aspect of violence prediction that is routinely ignored in mental health law: the communication of risk "forecasts."

The Meteorological Analogy

The first meaning *Merriam-Webster's Dictionary* (1977) gives for the term *analogy* is an "inference that if two or more things agree with one another in some respects, they will probably agree in others" (p. 41). But do violence and the weather "agree" with one another in any meaningful respect? Contrasting violence and the weather—pointing out ways in which the two "disagree" at the concrete level—certainly takes little imagination. Substantively, violence is a human activity that is subject to poorly known laws of psychology, sociology, and biology (Reiss & Roth, 1993). Weather is an atmospheric or oceanographic activity that is subject to better known laws of physical science (Ahrens, 1991). Humans who commit harm are moral agents, and notions of intent, blame, responsibility, excuse, and justification are invoked to describe them. Even storms that cause great devastation (e.g., "killer hurricanes") do not respond to moral censure or legal deterrence. Recall the parody: "A law was made a distant moon ago here. July and August cannot be too hot. And there's a legal limit to the snow here, in Camelot" (Lerner, 1962, pp. 32–33).

But a moment's reflection reveals that the "agreements" at the conceptual level between how meteorologists and how psychologists and psychiatrists actually assess risk are also striking and relevant. In both domains of risk assessment:

(a) Someone credentialed as a professional
(b) assesses risk factors derived from past experience or from theories and
(c) processes these risk factors with the aid of explicit or implicit prediction models.
(d) The professional then constructs a likelihood estimate (or "forecast") of the event of interest occurring, and, finally,
(e) the professional issues a risk communication containing this forecast to various audiences of relevant decision makers.

Why do these five parallels make us think that learning something about meteorology will be useful to researchers, and ultimately to practitioners, in mental health law? There are several reasons.

First, the prediction of weather events[1] provides a simplified and, therefore, clarifying model for the prediction of violent events (Faigman, 1989, p. 1047). Because weather events lack moral agency, they can serve to illustrate the technology of risk assessment in its purest and most schematized form. The fact that principles of thermodynamics and fluid mechanics are so much better understood than principles of sociology, psychology, and biology means that weather prediction can serve as an ideal case illustration of what risk assessment in mental health law would look like if we really knew what we were doing (Monahan & Steadman, 1994). Predicting the weather is easy compared with predicting violence, and taking easy examples is a good way to start thinking through a difficult topic.

Second, meteorologists have an enormous amount of experience with the generic concepts and techniques of risk assessment. Although there may be an increasing concern with violence in the practice of psychology and psychiatry, the experience of most mental health professionals with forecasting violence (except for those employed in forensic facilities) is not acquired on a daily basis. However, with weather events being forecast throughout the day—or throughout the hour—every day by meteorologists, a vast store of experience in forecasting weather events has been accumulated. It would be surprising indeed if some of the concepts and techniques that meteorologists have found useful in managing their risk assessment tasks would not be portable to less experienced uses of risk assessment in other areas—one of these areas being mental health law.

Finally, risk assessment in meteorology is much better understood and accepted by policymakers and the general public than risk assessment in mental health law. To the extent that some of the concepts taken for granted in meteorology would be usefully applied to mental health law, drawing the analogy between risk assessment of violence and the risk assessment of the weather may be a powerful device for communicating with decision makers (e.g., judges and hospital staff) and the general public (Chess, Salomone, Hance, & Saville, 1995).

Meteorology: Concepts and Procedures

Meteorology is "the study of the atmosphere and its phenomena" (Ahrens, 1991, p. 13). Much of meteorology is

[1] It may be useful to distinguish *weather*—the "condition of the atmosphere at any particular time and place" (Ahrens, 1991, p. 564)—from *climate*. *Climate* is "average weather," or "the accumulation of daily and seasonal weather events over a long period of time" (Ahrens, 1991, p. 12). For example, the weather in Seattle today may be sunny, but the climate of Seattle at given times of year is rainy. Climate therefore may be thought of as the meteorological "personality" or set of relatively enduring meteorological "traits" of a given area, in distinction to more specific and behavioral weather "events," such as rain or snow in the area on a certain date.

concerned with understanding ordinary, day-to-day weather events, such as rain, wind, and clouds. Another subdiscipline of the field, and the one of most direct relevance here, is concerned with estimating the risk of certain hazards, such as tornadoes, hurricanes, and heavy rains, that pose a threat to life or property. Murphy (1991) referred to these hazards as "rare and severe [weather] events" (RSEs; p. 302). To assist in assessing these risks, governmental agencies around the world routinely collect information on variables (e.g., barometric pressure, wind speeds, and cloud formation) that are known to be predictors of one or another of these hazards. This information is analyzed by regression-based computer programs that incorporate models of the association between patterns of these predictors and the occurrence of given hazards in the past. These programs yield *objective predictions* (sometimes called *statistical* or *numerical predictions)* of various weather events. These objective predictions are given at regular periods to meteorologists in local areas. These meteorologists then modify the objective predictions in light of predictors that they believe were not adequately accounted for in the computer model, or in response to new information that has become available since the objective prediction was formulated. A *subjective prediction* is then publicly issued, and this risk message is referred to as the *forecast.*

Three aspects of forecasts are of central importance: The forecast is issued only for a specified valid period of time; the forecast is issued only for a specified forecast area; and the forecast always mentions, in addition to specifying the nature of the hazard in question (e.g., tornado, etc.), the degree of certainty about the occurrence of the hazard. Sometimes this uncertainty is expressed in probabilistic terms, such as a 40% chance of precipitation, and sometimes it is expressed in categorical terms, as in hurricane "watches" and "warnings" (see below). In whatever manner it is expressed, the forecast then becomes information that a wide variety of users can take into account, depending on how a particular user balances the monetary and nonmonetary costs of precautionary measures and the losses that would ensue if the event occurred—often referred to as the user's *cost–loss function.* One important category of users is *emergency managers,* officials responsible for taking public precautions such as evacuating the population of an area in response to a large-scale hazard (e.g., a hurricane). These officials have formalized their cost–loss function into critical action thresholds for given precautions (see, in general, Mileti & Fitzpatrick, 1991, 1992). For example, when the forecast includes a hurricane warning, there are standard policies that automatically trigger a series of steps to minimize the exposure of the affected population to harm.

The system that provides the comprehensive data from which all forecasts are generated is operated, in the United States, by the National Weather Service (NWS), a division of the National Oceanic and Atmospheric Administration within the Department of Commerce. Worldwide, over 10,000 land-based stations and hundreds of ships collect weather information daily at six-hour intervals. In addition, many satellites, radiosondes (weather balloons), aircraft, and trained volunteers ("spotters") make observations throughout the day (Ahrens, 1991). The gathering of information from all these sources is coordinated by the World Meteorological Organization, a United Nations agency. The information is sent to one of several World Meteorological Centers. For the United States, the information is analyzed at the National Meteorological Center in Camp Springs, Maryland, and then sent electronically to one of 53 regional Weather Service Forecast offices. These offices prepare regional forecasts. These regional forecasts are made more specific at 249 Weather Service offices, which adapt the regional forecasts to local conditions. These local NWS forecasts are communicated to the general public by being read verbatim by many radio and television announcers (or printed in newspapers). Other radio and television stations hire their own meteorologists to make "private" forecasts (such as "Accuweather"), but even these forecasts are based on NWS data and analyses. As described by Murphy and Brown (1984, p. 371),

> Weather forecasters in the U.S. are charged with the responsibility of preparing the official forecasts disseminated to the general public and specific users. In formulating these forecasts, the forecasters aggregate information from many different sources, including the output of numerical and statistical models as well as observational data. The aggregation process and the process of determining the form and content of the official forecasts varies greatly from forecaster to forecaster and from occasion to occasion for each forecaster.

The Meteorological Analogy and Mental Health Law: Risk Communication

Before 1965, the NWS issued risk messages for common weather events, such as precipitation, in dichotomous terms (sometimes called *deterministic predictions*—for example, "It will/will not rain today." On occasion, those deterministic predictions were qualitatively hedged, as in "it is likely/not likely to rain today." Beginning in 1965, however, the NWS began issuing risk messages for common weather events in probabilistic terms—for example, "There is a 40% chance of rain today." Surveys indicated that although there was some resistance among users to the introduction of probabilistic precipitation forecasting, the general public not only quickly adapted to it, but soon came to prefer probabilistic prediction—by a ratio of two or three to one (Murphy, 1991)—to the deterministic or qualitatively hedged statements that had previously been the staple of the NWS.

For weather events more rare and more severe than precipitation (i.e., thunderstorms, tornadoes, hurricanes, high winds, flash floods, heavy snow, and winter storms), however, the NWS has, since the 1950s, provided risk estimates in categorical form (Wernley, personal communication, May 1994). The NWS did not abandon the use of categorical risk messages for severe weather events

in 1965, when it switched to probabilistic prediction for more common events such as rain. Although the categories that are used vary somewhat from one type of severe weather event to another (e.g., *advisories* are issued when inconvenient, but not life-threatening, weather events are anticipated; *small craft cautionary statements* are given when there is a risk of a tropical cyclone), in general, three categories are still used by the NWS to describe the risk of a severe weather event.

Category 1: *No message.* From the absence of any NWS risk message, one can infer that the Service does not assess risk for the weather event in question to be appreciably above base rate.

Category 2: *Watches.* This category indicates a significantly higher than base-rate likelihood of a life-threatening weather event occurring in a given area. A NWS risk message headed *hurricane watch,* for example, is "an announcement that hurricane conditions pose a possible threat to a specified coastal area within 36 hours" (National Weather Service, 1993a, p. 33).

Category 3: *Warnings.* This category represents the highest likelihood of a life-threatening weather event. A NWS risk message headed *flash flood warning,* for example, "means that a flash flood has been reported or is imminent" (National Weather Service, 1991, p. 4). A hurricane warning is issued "when hurricane conditions are expected in a specified coastal area in 24 hours or less" (National Weather Service, 1991, p. 4).

Some warnings are conditional. In the case of tornado warnings, for example, the relevant NWS publication (1993b) states that "if a tornado warning is issued for your area and the sky becomes threatening, move to your pre-designated place of safety" (p. 6). Presumably, if a tornado warning is issued but the sky does not become threatening, no action is indicated (see Mulvey & Lidz, 1995, on "conditional" violence prediction).

The NWS categorical messages for severe weather events do more than communicate information about risk levels. Each category integrates a *descriptive statement* of current risk (i.e., a forecast) with two kinds of *prescriptive statements,* one about the need for additional information and another about risk management strategies. A *watch* message, in addition to informing the public that an intermediate risk of a negative weather event is present, is accompanied by a recommendation that people carefully monitor the situation and prepare for action. For example, NWS publications exhort the reader: "When a flash flood watch is issued, be alert to flash flooding and be ready to evacuate on a moment's notice" (p. 4). More prescriptive advice is given in hurricane watches, including "frequently monitor radio . . . for official bulletins of the storm's progress," "fuel and service family vehicles," "check food and water supplies," and "stock up on extra batteries" (p. 34). Likewise, a *warning* message, in addition to informing users that a high risk of a serious weather event is present, is joined with a recommendation for immediate action to prevent harm. For example, when it issues a flash flood warning, the NWS advises people to "act quickly to save yourself. You may have only seconds! Go to higher ground" (National Weather Service, 1992, p. 10). For hurricane warnings, people are told to "stay home, if sturdy and on high ground . . . Stay indoors on the downwind side of house away from windows. Leave mobile homes" (National Weather Service, 1991, p. 4).

The use of categorical risk messages by the NWS is by no means generally accepted in the meteorological community. Some leading meteorologists have argued cogently that categorical risk messages necessarily convey less information about risk than probabilistic risk messages, because they are less precise and because it is unclear what cut-off scores separate each of the categories. In addition, the values of the decision maker are unknown to the forecaster and may well vary across decision makers (Alexandridis & Krzysztofowicz, 1985). In other words, all of the criticisms made about dichotomous risk messages ("it will rain," "it will not rain") also apply to multilevel risk messages (e.g., *no message, watch,* and *warning).* As Alan Murphy (1991, p. 304) stated, in terms as applicable to violence forecasting as to weather forecasting, when categorical risk messages are offered, "Uncertainty is ignored and, in effect, the forecaster 'becomes' the decision maker, a role for which he/she generally is not well-equipped."

Why does the NWS choose to offer probabilistic risk messages for common weather events (e.g., precipitation) and categorical risk messages for rare ones (e.g., tornadoes)? The answer appears to lie in the NWS's skepticism about the competence of users—particularly the general public—to optimally process information about low-probability events (Hughes, 1980). For example, 72 hours before landfall, the maximum probability of hurricane conditions at any given coastal location does not exceed .10 (Baker, 1984b). It can be argued—with much support from psychological research (e.g., Slovic, 1987)—that people will either overvalue or undervalue such relatively small probabilities, with potentially catastrophic consequences for their decision making.

Little research exists to help resolve this choice between probabilistic and categorical risk messages. Baker (1984a), in one of the few studies in this area, investigated people's stated intentions to evacuate their homes in response to various risk messages. He compared official risk management statements (no statement, official advice to evacuate, and official order to evacuate) with and without probability-of-hurricane statements appended. He found that stated intention to evacuate was strongly influenced by the categorical risk statement and less affected by the probability figures. People used probabilities primarily in a comparative or ordinal sense: If the probability of a hurricane hitting their area was appreciably higher than the probability of a hurricane hitting adjacent areas, people would tend to evacuate. If the probability of the hurricane hitting their area was appreciably lower than it hitting adjacent areas, they would tend not to evacuate. These results were independent of what the absolute values of the probabilities were.

Among many others, we have long recommended that mental health professionals communicate risk assessments of violence in probabilistic terms (Monahan & Wexler, 1978; Steadman, 1987). We believe that as predictions become more valid, they will become more likely to be expressed as probabilities. Our own ongoing research assumes probabilistic risk communication as one of its primary goals (Steadman et al., 1994, p. 297). But the meteorological analogy forces us to rethink this long-held and taken-for-granted assumption and to ask the following question: Is communicating a risk estimate of a rare and severe behavioral event such as violence sufficiently analogous to communicating a risk estimate of a rare and severe weather event such as a tornado that categorical rather than probabilistic risk messages should be preferred in mental health law, as they are in weather prediction?[2]

As with categorical risk communication in meteorology, there is no research that would directly answer this question. What would categorical risk messages in mental health law look like? Three things about categorical risk communication should be kept in mind. First, there is no necessity that the categorical communication format be segmented into three levels (although the strategy must have at least three levels or we are back to dichotomous statements of *dangerous* or *not dangerous*), and there is certainly no necessity that the category labels be the same as those used by the NWS (*no message, watch,* and *warning*). Indeed, it has been recently suggested that the NWS itself change both the number of risk categories and the labels applied to them. The NWS is considering a move to a four-category format in light of highly favorable experience using a four-category approach on the children's television workshop program, *Sesame Street* (with the category labels being *no message, Ready, Set,* and *Go!*; Wernley, personal communication, May 1994).

Second, a risk communication strategy that integrated descriptive risk estimates with prescriptive statements about (a) the need for additional information gathering and (b) recommended risk management strategies would have to be carefully tailored to the specific clinical or legal context in which the relevant decision makers ("users") are likely to be found (Maibach & Holtgrave, 1995). A probability of violence that would qualify for the highest risk category in a civil hospital may be determined not to qualify for the highest risk category in a forensic hospital. Just as the NWS prescriptions for additional information gathering and for risk management activities differ for hurricanes and for tornadoes, there could be no "generic," context-independent risk messages for violence. Information gathering and risk management activities appropriate in an outpatient setting may be different than those appropriate in a hospital. Decisions to be made by clinicians, for example, the decision to issue an escorted or an unescorted grounds pass, present different issues than decisions to be made by judges (e.g., the decision to involuntarily commit a person as *dangerous to others*). Each type of decision has its own "critical threshold for action" (Wernly, 1994, p. 17), and the categories by which risk is communicated must be relevant to these thresholds.

Third, there is no reason why categorical and probabilistic formats could not be combined in a single risk message (see Wallsten, Budescu, Zwick, & Kemp, 1993). The use of multiple risk formats might aid comprehension. One could issue a categorical risk message and add "this means that the patient is believed to have an X likelihood of being violent over Y period of time" (or, better, "of being violent to the following people," or "under the following conditions"). Alternatively, a categorical risk message could be joined with a frequentist, rather than a probabilist, statement (Gigerenzer, 1994), as in "this means that of every X patients with this person's salient characteristics and in this context, Y have been found to be violent over Z period of time."

With these points in mind[3], consider the following hypothetical illustration of categorical risk messages:

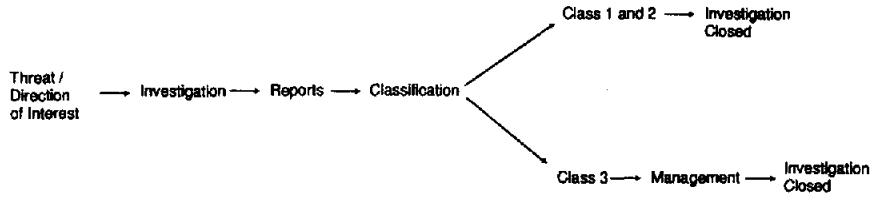
Category 1: *Low violence risk.* Few risk factors are present. No further inquiry into violence risk or special preventive actions are indicated (e.g., a 60–year-old depressed man with no violence history and no threats of violence).

Category 2: *Moderate violence risk.* Several risk factors are present. Gather additional information and monitor the individual more closely than usual (e.g., a 25–year-old woman who is abusing alcohol, with a history of assault, but without a recent violent act or threat).

[2] There may be two additional reasons to question whether clinical risk estimates of violence are best expressed in probabilistic form. First, much anecdotal evidence suggests that clinicians, unlike meteorologists, are distinctly uncomfortable in generating risk assessments in the form of explicit probabilities, not just in communicating risk assessments in probabilistic form. Given the substantively modest (though statistically significant) validity of clinical predictions of violence over a six-month period that the best recent research has revealed (Lidz et al., 1993), clinicians may find it both pretentious and potentially misleading to produce risk assessments along a 100–point probability scale. Second, a recent study (Slovic & Monahan, 1995) suggests that this discomfort may be warranted. Experienced forensic clinicians were shown vignettes describing mental patients and were asked to judge the probability that the patient would harm someone. Judged probability was strongly dependent on the form of the response scale the clinicians were given, suggesting that probability was not represented consistently and quantitatively in the clinicians' minds. For example, one response scale for expressing the probability of harm went from 0% to 100% in 10% increments. Another response scale went from "less than 1 chance in 1,000" to "greater than 40%." Clinicians' judgments about the probability of violence were much higher using the first response scale than using the second (see, in general, Fischhoff, 1994, 1995; Teigen and Brun, 1995; Tversky & Kochler, 1994).

[3] The political issue of who decides the number of risk categories and the category labels and the prescriptions for information-gathering and risk management that accompany each category must also be confronted. In light of legitimate concerns such as those of Murphy (1991) that categorical risk assessment conflates scientific questions (i.e., probability estimates) with questions of social values (i.e., the choice of cut-off scores distinguishing categories), we believe that it is essential that the ultimate users of risk communications about violence (e.g., judges and other policymakers) be centrally involved from the beginning in developing any categorical risk communication scheme.

Figure 1
Secret Service Case Classification System



Category 3: *High violence risk.* A number of key risk factors are present. Give priority to gathering additional information and close patient monitoring. Make preparations for preventive action should the situation deteriorate (e.g., a 30-year-old woman who is using illegal drugs, with a history of assault, and with vague recent threats).

Category 4: *Very high violence risk.* Many key risk factors are present. Enough information is available to make a decision. Take preventive action now (e.g., intensive case management or treatment, voluntary or involuntary hospitalization, and warning the potential victim; e.g., a 35-year-old man who is using illegal drugs, is noncompliant with psychotropic medication, has a history of recent serious violence, is threatening his wife, and has just bought a gun).

An excellent example of how categorical risk communications can work in practice is provided by the United States Secret Service (USSS; Steadman, 1991). As part of its protective intelligence mission, the USSS is responsible for investigating and assessing threats and inappropriate behavior against their *protectees* (i.e., persons whom the Service is authorized to protect). What the USSS has developed is a risk assessment and risk management system that relies on a wide variety of factors, many of which are quantified. However, for the purpose of decision making about risk management, the individual cases are put into one of three categories, with no attempts at further refinement.

In 1987, the USSS implemented a three-tiered Case Classification System (CCS) to structure both the conduct of its investigations and the reports of these investigations. The intent of the system was to match investigative resources and staff to the seriousness and complexity of the case (i.e., the subject or subjects being investigated) and to provide a format whereby investigative agents have significant input in terms of assigning a proper priority to cases being investigated.

The new system resulted in all investigations being categorized as Class 1, Class 2, or Class 3 on the basis of how comprehensive an investigation was needed and the estimated level of threat posed to protectees of the USSS by the subject. The level of threat was determined by the findings of the investigating case agent, with input from agents in the Intelligence Division at USSS headquarters.

Persons categorized as *Class 1* are those for whom initial investigation clearly demonstrates that they present no danger to persons under USSS protection. Persons in *Class 2* also do not appear to present a danger to USSS protectees, but this determination is made only after a more extensive investigation than occurred for Class 1 cases. *Class 3* cases are those that are determined to present a significant danger to persons under USSS protection.

The CCS process begins with a reported threat or an identified "direction of interest" (e.g., a person who is reported to have excessive and inappropriate interest in a protectee or in assassinations of public figures). The sequence is shown in Figure 1.

Class 1 and Class 2 investigations terminate with the case being closed because there is insufficient risk to protectees to warrant case management (i.e., periodic checks with persons incarcerated or hospitalized, interviews with persons who are unconfined, or other appropriate monitoring). Class 3 cases are evaluated as posing sufficient risk to protectees that continuing case management is required until a person no longer is deemed to present serious concern. To maintain Class 3 status for cases that no longer warrant that high level of management wastes resources that could better be used for new investigations or for managing other Class 3 cases. Every additional incident that brings a previously classified person back to USSS attention results in a case being reopened and a new investigation being conducted.

A second example of categorical risk communication, this one tailored to violence among patients in maximum security forensic facilities, has recently been reported by Webster et al. (1994). To communicate empirically derived estimates of risk, these clinician-researchers partitioned their sample into nine categories that were based on the participants' likelihoods of violence. The authors provided an illustration of how risk is communicated to decision makers by including a report written on a "Mr. Moore." The concluding paragraph in the report reads as follows:

> Based on his score on a risk appraisal instrument constructed from the variables discussed above, Mr. Moore's category for risk of violent recidivism is the *third highest* of nine categories. Among mentally disordered offenders in the studies described above, less than *nine percent* obtained *higher* scores and approximately *fifty-five percent* in that category reoffended violently within an average of seven years after release. (p. 80)

Note that the report combines categorical risk communication ("third highest of nine categories") with statements of both absolute ("fifty-five percent") and relative likelihood ("less than nine percent obtained higher scores").

Finally, it is worth recalling in regard to communicating risk of violence to others that categorical risk communication has for many years been standard operating procedure when violence to self has been at issue. As stated by Maris, Berman, and Maltsberger (1992, p. 662):

> Almost every hospital has a policy and procedural manual in which various types of actual or probable self-destructive behaviors are linked to two or three levels of precautions. Suicide watches vary from 24-hour, (i.e., "constant") within-arms'-reach, one-to-one supervision (for acute suicide probability, often based on a prior explicit suicide attempt) to 15-, 30-, or 60-minute logged observations.

Conclusion

Even people intrigued by the meteorological analogy in mental health law often mention one objection to pursuing its implications in areas such as risk communication: Despite the conceptual agreements between what meteorologists and what psychologists and psychiatrists do in assessing risk, the state of the art of risk assessment in meteorology is so much more advanced than the state of the art of risk assessment in psychology and psychiatry that the analogy lacks force. This would be an important objection, if it were true.

As amazing as it may seem, however, the superiority of meteorologists over psychologists and psychiatrists as risk assessors is more apparent than real in all but very short-term predictions. The National Research Council (1989) was accurate in stating, "When they [meteorologists] predict a 70 percent chance of rain, there is measurable precipitation just about 70 percent of the time" (p. 46). What was not said, however, is that this impressive degree of predictive validity can be achieved only when the lead time is 12–24 hours (see, e.g., Murphy & Winkler, 1992). The accuracy of weather forecasts "falls off rapidly" (Ahrens, 1991, p. 382) when they are made more than three days in advance (Ahrens, 1991, p. 382) and "tends to be swamped by chaos beyond six days or so" (Kerr, 1994, p. 1940). It was not until January of 1995, for example, that the NWS even attempted to forecast rain more than 90 days in advance, and these new long-lead climate outlooks are limited to a simple four-level categorical statement: *above median precipitation, below median precipitation, normal precipitation,* and *insufficient skill to make a valid estimate of precipitation.* Courts have held psychologists and psychiatrists liable for inaccurately assessing risk of violence when the violence in question did not transpire until many months after the clinician had made the prediction (Monahan, 1993). It is not clear that meteorologists can do any better in making long-lead predictions of the weather than clinicians can in making long-lead predictions of violence.

Ultimately, the goal of a warning system in mental health law is the same as the goal of a warning system in meteorology: "to maximize the number of people who take appropriate and timely actions for the safety of life and property. All warning systems start with detection of the event and end with getting out of harm's way" (Wernly, 1994, p. 12). Both the production of risk estimates and the construction of risk communications demand careful, creative research. Until now, much attention has been paid to producing valid risk estimates, but none to constructing effective risk communications. What Murphy (1993, p. 286) observed about weather forecasts, however, is equally applicable to forecasts of violence: "Forecasts possess no intrinsic value. They acquire value through their ability to influence the decisions made by users of the forecasts." Understanding how best to communicate assessments of risk is as important to mental health law as improving the validity of those assessments themselves.

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