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Air Turbulence Liability

Frank D. Cimino

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AIR TURBULENCE LIABILITY

FRANK D. CIMINO*

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I. INTRODUCTION

AIR TURBULENCE, in its various forms, has been providing
air travelers with a bumpy ride since the early days of aviation. Over this time, turbulence has caused many injuries and
some fatalities. Standard negligence analysis has ruled this area
for a long time.¹ In air turbulence litigation, pilots' actions are
scrutinized for the appropriate standard of care and liability attac
taches accordingly.² Generally, courts refuse to allow plaintiffs

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¹ See Annotation, Liability of Carrier By Air for Injury or Death of Passenger Due to
² See id.
to use the doctrine of res ipsa loquitur in turbulence cases and, likewise, do not consider strict liability appropriate either.\footnote{See Kohler v. Aspen Airways, Inc., 214 Cal. Rptr. 720, 725 (Cal. Ct. App. 1985).} Considering the advancement in detection technology, the acceptance of air travel as part of everyday life in today's society, the imbalance in access to information and knowledge in this area, and the number of turbulence-related accidents, these legal theories deserve serious consideration. Additionally, considering the unique technology issues and knowledge associated with aviation litigation in general, other potentially attractive approaches deserve investigation. These include, for example, a requirement of mandatory expert testimony before a finding of negligence, or implementation of a preflight weather-briefing version of the doctrine of informed consent, both analogous to medical malpractice and argued briefly in several cases.

Turbulence comes in various forms, each presenting a different set of factual and legal problems. The type of turbulence involved in a particular case should play a significant role in determining the type of legal analysis to be employed. For instance, res ipsa loquitur or even strict liability may be the appropriate doctrines to invoke in many weather-related or wake turbulence incidents, but may not yet be appropriate for most clear air turbulence cases. Therefore, comprehending the differences among the common types of turbulence encountered by air carriers may be of critical importance in understanding how to resolve a particular case.

In addition to the airline's liability for pilot actions or omissions, issues involving liability and indemnification of air traffic controllers (ATCs) will be discussed. ATCs play an important role once an aircraft has entered into their coverage area, especially in instrument flight rule (IFR) conditions. For the purposes of determining liability, an ATC's actions are particularly important in cases involving wake turbulence. This comment will explore the traditional negligence analysis in this context, causation problems including access to information and knowledge, and the "pilot in command" concept.

With respect to encounters with turbulence in international flights, the applicability and impact of the Warsaw Convention will also be considered briefly. The Convention may have an effect on potential liability and bring about variations from state tort law normally applicable to this area.
Finally, various airline and government defenses such as contributory negligence and assumption of risk will be considered. Specific areas of interest include the application of these defenses in connection with the "preflight-weather briefing informed consent" scenario and in situations where passengers fail to fasten their seat belts or otherwise fail to take the necessary precautions under the circumstances.

II. BACKGROUND

Air turbulence has caused many injuries and some fatalities over the years. In fact, Federal Aviation Administration (FAA) statistics reveal that in the United States approximately fifty-eight airline passengers are injured every year by air turbulence while not wearing their seat belts. During the period from 1981 through December 1997, there were 342 reports of turbulence affecting major air carriers resulting in three fatalities, eighty serious injuries, and 769 minor injuries. The same report reveals that turbulence is the leading cause of injuries to airline passengers and flight attendants in non-fatal accidents. Although these numbers are substantial, there are indications that the numbers, in reality, are significantly higher. Regardless, the numbers were high enough to spur the FAA to sponsor a national public awareness campaign, "Turbulence Happens," designed to educate airline passengers in ways to avoid injuries caused by turbulence. Additionally, a joint industry and government consulting group consisting of the FAA, McDonnell Douglas, and the Air Transport Association (ATA) is distributing a manual and video tape program titled "Turbulence Education and Training Aid" to assist flight crews and controllers in predicting and handling turbulent weather conditions in an ef-

5 See id.
6 See id.
7 See Dateline: Things That Go Bump in Flight (NBC news broadcast 1998) (reporting that the NBC news program Dateline contacted various aviation experts who believe that the number of injuries is easily 10 times that reported by the FAA); see also Turbulence Data Show Importance of Using Seat Belts, AIR SAFETY WK., July 7, 1997, at 7 (stating that the number of injuries reported in the FAA's data base may seriously underestimate the extent of the problem. According to a special report on airline safety in the July/August issue of Consumer's Digest, more than 7,600 people were injured in turbulence-related incidents last year.).
fort to reduce injuries and aircraft damage caused by severe turbulence.\textsuperscript{9} The following are a few of the more recent incidents that have contributed to this heightened awareness.\textsuperscript{10} In December 1997, a United Airlines Boeing 747 encountered clear air turbulence en route from Japan to Hawaii.\textsuperscript{11} The airplane first bounced upward, pushing passengers into their seats with a force of nearly two Gs and then, after hitting a downdraft, threw passengers from their seats with some hitting the ceiling and overhead luggage compartments.\textsuperscript{12} This jolt killed one passenger and injured seventy-four others, as well as nine flight attendants.\textsuperscript{13} In March 1998, six people were injured when a Delta Airlines Boeing 757 flying from Los Angeles to Tampa hit a pocket of turbulence while flying through severe thunderstorms.\textsuperscript{14} On December 5, 1996, an American Airlines jetliner encountered clear air turbulence over Colorado injuring sixteen people.\textsuperscript{15} Over a one-week period in June 1995, there were forty passengers injured on three flights.\textsuperscript{16} Encounters with this phenomenon are neither new nor diminishing with improved detection technology, but rather these encounters arguably appear to be increasing.\textsuperscript{17}

Air turbulence is generally defined in various forms. The statistics provided above are based on the FAA’s definition of turbulence as “air movement that normally cannot be seen and


\textsuperscript{10} For an FAA sampling of reported injury-causing turbulence encounters for the period of February 20, 1996, to March 27, 1997, see Turbulence Data Show Importance of Using Seat Belts, AIR SAFETY WK., supra note 7.

\textsuperscript{11} See Mark Hosenball, A Fatal Jolt Over the Pacific, NEWSWEEK, January 12, 1998, at 34.

\textsuperscript{12} See id.

\textsuperscript{13} See id.


\textsuperscript{15} See Mason, supra note 8.

\textsuperscript{16} See Laura Bly, FAA May Tighten Airplane Seat Belt Rules, STAR TRIB., METRO EDITION (Minneapolis, MN), August 20, 1995, at 2G.

\textsuperscript{17} Many incidents have been reported over the last few years causing air travelers to believe that encounters with severe turbulence has significantly increased. However, “[a] spokesman for the National Transportation Safety Board (NTSB) says he does not know if the planes are encountering an unusual level of turbulence lately, or if this is simply a case of the media putting extra focus on this type of transportation hazard.” Jennifer Brill, Air Passengers Wonder if We're Going Through Turbulent Times, (last modified May 28, 1998) <http://www.disasterrelief.org/Disasters/980526turbulence>.
often occurs unexpectedly. It can be created by a number of different conditions, including atmospheric pressures, jet streams, mountain waves, cold or warm fronts, or thunderstorms. Turbulence can occur when the sky appears to be clear.\textsuperscript{18} This definition obviously leaves out all forms of wake turbulence (turbulence caused by other planes), but generally encompasses most other forms of turbulence. Turbulence has also been defined by aviation experts as “random, unpredictable motion that occurs at the boundary between layers of air moving at different speeds.”\textsuperscript{19} In the context of legal analysis it is especially useful to make an attempt to separate turbulence into at least three manageable categories, each corresponding to the manner by which the turbulence is created. The first suggested category is weather-related turbulence, including what has also been termed storm-related turbulence, or convective turbulence; the second category is clear air turbulence; and the third category is wake turbulence or vortex turbulence.

Weather-related turbulence, as its name indicates, is any turbulence related to unsettled weather conditions such as thunderstorms. Storm clouds or heavy rains are generally reliable indicators of the possible presence of this form of turbulence.\textsuperscript{20} Conversely, clear air turbulence is generally more difficult to detect and can be encountered without warning.\textsuperscript{21} Clear air turbulence, again as its name indicates, is very loosely defined as turbulence without clouds.\textsuperscript{22} One area where clear air turbulence can occur is at a boundary of the jet stream.\textsuperscript{23} The jet stream is “a broad ribbon of high-speed air moving from west to east at altitudes of 30,000 to 45,000 feet . . . .”\textsuperscript{24} At the jet stream boundaries, “where it moves over slower air, windshear can generate severe turbulence.”\textsuperscript{25} During the winter months, the jet stream lies at lower altitudes and latitudes causing such turbulence to become more common.\textsuperscript{26} Another place clear air turbulence can be encountered is above or near mountain

\textsuperscript{18} Facts About Turbulence, supra note 4.
\textsuperscript{19} Ron Cowen, Clearing the Air about Turbulence, SCIENCE News, June 27, 1998, at 408.
\textsuperscript{20} See id.
\textsuperscript{21} See Jack Williams, Forecasts that Fly, WEATHERWISE, December, 1994, at 26.
\textsuperscript{22} See id.
\textsuperscript{23} See Cowen, supra note 19.
\textsuperscript{24} Id.
\textsuperscript{25} Id.
\textsuperscript{26} See id.
ranges. 27 "When an air mass slams into a mountain, it's forced upward. This parcel of air, denser than the surrounding air at that altitude, subsequently sinks back down to below its original height. The oscillations generated as the parcel continues to rise and fall create" this form of clear air turbulence. 28 These air disturbances may be found fairly distant from the mountain as it may take a while for a disturbance to settle. 29 The effects of this type of turbulence may be felt at altitudes up to 20,000 feet above a 12,000-foot mountain range. 30 For example, it is noted that wind blowing over the Colorado Rockies may create clear air turbulence high above the plains of Kansas. 31 A similar phenomenon occurs with respect to other substantial surface conditions such as buildings, bridges, and structures of that nature. 32 In addition, clear air turbulence can be triggered when an area of air at a low altitude is heated by the energy released by the sun-warmed ground or by a group of forming clouds. 33 When the heated area of air rises, the wind-flow pattern at higher altitudes is distorted and chaotic motion is generated. 34 The distinction between clear air turbulence and weather-related turbulence is not always clear-cut. 35 The overlap occurs because unsettled weather can create turbulence as far as twenty miles away from the storm regions in areas where clouds may be few in number. 36

Wake turbulence is caused by the movement of airplane wings, forcing air downward under the wings and creating counter-rotating cylindrical vortices off the wing tips. 37 "These

27 See id.
28 Id.
29 See id.
30 See id.
31 See Williams, supra note 21.
32 Turbulence associated with these surface conditions will not likely create enough turbulence to affect large and heavy aircraft but can generate enough to affect smaller air carriers. See Arrow Aviation, Inc. v. Moore and Socony Mobil Co., 266 F.2d 488 (8th Cir. 1959) (recognizing strong wind conditions, together with ground conditions including buildings, hangars, and a railroad track (built on a twenty foot dike, with railroad cars) were considered likely to have caused a small Model 140 Cessna airplane to crash on approach for landing).
33 See Cowen, supra note 19.
34 See id.
35 See id.
36 See id.
'wing tip vortices' are the most predominant parts of aircraft wake turbulence and their rotational force is dependent upon the wingloading, gross weight, and speed of the generating aircraft. The vortices from medium to heavy aircraft can be of extremely high velocity and hazardous to smaller aircraft.\textsuperscript{38}

This form of turbulence can remain in an area for periods ranging from ten to twelve minutes and the paths of these vortices will continue until they strike the ground and are disintegrated.\textsuperscript{39} Large helicopters are also capable of creating wake turbulence significant enough to upset other aircraft.\textsuperscript{40}

The ability of pilots or ground weather personnel to detect the presence of turbulence also varies among the different types of turbulence. Weather-related turbulence can be directly detectable in many instances, and if not directly detectable, is at least foreseeable considering its association with clouds and storm systems. In the case of well-developed storms, ground weather stations and on-board systems are capable of detecting many turbulent conditions. Turbulence within areas of precipitation is detectable with current on-board radar technology.\textsuperscript{41} In addition, pilots are trained to maintain a safe distance of approximately twenty miles from these systems in order to avoid the otherwise undetectable turbulence that can be felt at their boundaries.\textsuperscript{42}

Clear air turbulence, on the other hand, is much more difficult to detect. Currently, knowledge of the various causes of clear air turbulence can be a pilot's only real tool in anticipating a clear air turbulence encounter. This, however, may be changing. Recently, there has been much discussion concerning technological breakthroughs in this area that may put detection technology in commercial airliners within the next five to seven years and some testing in commercial aircraft within three years.\textsuperscript{43} Current radar technology uses radio waves that are only capable of sensing relatively large particles such as rain or snow.\textsuperscript{44} These particles do not exist in clear air turbulence, how-

\textsuperscript{38} FAA, ORDER 7110.65, AIR TRAFFIC CONTROL, PILOT/CONTROLLER GLOSSARY (1999).

\textsuperscript{39} See Yates v. United States, 497 F.2d 878, 881 (10th Cir. 1974).

\textsuperscript{40} See Dyer v. United States, 832 F.2d 1062, 1068 (9th Cir. 1987).


\textsuperscript{43} See Cowen, supra note 19.

\textsuperscript{44} See id.
ever, and, hence, are not detectable with the current technology. One detection strategy researchers have developed is a laser radar system that emits an infrared light in front of the plane. The light is reflected back to its source by tiny dust particles, volcanic ash, and other natural aerosols. If these particles are in turbulence, their motion will change the frequency of the reflected light. This system was tested recently and was able to detect light and moderate turbulence three to four miles ahead of the aircraft. This system needs to be improved to allow enough time after detection to give passengers an opportunity to buckle up and prepare for the ensuing turbulence.

In another effort, meteorologists at the National Center for Atmospheric Research have developed software for installation in commercial airliners. The software uses existing instrumentation to measure wind currents and areas of turbulence and then sends these measurements down to a ground station that synthesizes the information into a picture of the ebb and flow of air currents. This system has already been installed in five United Airlines Boeing 737s and 757s with plans to equip another 200 United Airlines aircraft this year. If successful, the equipment will be installed in about 500 commercial jets from other airlines within two years, providing a very detailed scan of the areas of turbulence over the United States. Implementation of these types of systems could impact the question of airline negligence in failing to avoid turbulence that they would not have otherwise been able to detect.

Wake turbulence is also difficult to directly detect. The vortices created by other aircraft are not visible. Like weather-related turbulence, however, Federal Aviation Regulations (FARs) as well as other material, such as FAA Advisory Circulars, warn pilots of the possible presence of this type of turbulence and detail the procedures to take in order to avoid it. Arguably, this type of turbulence is generally more foreseeable than

45 See id.
46 See id.
47 See id.
48 See id.
49 See id.
50 See Fred Bayles, Panic at 33,000 feet, USA Today, Final Edition, December 30, 1997, at 1A.
51 See id.
52 See id.
53 See id.
54 See In re N-500L Cases, 691 F.2d 15, 28 (1st Cir. 1982).
weather-related turbulence. An ATC should provide ample separation of the aircraft and issue any necessary warnings. A pilot with knowledge of the regulations and procedures should know of the possibility of wake turbulence and be able to take the proper measures to avoid it. These measures may include maneuvering around it or touching down at a location farther down the runway. As with weather-related turbulence, detection is not necessarily critical to the negligence analysis as long as precautions could have been taken to avoid areas where it was known or should have been known that there was a possibility for turbulence to exist.

III. AIRLINE LIABILITY ANALYSIS

A. GENERAL NEGLIGENCE ANALYSIS

Actions for personal injuries caused by an encounter with air turbulence, and based on negligence of an airline's employees, are tort claims governed by state common law and are neither expressly preempted by the Airline Deregulation Act of 1978 (ADA) nor implicitly preempted by the Federal Aviation Act of 1958. With respect to express preemption by the ADA, it has been held that "a state law action for personal injuries sustained as a result of an airline’s alleged negligence" is not related to airline 'rates, routes or services' as required by the ADA.

The traditional requirements for a finding of negligence include: (1) a recognized duty requiring the person to conform to a certain standard of care; (2) a failure of the person to conform to that standard (i.e. a breach of that duty); (3) causation; and (4) actual loss or damage to the interests of another. Airlines are a common carriers of passengers and, accordingly, most courts have attributed to them an elevated duty of care towards their passengers.

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55 See id.; see also Dyer, 832 F.2d at 1069-71; Aviation Weather, supra note 37 at 89.
56 See Dyer, 832 F.2d at 1070; see also Aviation Weather, supra note 37 at 89.
57 See Dyer, 832 F.2d at 1068-71.
59 Id. (citing Butcher v. City of Houston, 813 F. Supp 515, 517-18 (S.D. Tex. 1993) (“[T]he services of an airline . . . necessarily exclude an air carrier’s common law duty to exercise ordinary care.”).
[A]n airline is required to exercise with respect to its passengers the highest degree of care consistent with practical operation of the conveyance . . . . However, a common carrier is not required to guarantee the safety of its passengers against all injuries, but only those which the exercise of the highest degree of care could have averted.61

New York may be the only state apparently refusing to hold common carriers to that elevated standard.62 Although the standard of care applied by most courts is quite high, plaintiffs are often unsuccessful in suing airlines for injuries caused by turbulence because of the difficulty in proving negligence.

_Small v. Transcontinental & Western Air_ is an example of an early case analyzing the potential liability of an airline for injuries caused by an airplane’s encounter with a downdraft.63 The analysis used by the court is typical of that still used by many courts today. The court acknowledged that airplane encounters with downdrafts were not uncommon and that

such a manifestation of nature, like the weather, is commonly referred to as an act of God. So far as the weather is concerned it cannot be denied that airplane operators take every precaution against weather hazards. If it is possible to determine or even suspect that under certain conditions downdrafts are likely or possible, it would appear to be the duty of a prudent operator to take whatever precautions are necessary or available to guard against dangerous consequences.64

In _Small_, the plaintiff was a passenger on a TWA airplane flying from Kansas to Los Angeles.65 While flying over Texas, the plane encountered turbulence and dropped so fast that a flight attendant flew to the ceiling of the plane and most of the passengers were thrown from their seats.66 As a result, the plaintiff was badly injured.67 She argued that, although the flight had become rough, the pilot failed to illuminate the “Fasten Seat
Belts" sign. The defendant did not dispute that the sign was not on, but contended that there was no need for it. The court held that there was ample evidence of the roughness of the flight prior to the accident supporting the verdict that the defendant was negligent. Therefore, although this was a clear air turbulence encounter and not directly detectable, the unstable conditions leading up to the big jolt were such that the pilot should have taken the necessary precautions to warn of the possibility of this type of encounter.

Similarly, in *Cudney v. Braniff Airways*, the court provided that

where science does afford or comes to afford a forewarning of a weather condition attended by the probability or reasonable likelihood of a hazard of dangerous turbulence, it would be too much to say that the airline need not anticipate and take the commensurate precautions reasonably available to guard against the hazard . . . .

In *Cudney*, the plaintiff was a passenger injured when the defendant's DC-3 airplane encountered weather-related turbulence on a flight from Missouri to Nebraska. The air began to get turbulent during the flight. There was some cloud-to-cloud and cloud-to-ground lightning, it began to rain, and several minutes later the plane experienced a sudden and severe downdraft. The "fasten seat belt" sign was on, and the plaintiff testified that she had her seat belt on, but that she was nevertheless thrown upward and across the aisle. The ceiling and the metal rail of the luggage rack were dented, likely by contact with the plaintiff's head and body. The defendant's meteorologist testified that light turbulence had been forecast prior to the flight. In addition, the stated weather conditions forecast cumulus clouds along the route, which generally develop into thunderstorms. The meteorologist testified that where thun-

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68 See id.
69 See Small, 216 P.2d at 37.
70 See id. at 410-11.
71 300 S.W.2d 412 (Mo. 1957).
72 Id. at 417.
73 See id. at 413.
74 See id. at 414.
75 See id. at 414-15.
76 See id. at 415.
77 See id.
78 See Cudney, 300 S.W.2d at 416.
79 See id.
derstorms develop, there are frequently columns of rain present and downdrafts and updrafts could be expected. He further provided that generally, if the pilot can, he ought to avoid flying into such a situation and "if you decide to fly into [a thunderstorm] you're taking a chance as to whether you're—going to run into one of these so-called cells or not." An experienced pilot, as a witness for the plaintiff, testified that "if you have a thunderstorm accompanied by a heavy rainstorm and lightning—to avoid them if possible.' But, 'if they (pilots) do for some reason have to go through it,' it is the custom to slow down." Here, the pilot was warned of the potential thunderstorms, observed cloud-to-cloud lightning, and entered rain a few minutes before the jolt. The pilot testified that there was no reason to slow down because doing so would have made him late and they did not operate that way if they could help it. The court correctly held that the jury was reasonable in finding the defendant negligent for failing to take the necessary precaution of either circumnavigating the storm or diminishing his speed in passing through the area. Especially with weather-related turbulence, even if the turbulence is not directly detectable, the foreseeability of its presence from signs of inclement weather could be enough to render the defendant negligent if he fails to take the necessary precautions dictated by the circumstances at hand. The evidence and testimony, particularly by the defendant's own witnesses, made the decision a relatively easy one for the court in Cudney.

Ness v. West Coast Airlines is an example of a case dealing with a passenger injured on the defendant's airplane from an encounter with what appeared to be clear air turbulence. The "Fasten Seat Belt" signs were not illuminated at the time of the encounter, and the plaintiff's seat belt was loosely fastened. The plaintiff provided evidence showing that: (1) there were cumulo-nimbus clouds earlier in the area south of where they took off, (2) there was a low pressure area along the course of the flight, (3) a cold front was approaching the area, and (4).

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80 See id.
81 Id.
82 Id.
83 See id.
84 See Cudney, 3000 S.W.2d at 416-17.
85 See id. at 418.
87 See id. at 966.
the accident occurred over mountainous terrain. A meteorologist testified that these weather conditions were factors that can contribute to air turbulence. The evidence showed that this information was available to the defendant’s pilot. The lower court’s judgment for the defendant was reversed and remanded. The court held that with respect to proximate cause, “it was sufficient to show that the probability of air turbulence, and the likelihood of injury to passengers therefrom, in the absence of warning thereof, was foreseeable.” Thus, the plaintiff raised sufficient evidence in the case to show that even though they encountered clear air turbulence, which is not directly detectable, the encounter may have been foreseeable given the various indicators available to the pilot.

_Dunbar v. American Airlines, Inc._, is an example of a case where the plaintiff, a passenger on the defendant’s airplane, was injured when the plane encountered turbulence, however, she was not successful in her action against the airline. The pilot testified that he had 25 years of flying experience; that he had checked the weather and there was only one thunderstorm reported; that this thunderstorm was too far south to be on the regular course of the flight plan; that he had flown this particular route many times encountering similar wind conditions; that the conditions looked the same to him with no lightening, no thunder, and no hail; and that all of a sudden the plane “started down at an alarming rate of speed.” The Oklahoma Supreme Court affirmed the judgment of the jury and found no error in not directing a verdict for the plaintiff who claimed that the defendant was negligent in flying “through a dangerous thunderstorm, when they knew, or in the exercise of ordinary care would have known, that the thunderstorm was turbulent, violent, unstable and unsafe for safe passage.” It appeared that the plaintiff simply did not have evidence that could counter the pilot’s testimony regarding whether or not he should have known that turbulence might be encountered.

88 See id. at 967.
89 See id.
90 See id.
91 See id.
92 Id. at 969.
94 Id. at 228.
95 Id. at 227.
Dyer v. United States is an example of a case exploring negligence of a pilot in an encounter with wake turbulence.\textsuperscript{96} A passenger was killed when the Piper Turbo Arrow aircraft in which he was flying crashed at an airport during a landing attempt shortly after a large HH-3 Coast Guard helicopter had landed.\textsuperscript{97} The pilot testified that he saw the helicopter approach the runway, and that he purposely slowed down and extended his approach to avoid the helicopter's wake turbulence.\textsuperscript{98} The court discussed excerpts from FAA Advisory Circulars, FARs, and an Airman's Information Manual, all dealing with the presence and avoidance of wake turbulence.\textsuperscript{99} The court stated that the pilot "had a duty to be, and actually was, familiar with information regarding wake turbulence avoidance" and although he "prolonged his approach . . . those measures were insufficient to prevent the accident."\textsuperscript{100} The "primary duty was on [the pilot] to understand and safely avoid the hazards left by the helicopter's wake. He breached this duty by following too closely . . . ."\textsuperscript{101} Thus, the court affirmed a finding as to the pilot's negligence.\textsuperscript{102} This case is an example of the potential liability of an airline in a wake turbulence encounter even though the turbulence itself is not detectable. In this case, the airport did not have a control tower and, therefore, the court did not reach the common issues regarding liability of ATCs, causation, and indemnification.

**B. ACTS OF NEGLIGENCE IN AIR TURBULENCE INCIDENTS**

There are many ways for an airline to be negligent. A few examples of these negligent acts are prevalent in turbulence cases. One example, as seen in Cudney v. Braniff, is flying into or in the area of a storm.\textsuperscript{103} It is well known that weather-related turbulence, especially turbulence of a severe nature, can be found in the vicinity of storms or other inclement weather. Therefore, if a pilot flies into such an area, that act can constitute negligence in and of itself. As discussed above, a pilot may be negligent even if he does not fly directly into the storm area

\textsuperscript{96}Dyer v. United States, 832 F.2d 1062 (9th Cir. 1987).
\textsuperscript{97}See id. at 1064-65.
\textsuperscript{98}See id. at 1064.
\textsuperscript{99}See id. at 1068-69.
\textsuperscript{100}Id. at 1070.
\textsuperscript{101}Id.
\textsuperscript{102}See Dyer, 832 F.2d at 1071.
\textsuperscript{103}Cudney, 300 S.W.2d at 417-18.
but merely fails to keep a proper distance from the area.\textsuperscript{104} In \textit{McKinney v. Air Venture Corp.}, the plaintiff's wife was killed when the defendant's plane crashed after encountering windshear.\textsuperscript{105} The court found that the pilot flew the plane within fifteen statute miles of the approaching storm.\textsuperscript{106} The court noted that both plaintiff and defense expert witnesses had testified that an area within fifteen to twenty miles of a thunderstorm was a danger area, and evidence revealed that the pilot, at the time of the crash, was well within this range.\textsuperscript{107} The court stated that:

wind shear is one possible part of a severe thunderstorm, just as rain, hail, lightning and turbulence within the cell itself are possibilities.

The fact that a windshear is somewhat more difficult to predict or detect than some of the other phenomena associated with a storm front of this size and intensity should cause a prudent pilot to exercise greater caution. This is especially true in situations like this where, as the evidence indicates, the pilot had access to information all of which indicated that the storm front in question was particularly severe . . .

Because of the possibility of extremely hazardous flight conditions in the vicinity of thunderstorms . . . it has long been the practice of pilots to avoid them. The possibility of the presence of a wind shear is simply one of several reasons to avoid the area close to thunderstorms, especially that area lying directly in the storm's path.\textsuperscript{108}

It is, therefore, apparent that flying into or near inclement weather can amount to negligence. Also, as provided in \textit{Cudney}, failure to slow down when storms or turbulence are encountered can constitute negligence.\textsuperscript{109} Thus, for weather-related turbulence, flying into or near potentially hazardous weather or failing to take necessary precautions once these conditions are encountered are common acts of negligence.

As seen in \textit{Ness v. West Coast Airlines}, the pilot need not have knowledge of the presence of turbulence or inclement weather or even the possibility of its presence, and negligence can still be

\begin{footnotesize}
\begin{enumerate}
\item See \textit{McKinney}, 758 S.W. 2d at 857.
\item Id. at 850 (defining windshear as "the leading edge of cold air outflow from severe thunderstorms").
\item See id. at 859.
\item See id.
\item Id. at 859-60.
\item \textit{Cudney}, 300 S.W.2d. at 416-18.
\end{enumerate}
\end{footnotesize}
found if such weather information was available but the pilot failed to obtain it.\(^{110}\)

Not only can the pilot’s failure to obtain weather reports that could have warned him of possible turbulent weather constitute negligence, but failure of one flight to warn other flights or ground weather stations of these weather conditions can also constitute negligence. In addition, airline negligence can be found in the failure of weather dispatchers to advise flights of these weather conditions. Both acts of negligence occurred in *Stiles v. National Airlines.*\(^{111}\) In that case, plaintiff’s intestates were killed when defendant’s plane, Flight 470, crashed in the Gulf of Mexico after a probable encounter with severe turbulence associated with a storm in the area.\(^{112}\) Another of the defendant’s planes, Flight 917, had preceded Flight 470 by two-and-one-half hours and had encountered worsening weather and severe turbulence.\(^{113}\) Flight 917 made no direct report of this weather to Flight 470 nor did it report at all until two hours after the turbulence had been encountered.\(^{114}\) In addition, the reports that were finally made were never relayed by defendant’s weather dispatchers until Flight 470 asked for weather at a time in which it was already surrounded by severe thunderstorms.\(^{115}\) The court held that, among other things, the crash was proximately caused by the following acts of defendant’s negligence:

[failure of Flight 917 to advise Flight 470, or [defendant’s] Flight-Control office for the benefit of Flight 470, of the severe weather encountered at the time it was encountered, as required by defendant’s own rules and by the Civil Air Regulations; . . . and Flight 917’s failure to make a full report of these turbulent weather conditions at any time before Flight 470 was lost[;]

and failure of defendant’s weather dispatchers to advise Flight 470 on numerous opportunities of the forecast of severe turbulence in the area.\(^{116}\)

The failure of Flight 917 to report the weather phenomena essential to the safety of other flights would now be considered

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\(^{110}\) *Ness,* 410 P.2d at 967-68.


\(^{112}\) *See id.* at 130.

\(^{113}\) *See id.* at 127.

\(^{114}\) *See id.*

\(^{115}\) *See id.* at 127-28.

\(^{116}\) *Id.* at 130-31.
a violation of FAR 121,561 which requires:
(a) Whenever he encounters a meteorological condition or an
irregularity in a ground or navigational facility, in flight, the
knowledge of which he considers essential to the safety of other
flights, the pilot in command shall notify an appropriate ground
station as soon as practicable.\textsuperscript{117}

As Stiles indicates, the violation of a FAR can be used to show
negligence. Airlines operate under the authority of the FARs.\textsuperscript{118}
FARs are always admissible in evidence, if pertinent to the issues
in the case, to establish “impartial and authoritative criteria” for
determining negligence. They are admissible in evidence
against an airline to establish “the proper standard of care
under the circumstances.”\textsuperscript{119} This stems from the principle of
law that violation of a regulation, which is usually interpreted as
fixing a standard of care, is evidence of negligence, and may in
some cases constitute negligence \textit{per se}.\textsuperscript{120} This was also dis-
cussed in \textit{Dyer v. United States}.\textsuperscript{121} In that case, the court also
looked at FAA Advisory Circulars and an Airman’s Information
Manual to establish negligence.\textsuperscript{122} Airlines themselves develop
and use manuals that provide their own rules and standards for
both the operation and maintenance of their aircraft.\textsuperscript{123} These
manuals can also be looked to for establishing a standard of
care, the violation of which may constitute negligence.\textsuperscript{124}

As alluded to above, even if the airline is not negligent in fly-
ing into a particular area, it may be negligent in its failure to
warn passengers of a potential encounter with turbulence. For
example, if a pilot flies directly into a storm or an area where
severe turbulence is likely, that in and of itself would constitute
negligence. Where a pilot flies into an area where turbulence is
only a possibility, such as the outer edges of a storm or in the
vicinity of mountains, flying into those areas may not itself con-
stitute negligence under the circumstances; yet negligence may
be still be founded on a failure to warn passengers of the possi-
bility of a turbulence encounter. \textit{Brittain v. Piedmont} is an exam-

\begin{footnotesize}
\begin{itemize}
\item[117] \textsc{Lee S. Kreindler, Aviation Accident Law} § 2.10[10], at 2-59 (Mathew
Bender, revised 1998).
\item[118] See id. at 2-52.
\item[119] Id. at 2-52 to 2-53.
\item[120] See id. at 2-53.
\item[121] Dyer, 832 F.2d at 1065.
\item[122] See id.
\item[123] See \textsc{Kreindler, supra} note 117, at 2-54.
\item[124] See id.
\end{itemize}
\end{footnotesize}
ple of such a case. The plaintiff was a passenger on the defendant’s plane. The plaintiff was injured when he was thrown to the ceiling of the washroom by a sudden encounter with a severe downdraft. There was some conflict in testimony as to whether the seat belt light was on before the encounter. The defendants knew that air turbulence was very possible in the area they were flying due to the mountains of Western North Carolina. Therefore, if the airline in fact failed to warn the passengers of the possibility of turbulence in this area that would constitute negligence. If the airline did in fact warn the passengers of the possibility of turbulence and did not negligently encounter the turbulence, however, the airline would not be liable.

Even though the passengers are warned that turbulence is possible by means of the “Fasten Seat Belt” sign, an airline may still be liable if a flight attendant permits a passenger to get out of his seat and proceed to the lavatory during turbulent weather. In Urban v. Frontier Air Lines, after the weather had become rough and turbulent, the plaintiff requested permission to go the lavatory. The plaintiff was told by the flight attendant to “wait a little while.” The plaintiff complied and a few minutes later, according to the plaintiff’s testimony, the flight attendant nodded her head telling the plaintiff “I think you can go now.” The plaintiff proceeded to the lavatory and when the plane hit a down draft, she was thrown to the floor and sustained injuries. The court found that the permission provided by the flight attendant constituted negligence that was the proximate cause of the plaintiff’s injuries. The court provided that “a reasonable and prudent person would have known or should have known that rough and turbulent weather would have likely reoccurred before plaintiff returned to her seat.”

126 See id.
127 See id.
128 See id. at 74-75.
129 See id. at 72.
130 See id. at 75-76.
132 Id. at 288.
133 Id.
134 Id.
135 See id.
136 See id. at 290.
137 Urban, 139 F. Supp. at 290.
C. Alternative Approaches to Traditional Negligence Analysis

With the number of turbulence-related injuries seemingly on the rise, the ever increasing pressure on airlines to cut costs and meet demanding schedules, the imbalance of access to critical information and knowledge regarding flights and surrounding conditions, the highly technical nature of aviation and meteorology, and the general acceptance of aviation as an everyday form of travel in today's society, consideration must be given to whether this traditional negligence-based liability standard is appropriate. Whatever standard is used, it should encourage airlines to continue to research and improve detection technology and their ability to avoid turbulence. Application of the current negligence analysis may actually punish airlines for their efforts by imposing a greater risk of negligence on them if they are better able to detect turbulence. The chosen standard should also encourage airlines to avoid the risk of encountering turbulence by circumnavigating or canceling flights even though this may have negative economic ramifications. The pilot testimony in Cudney v Braniff Airways, discussed earlier, brought to light the underlying pressure on pilots to maintain their increasingly narrow flight schedules in order to satisfy their superiors and passengers.\(^{138}\) If an airline decides to either cancel a flight or circumvent an area of potential turbulence, this could create havoc with the outgoing flight schedules from the destination airport and cause the plane to use up more fuel than allotted. Faced with these consequences, a pilot may choose to take a direct path even though there is some risk of encountering turbulence along the way. Another consideration to be taken into account when determining the proper liability standard is the need for injured passengers to be able to hold an airline liable for its lack of caution without being significantly hindered by an inability to produce evidence of negligence or causation due to an imbalance of access to such information. The current negligence standard places the burden directly on the plaintiff passenger to find this information and technical knowledge. Other potential standards or doctrines would allow the burden to be shifted or at least eased. With acceptance and integration of this form of transportation into the fabric of today's society, there arguably should be a higher standard of liability.

\(^{138}\) Cudney v. Braniff Airways, 300 S.W.2d. 412, 417 (Mo. 1957).
Strict liability was applied in the early days of aviation, but as the industry's safety record developed, this form of liability essentially passed nearly a half of a century ago. Some consideration must be given to its application in this area. Specific policy reasons for strict liability have been developed by the courts. These include, for example, loss shifting, safety, superior knowledge, and insurance. Loss shifting is based on the theory that by incorporating the cost into the goods or services and spreading it among the entire population of consumers, the seller is better able to bear the damages than the consumer. Theoretically, sellers who exercise the most care will capture the market lost by the sellers who go out of business because they are unable to bear the risk of damages. Thus, loss shifting, in theory, would encourage airlines to research and implement safety measures, one of the more important goals set out above.

The second policy reason listed above is safety. Theoretically, the seller will have a greater incentive to exercise a high degree of care to avoid injuries for which it will be held strictly liable. Thus, in theory, the more suits an airline can avoid, the lower the ticket prices they can charge and the greater business they will enjoy. This encourages airlines to implement greater safety measures and develop detection and other safety enhancing technology.

The third policy reason is superior knowledge. This policy acknowledges the large imbalance in knowledge between a seller and consumer. In the airline context, pilots and airlines hold all the knowledge regarding potential risk of encounters with turbulence, weather forecasts, ability to circumnavigate a risky area, etc. The uninformed passenger, therefore, has little or no knowledge as to the potential danger that lies ahead and the ability of the airlines to take precautions for such encounters.

The last policy reason noted above is insurance. This takes into account that the loss to the person injured can be great and the risk of injury can be more easily and sensibly insured by the goods or service provider, who can spread this cost out among

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139 See KEETON ET AL., supra note 60, § 78 at 557.
140 See FRANK J. VANDALL, STRICT LIABILITY, LEGAL AND ECONOMIC ANALYSIS 20-22 (1989).
141 See id. at 20-21.
142 See id. at 21.
143 See id.
144 See id. at 22.
the entire consumer base. This is again applicable in the air turbulence context.

Although these factors appear attractive, a court will not likely adopt such a harsh form of liability at this time, especially with their reluctance to even allow plaintiffs to use the doctrine of res ipsa loquitur in turbulence cases. Because turbulence may be an "act of God," and because it cannot be said at this time that a turbulence encounter does not occur without negligence, courts have generally viewed negligence as the appropriate standard. The premise that an encounter with turbulence does not occur without negligence may be accurate with respect to most clear air turbulence encounters, but other forms of turbulence may be generally detectable or foreseeable and thus avoidable. Traditional strict liability, however, does not differentiate and would hold the airlines liable regardless of the type of turbulence encountered. On one hand, this may seem too harsh an outcome. On the other hand, this may be an appropriate means of bootstraping the industry to higher levels of precaution as well as achieving the goals set out above.

A strict liability system that is not so rigid in its application may be more appropriate than traditional strict liability. Such a system would differentiate a compensable injury from others not recoverable under strict liability. Various threshold tests for invoking strict liability may be used that balance factors such as shifting of the loss, social utility of the service, the likelihood of injury, the nature of the injury, the cost of reducing the risk, the ability to obtain insurance, the amount of judgment required of the defendant in making the decision, and others. In turbulence cases, the type of turbulence encountered may constitute an additional threshold factor. If the evidence shows that the turbulence was associated with anything other than clear air, then this factor would weigh heavily towards application of strict liability. The inherent problem with this approach is that it would still require the plaintiff to uncover evidence as to the type of turbulence involved and, thus, not entirely eliminate the problems associated with an imbalance in access to information. Also, this modification of the strict liability analysis would dimin-

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145 See id.
146 See Kohler, 214 Cal. Rptr. at 725 ("In the instant case, we have a turbulence mishap and generally res ipsa loquitur has not been applied where natural conditions affect the airplane's operation.").
147 See supra Part III.A.
148 See VANDALL, supra note 140, at 119-120.
ish the benefit of encouraging airlines to accelerate development of clear air turbulence detection technology. This diminished incentive would likely result under this altered scheme because, similar to the outcome in a standard negligence analysis, the less knowledge airlines have regarding clear air turbulence, the less likely they would be held strictly liable for encounters with it.

This brings us to the doctrine of res ipsa loquitur. Although viewed by some courts as "strict liability in disguise," it is clearly a distinct doctrine with characteristics that may be more appropriate for handling the problems in this area. Res ipsa loquitur simply allows negligence to be proved by circumstantial evidence. The conditions for its application are:

(1) the event must be of a kind which ordinarily does not occur in the absence of someone's negligence; (2) it must be caused by an agency or instrumentality within the exclusive control of the defendant; (3) it must not have been due to any voluntary action or contribution on the part of the plaintiff.

Some courts further require a fourth condition, "that evidence . . . must be more readily accessible to the defendant than to the plaintiff." Although some do not believe that this fourth condition can ever be controlling, the inclusion of this fourth condition should not be an obstacle in this area anyhow since evidence in turbulence accidents will always be more accessible to the defendant than to the plaintiff.

Confusion among the courts exists as to the exact procedural effect of res ipsa loquitur. The majority of courts invoke the doctrine by simply allowing circumstantial evidence to support a finding for the plaintiff if, in the absence of direct evidence, the circumstantial evidence indicates that the most plausible explanation for the plaintiff's injury is the negligence of the defendant. The basic significance of res ipsa loquitur is that it allows the circumstantial evidence submitted by the plaintiff to get to a jury, and thus prevents summary judgment for the defendant.

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150 See Keeton et al., supra note 60, § 39, at 242.
151 Id. at 244.
152 Id.
153 See id. at 254.
154 See id. at 257.
155 See id.
156 See Keeton et al., supra note 60, at 258-59.
Any inference of negligence to be drawn from the circumstantial evidence is left to the jury, which is permitted, but not compelled to find it. In most jurisdictions the burden of proof does not shift to the defendant, nor does the burden of introducing evidence, although in some cases, if he fails to do so, he may risk an adverse jury verdict. Some states hold that it does create a presumption of negligence, which may yield a directed verdict if the defendant fails to proffer evidence to meet it, while others simply shift the burden to the defendant thereby requiring him to go forward with an explanation. Other states, as indicated earlier, require the defendant to possess superior knowledge before invoking the doctrine. A few states maintain they do not recognize the doctrine at all, yet apply different rules that essentially amount to the same principle. While some states deny the plaintiff use of the doctrine if he has merely pleaded some specific negligence, other states view the production of specific proof as consistent with the use of res ipsa loquitur.

It is well accepted that res ipsa loquitur is generally applicable to aviation accidents since "commercial airlines generally do not crash if due care has been exercised." For turbulence incidents, however, courts have generally not considered res ipsa loquitur appropriate. In Cudney v. Midcontinent, the plaintiff, a passenger injured when the defendant's plane suddenly encountered turbulence, was not allowed to use the doctrine. In determining whether the doctrine was applicable the court asked:

Is it possible, in the present, to say that it is now the common experience of mankind that commercial airliners do not suddenly lurch and drop in flight and then resume their course without mishap except through failure to exercise due care? If so there is no reason why the doctrine should not apply to airliners as it does to other common carriers.

157 See id. at 258.
158 See id.
159 See id.; see also Kreindler, supra note 117, at 2-31.
160 See Kreindler, supra note 117, at 2-31.
161 See id.
162 See id.
164 See Cudney v. Midcontinent Airlines, Inc., 254 S.W.2d 662, 666 (Mo. 1953); see also Kohler, 214 Cal. Rptr. at 724-25.
165 Cudney, 254 S.W.2d at 666.
The court in answering this question stated:

[I]t is not possible at this date, as it may be in another day, to say that it is the common experience of mankind that commercial airliners do not lurch and drop for some distance except for negligence in the operation of the plane and, therefore, it is not now possible to confidently apply the doctrine of res ipsa loquitur to the mere occurrence in the circumstances relied upon by [the plaintiff], as it is in the instance of certain crashes . . . .

The first condition therefore has been the biggest stumbling block for plaintiffs attempting to invoke this doctrine for turbulence-related injuries.

Kohler v. Aspen Airways is a more recent case illustrating this difficulty and discussing numerous other cases that have refused to apply the doctrine in this area. The court, acknowledging that res ipsa loquitur has been applied in a variety of airplane accidents, refused to apply the doctrine to a “turbulence mishap” since “generally res ipsa loquitur has not been applied where natural conditions affect the airplane’s operation.”

The court cited the Fifth Circuit decision of Kelly v. American Airlines and noted that “[the] overwhelming weight of authority has declined to invoke res ipsa loquitur in air turbulence cases,” because the first requirement of the doctrine, i.e., that the event not usually occur in the absence of negligence, cannot be met.

The court also cited the New York Supreme Court decision in Sanchez v. American Airlines, which provided that

[sudden] changes in meteorological conditions which cause the atmosphere to be disturbed, to become choppy and rough and its motion irregular, whether referred to as turbulence or by any other nomenclature, cannot be anticipated or avoided. The lurching, dipping or bumping of an aircraft when such unexpected air currents are suddenly encountered certainly do not spell out negligence on the part of the plane’s operator.

Again, the basic premise on which plaintiffs are denied this doctrine is that an encounter with air turbulence is not some-

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166 Id. at 667.
167 Kohler, 214 Cal. Rptr. at 724-25.
168 Id. at 725.
169 Id. (citing Kelly v. American Airlines, Inc., 508 F.2d 1379, 1380 (5th Cir. 1975)).
170 Id. (citing Sanchez v. American Airlines, Inc., 106 Misc.2d 1010, 1013-14 (N.Y. Sup. Ct. 1981)). For other decisions also refusing to allow res ipsa loquitur in this area, see Gafford v. Trans-Texas Airways, 299 F.2d 60 (6th Cir. 1962); Lazarus v. Eastern Air Lines, 292 F.2d 748 (D.C. Cir. 1961).
thing that does not occur in the absence of negligence. As stated earlier, this may be an accurate premise for most clear air turbulence encounters, but it is not accurate for weather-related or wake turbulence encounters. Both the knowledge of its possible presence and the continually improving weather detection technology have come to the point where, for some forms of turbulence, it can be said that an encounter does not occur without negligence on the part of the airline. Some courts have seemed at least willing to consider res ipsa loquitur in this area where some testimony or evidence demonstrates that this type of accident only occurs as a result of negligence. No case, however, has actually allowed the plaintiff use of the doctrine as a substitute for the traditional negligence standard.  

A treatise on aviation accident law also provides that whether or not res ipsa loquitur is to be applied to turbulence accidents may itself be a question of fact that "may change as the aviation and weather reporting sciences develop." Thus, a strong case can be made that res ipsa loquitur should now be available when enough evidence can be presented to prove that the form of turbulence was weather-related or wake turbulence, and, in the relatively near future regarding clear air turbulence.

In cases involving weather-related or wake turbulence it may be possible to provide evidence of weather forecasts, terrain features, cloud formations, locations of other aircraft, and other indicators that support the usage of the doctrine. Although not eliminating the problem of imbalance of access to information, this might reduce the amount of information required since the threshold of evidence to get to the jury would be lower. For this doctrine to be most effective towards meeting the goals set forth above, it should be used to provide a presumption of negligence requiring the defendant to proffer evidence showing that he was not negligent. This would further alleviate the problem of imbalance of information and technical knowledge by placing the burden on the party who has access to most of the information. The plaintiff would still be required to provide some evidence that the encounter with turbulence was weather-related or wake turbulence and not simply a clear air turbulence encounter. But, beyond that, the burden would be on the airline to show

171 See Ness, 410 P.2d at 968-69 n. 84; see also Sanchez, 436 N.Y.S. 2d at 826 (finding that no expert testimony was given to establish what might have caused the incident or that this type of accident ordinarily occurs only due to negligence, and concluding that the doctrine could not apply to this particular case).

172 KREINDLER, supra note 117, at 2-36.
that it was not negligent in its operation of the airplane. This would also place a greater awareness on the airline industry to decrease these incidents, possibly at a sacrifice of greater fuel consumption or fewer connecting flights, and foster greater safety precautions in an industry that is a predominant aspect of our society's transportation infrastructure.

To convince the majority of courts to extend the doctrine this far, however, will be a difficult endeavor. Most jurisdictions in other areas do not allow the doctrine to create a presumption of negligence. At most they allow an inference of negligence based on the circumstantial evidence as well as an avoidance of the action's dismissal. The first step along this path may be attainable, however. This involves pushing the courts beyond the first condition and recognizing that encounters with most forms of air turbulence do not normally occur without some negligence on the part of the airline.

The second and third conditions for allowing res ipsa loquitur are not as difficult for a plaintiff to meet in an air turbulence case. The second condition requires that the event be caused by an agency or instrumentality within the exclusive control of the defendant. Generally, the courts do not analyze this requirement too critically. At first glance, it appears quite obvious that the airline is in total control of the operation of the aircraft and most of the information associated therewith. But, some complications may arise because of the control exercised by governmental authorities in areas such as air traffic control, provision of weather information, and radio beams. Courts have held, however that this external control by the government does not eliminate the finding of exclusive control for the purposes of res ipsa loquitur.

The third condition requires that the event must not have been due to any voluntary action or contribution on the part of the plaintiff. This involves, for example, findings such as contributory negligence or assumption of risk on the part of the plaintiff. A possible finding of contributory negligence would involve a situation, for example, where an encounter with turbulence was unavoidable, the plaintiff was warned of a potential encounter, and yet the plaintiff failed to fasten his seat belt.

173 See id. at 2-51.
174 See id.
175 See id. (citing Northwest Airlines, Inc. v. Rowe, 226 F.2d 365 (8th Cir. 1955); Des Marais v. Beckman, 198 F.2d 550 (9th Cir. 1952); Trihey v. Transocean Air Lines, Inc., 255 F.2d 824 (9th Cir. 1958)).
These considerations need to be taken into account and analyzed on a case by case basis but, in general, absent any such actions by the plaintiff, this third condition will not hinder the invocation of the doctrine of res ipsa loquitur.

Unfortunately, moving towards this standard and away from a straight negligence analysis will not affect the airline industry's incentive to improve current turbulence detection technology as would the application of strict liability. Under a straight negligence standard, an increase in the airline's ability to avoid turbulence in turn increases their chances of incurring liability for failure to do so. If res ipsa loquitur is applied, the airline would still be at a greater risk of being held liable if their ability to avoid turbulence is enhanced. Similarly, the more improvements made in detection technology, the greater the argument for application of res ipsa loquitur across the board for turbulence incidents given that clear air turbulence would no longer be an exception to detectability. In a strict liability scheme on the other hand, the airlines would truly have a direct incentive to detect any form of turbulence. This would allow them to avoid liability either by warning passengers of an ensuing encounter or increasing their ability to circumnavigate a turbulent area.

D. DISCUSSION OF THE MEDICAL MALPRACTICE ANALOGIES

A well known doctrine in medical malpractice is "informed consent." This doctrine deals with a medical professional's duty to inform a patient of risks associated with the particular treatment being performed. This doctrine stems from the premise that individual autonomy allows everyone the right to make decisions regarding their own body. The medical professional must provide sufficient information to permit a patient to make an informed and intelligent decision regarding the proposed medical treatment. This doctrine is very attractive since individual autonomy is a basic right of every person and most feel strongly about having this kind of control. Does this doctrine have any use in the area of air turbulence liability? If an airline is aware before a flight commences that turbulent and stormy conditions are forecast for their flight path, do they have a duty to warn the passengers of these conditions and allow

176 See Keeton et al., supra note 60, § 32, at 190.
177 See id.
178 See id.
them to decide for themselves whether they want to proceed with the flight? The answer to this question appears to be yes. In Fleming v. Delta Airlines, weather forecasts included heavy thunderstorms, surface wind gusts of 50 to 70 miles, cloud tops to 45,000 feet, isolated tornadoes and hail storms, and moderate to severe turbulence. Although these conditions were not necessarily extreme enough to prevent the flight from proceeding, the court felt that they were serious enough to cause significant concern to the passengers. The court provided that

[a]lthough an airline must bear the ultimate responsibility for deciding whether conditions permit a safe flight, it need not and, we think, must not arrogate to itself a decision which rightly belongs to each passenger, namely whether to fly under conditions which, although not hazardous, might prove to be emotionally or physically traumatizing . . . . [C]onditions may be dangerous to some and not to others. Clearly, an airline cannot be expected to screen the former from the latter. However, it owes its passengers the duty to share with them information indicating such serious weather disturbances, so that they can choose for themselves whether they are physically and emotionally capable of undertaking the trip and wish to do so.

It is not clear from this decision, or other similar decisions, exactly what level of weather disturbance courts will require before the airline is obligated to inform passengers of the weather prior to a flight. This case provides one example where the weather was serious enough to warrant a duty to inform.

In the medical context, the patient must also establish a causal link between the failure to disclose the information and the harm. The patient met this burden by proving that had he been informed of the risks, he would not have undergone the treatment. To analyze this, most courts utilize an objective standard such that liability attaches only if a "reasonable patient in the plaintiff’s position would have withheld consent to the treatment or procedure had the material risks been disclosed." Kohler v. Aspen Airways extended this causation requirement to the air turbulence liability context. In Kohler,

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180 Id. at 341.
181 See id.
182 Id.
183 See id.
184 See Keeton et al., supra note 60, § 32, at 191.
185 See id.
186 Id.
187 Kohler, 214 Cal. Rptr. at 726.
the weather forecast at flight time indicated clear weather with occasional moderate turbulence.\textsuperscript{187} This type of worst-case forecast was supposedly very common and the forecast turbulence was not usually experienced when the forecast was this generalized.\textsuperscript{188} The aircraft in this case did encounter severe clear air turbulence resulting in injury to the plaintiff.\textsuperscript{189} The court held, however, that since the plaintiff presented no evidence revealing that a reasonably prudent person would have refused to take the flight if warned of the possible air turbulence, the airline had no duty to warn passengers of the hazardous forecast.\textsuperscript{190}

This duty to warn, analogous to the medical profession's doctrine of informed consent, provides another manner in which an airline can incur liability even if it does not negligently encounter turbulence or to warn the passengers during the flight of an impending encounter with turbulence. The airline could incur liability if it had access to information regarding the possible existence of inclement weather or potentially significant turbulent conditions prior to the flight, yet failed to inform the passengers to allow them to make an informed decision. The passenger would, in most jurisdictions, have to prove that a reasonably prudent person would have refused to take the flight in question had he been warned of the possible air turbulence. A minority of jurisdictions utilize a subjective question to establish causation, whereby liability attaches if the particular plaintiff would have avoided the flight had the information been provided. This constitutes a more protective scheme for passengers that places a greater incentive on the airlines to distribute this preflight information. It would, however, prove difficult to administer since it would be prone to self-serving testimony. Because some jurisdictions utilize this subjective standard in the medical malpractice context, those jurisdictions could likely use it in this context as well.

This doctrine is obviously not favored by airlines, and it has not yet seen widespread usage. But if it does become widely relied upon, it could force airlines into a general policy of informing passengers of these preflight conditions. This could lead to the last minute loss of paying passengers and the inability to resell seats because of the close proximity to flight time.

\textsuperscript{187} Id. at 721.
\textsuperscript{188} See id.
\textsuperscript{189} See id at 721-22.
\textsuperscript{190} See id. at 726.
If applied, this doctrine may force airlines to raise the defense of assumption of risk. They will argue that a passenger assumes the risk of an encounter with turbulence if he receives warning of the possibility of such an encounter but, nevertheless, decides to proceed with the flight. This should not work to relieve the airline of liability, however, if airline negligence actually causes the encounter with turbulence. The passenger does possess knowledge of the risk and voluntarily decides to accept it. But, the passenger does not voluntarily assume the risk of airline negligence unnecessarily causing a turbulent encounter. The only risk assumed is that turbulence may exist in the flight path and the aircraft may encounter it absent any airline negligence.

Another well established doctrine in the medical malpractice area is the mandatory requirement of expert testimony as a prerequisite to a holding of negligence. This requirement is based on the premise that juries generally lack the competence to judge technical and scientific medical questions. The issue of whether this requirement should extend to air turbulence litigation has been raised in at least one case. In Arrow Aviation v. Moore, the defendant airline argued that since lay jurors lack general knowledge about aviation, and experts should be required in determining the requisite standard of care in establishing negligence. The court rejected this argument and stated that the rules of law applicable to torts on land, which do not require mandatory expert testimony, should apply to these cases.

The underlying premise of jury ignorance is arguably just as applicable in this complex area as it is in the medical arena. Simple cases will exist in which a jury can provide an educated judgment without expert explanation. But even in medical malpractice, where a case appears quite clear and the underlying premise of jury ignorance no longer exists, the mandatory requirement for expert testimony is no longer strictly followed by the courts. Although somewhat favorable to the airlines, application of this doctrine would not have much impact, because in order to establish airline negligence, the testimony of experts is practically required and utilized by plaintiffs.
IV. GOVERNMENT LIABILITY FOR NEGLIGENCE OF ATCS IN TURBULENCE CASES

The Federal Tort Claims Act (FTCA) enacted in 1947, allows a tort suit to proceed against the United States government. The government can incur liability "in the same manner and to the same extent as a private individual under like circumstances, but shall not be liable for interest prior to judgment or for punitive damages." Under this act, state common law determines the form of the applicable cause of action. Under the FTCA, the United States government can also incur liability for negligent acts or omissions of FAA Flight Service Station (FSS) employees or ATCs.

When turbulent weather or wake turbulence conditions are located near airports, ATCs can incur liability for negligent acts or omissions that cause aircraft to encounter this turbulence. "Air traffic controllers must be familiar and comply with the mandatory provisions of the ATCM which pertain to their operational responsibilities, and the ATCM instructs them to 'exercise their best judgment' when confronted with situations not specifically covered by the ATCM." ATCs, therefore, have a duty to "give pilots all applicable information and warnings specified in the ATCM and, in certain situations, to take steps beyond those set forth in the ATCM where necessary to assure pilot and passenger safety." The court in First of America Bank Central stated, however, that this duty to warn does not arise unless the controller knows or should have known of a danger .... [C]ontrollers, in the exercise of reasonable care, have a duty to take wake turbulence hazards into consideration when giving landing clearances, but they are not required to anticipate or foresee negligent, grossly negligent or unlawful pilot actions, and they have a right to rely upon the assumption that pilots know and will abide by all applicable FARs, FAA advisory circulars and AIM provisions.

The key analysis in cases involving liability for actions (or omissions) of an ATC includes the determination of causation among the primary actors. Even where actions of the ATC are

198 Id.
199 ATCM is an acronym for "Air Traffic Control Manual".
201 Id.
202 Id. at 455-56.
negligent, it must be determined whether these actions are a proximate cause of the incident. Possible pilot negligence must also be taken into account. Courts have traditionally placed significant reliance on the "pilot in command" concept, which is well entrenched in aviation law. The "pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of [the] aircraft." According to the FARs, the pilot in command has a significant amount of discretion in an emergency situation with authority to violate instructions of an ATC if, in his judgment, safety so requires. This final authority of the pilot has traditionally allowed ATCs to escape liability. Arguably, strict application of the pilot in command concept creates a less safe environment by fostering a disincentive for ATCs to perform their jobs with utmost caution.

Application of the pilot in command concept, although still valid and widely used, has been somewhat relaxed. Many courts recognize that ATCs and pilots have concurrent duties and responsibility for "safe conduct of the aircraft and safety of its passengers" and that pilot negligence "does not, in and of itself, absolve the government of liability." In most circumstances the pilot bears a heavier burden if he possesses access to all the information and has the last chance to avoid the accident. In analyzing liability for a fatal encounter with weather related turbulence, the court in In re Air Crash at Dallas/Fort Worth Airport stated that "[a]ny failure of the air traffic controllers to warn a pilot of the presence of a storm in his path cannot be regarded as a continuing proximate cause after the pilot himself discovered its presence, appreciated the danger, and decided to fly ahead into it." In that case the court found the air traffic controllers negligent in not transmitting to the aircraft pertinent weather information known to them before the crash. This information included the presence of a thunderstorm at the ap-

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203 Responsibility and Authority of the Pilot in Command, Federal Aviation Regulations § 91.5 (1990).
204 See id. ("In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.").
205 Rodriguez v. United States, 823 F.2d 735, 746 (3rd Cir. 1987); see also First Bank of America Bank-Central, 639 F. Supp. at 455 (holding "Air traffic controllers are held to a standard of care for the safe conduct of planes and their passengers which is concurrent with the duty of the pilot").
206 In re Air Crash at Dallas/Fort Worth Airport, 919 F.2d 1079, 1085 (5th Cir. 1991).
207 See id.
proach end of the runway, very heavy rain described by some as a wall of water and by others as resembling a tornado, the presence of cloud to ground lightening in that area, and the presence of cumulonimbus clouds.\textsuperscript{208} The district court found, however, that the pilot knew all of the weather information that was available from the ATC and was, in fact, aware of additional conditions that were not known by the ATC.\textsuperscript{209} Based on this, the court considered the failure of the ATC "to pass on the weather information to have been inconsequential to the fate of [the aircraft] in that there [was] no evidence that the crew would have acted differently with this confirmation of information already known."\textsuperscript{210}

In analyzing liability for a fatal encounter with wake turbulence, the court in \textit{In re N-500L Cases} stated that:

\textit{[a]lthough air traffic controllers may have responsibilities concurrent with those of the pilot in the terminal area, the primary responsibility for avoiding collision and wake turbulence in VFR conditions is with the pilot. This is so regardless of whether a clearance has been given by the controller, because the pilot generally is in the best position to see other aircraft around him and to visualize their vortex trails.}\textsuperscript{211}

In that case, the pilot of a small twin propeller aircraft in a VFR landing approach had lost sight of a large Eastern Airlines L-1011 jumbo jet approaching the same runway.\textsuperscript{212} After instructions from the ATC establishing visual separation, the court stated that the pilot assumed responsibility for providing his own separation from the large jet.\textsuperscript{213} Two seconds after the communication with the ATC, the L-1011 overtook the small plane passing close enough for the L-1011 crewmen "to observe the silhouettes of the small plane's passengers."\textsuperscript{214} Approximately forty seconds after being overtaken, the small plane encountered wake turbulence generated by the L-1011, causing it to crash, and killing all six people on board.\textsuperscript{215} Evidence was shown that, after the small plane was overtaken, the pilot must have been able to see the L-1011 for at least twenty seconds with-

\textsuperscript{208} See id.
\textsuperscript{209} See id.
\textsuperscript{210} Id.
\textsuperscript{211} \textit{In re N-500L Cases}, 691 F.2d at 28-29.
\textsuperscript{212} See id. at 27.
\textsuperscript{213} See id. at 29.
\textsuperscript{214} Id. at 27.
\textsuperscript{215} See id.
out much difficulty. This would have given him enough time to execute an evasive maneuver to avoid any potential wake turbulence.216

_In re N-500L Cases_ is a typical example of the approach taken by the courts regarding the responsibility of ATCs in wake turbulence avoidance. Those courts still place significant weight on the pilot in command concept, especially in a VFR landing situation. _Yates v. United States_, in finding the ATC negligent in connection with an aircraft’s fatal encounter with wake turbulence during a VFR landing situation, placed less weight on the pilot in command concept and greater recognition of the responsibility of the ATC.217 The court recognized the pilot’s duty of care and ability to react in these situations, but it also recognized the unique position that ATCs are in, and thus, attributed a similar duty to them. The court recognized, like many other courts do in VFR landing situations, that ATCs and pilots have concurrent obligations.218 This approach creates a greater incentive for controllers to exercise extreme caution and care in their critical roles. Due to the equipment they have, the information they have access to, and their ability to monitor the whole situation, they are in the best position to reduce the possibility of these fatal situations developing and such a duty must not be taken lightly. Although the FAA has published minimum separation distances behind large and heavy aircraft to minimize wake turbulence effects, pilots cannot realistically assess the exact separation distance like ATCs can. The court in _Yates_ stated that

> the relationship between the air controller and the pilot of a plane which is landing or taking off creates a duty of care on the part of the controller. . . . A pilot has a choice before he commits himself to a landing, but after the commitment he is not free to change his course and thereafter he is controlled by the controller. . . . We cannot, therefore, accept the view that the controllers with the complex equipment which they employ are there merely to give advice.219

Most courts, however, still place a greater responsibility on the pilots, especially in VFR landing situations, for maintaining the proper separation necessary for wake turbulence avoidance.

216 See id.
217 _Yates_, 497 F.2d at 881.
218 For other cases applying this type of analysis see _In re Greenwood Air Crash_, 924 F. Supp 1518 (S.D. Ind. 1995); _Mattschei v. United States_, 600 F.2d 205 (9th Cir. 1979).
219 _Yates_, 497 F.2d at 882-83.
This diminishes the responsibility and incentive for ATCs to use due care and, unfortunately, places pilots in a more dangerous situation when performing a visual landing procedure.

V. WARSAW CONVENTION

For cases dealing with turbulence encounters in international flights, the Warsaw Convention may preempt state law. The Warsaw Convention applies to all actions against an airline for injuries sustained in an accident that "[takes] place on board the aircraft or in the course of any of the operations of embarking or disembarking." The term "accident" is defined as "an unexpected or unusual event or happening that is external to the passenger." In Cheng v. United Airlines, all parties agreed that the turbulence encountered by the aircraft in that case, qualified as an "事故" under the Warsaw Convention. However, that does not end the inquiry. Although the turbulence encounter constitutes an "事故," more is required to implicate the Warsaw Convention. The injuries sustained must also have been caused by the accident in question.

Chang, quoting the Supreme Court decision in Saks stated that "'any injury is the product of a chain of causes, and [for the Convention to apply] we require only that the passenger be able to prove that some link in the chain was an unusual or unexpected event external to the passenger.'" Thus, an action for injuries sustained by a passenger in a turbulence encounter in an international flight would likely trigger the Warsaw Convention.

Where the Convention applies, it preempts all of a plaintiff's state law claims. What this entails exactly and how it effects the state law claims and the duty of care required by the airline is not clear and depends on the interpretation of the Supreme Court's decision in Zicherman v. Korean Air Lines Co. as well as numerous lower court decisions.

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220 Warsaw Convention, Art. 17.
223 See id. at *3.
224 See id.
225 Id.
226 See id.
228 See, e.g., In re Air Crash in Bali, Indonesia, 684 F.2d 1301 (9th Cir. 1982); Floyd v. Eastern Airlines, Inc. 872 F.2d 1462 (11th Cir. 1989); Abramson v. Japan
VI. CONCLUSION

When attempting to investigate the liability of an airline or the government in an air turbulence incident, a determination of the particular form of turbulence encountered should be the primary inquiry. Three general categories of turbulence exist—clear air turbulence, weather-related turbulence, and wake turbulence. The form of turbulence encountered in a given incident bears significantly on the type of liability analysis performed and thus could also have a significant impact on the outcome of a case. Pilots, airline officials, and ATCs each have certain duties in avoiding or circumventing turbulent areas or otherwise preventing harmful consequences from transpiring upon an imminent encounter. The duties required of these individuals vary depending on the form of turbulence encountered. Thus, the form of turbulence encountered in a particular situation, as well as the related duties of the individuals, must be taken into account.

Currently, liability of an airline for injuries caused by encounters with turbulence is based on standard negligence analysis. An airline can be negligent in a number of ways including: flying into or in the area of a storm, failing to maintain a proper distance from a storm area, failure to warn passengers of an imminent and unavoidable encounter with turbulence, failure to slow down or take other necessary precautions when a storm or other turbulence is encountered, failure to obtain weather information available to the pilot, failure of one flight to warn others of certain weather conditions it has encountered, failure of weather dispatchers to advise flights of certain known weather conditions, and violations of FARs or other airline manuals.

The above examples illustrate that a number of different ways exist in which an airline can incur liability under the traditional negligence analysis. A number of technological changes in the aviation industry and society in general, however, may warrant application of a harsher liability standard and thus, a deviation from this traditional analysis. A liability standard that considers up front the form of turbulence encountered may comprise the most appealing and equitable solution. The driving factors behind such a shift in liability analysis include the seemingly in-

Airlines Co., 739 F.2d 130 (3d Cir. 1984); Boehringer-Mannheim Diagnostics, Inc. v. Pan American World Airways, Inc., 737 F.2d 456 (5th Cir. 1984). For a discussion of these and other cases see LEE S. KREINDLER, AVIATION ACCIDENT LAW § 10.08, at 10-101 (Mathew Bender, revised 1998).
Increasing number of turbulence-related injuries, the ever-increasing pressure on airlines to cut costs and meet demanding schedules, the imbalance of access to critical information and knowledge regarding flights and surrounding conditions, the highly technical nature of aviation and meteorology, and the general acceptance of aviation as an everyday form of travel. The chosen liability standard must foster an incentive for airlines to continue to research and to improve detection technology and their ability to avoid turbulence. The standard negligence analysis actually punishes airlines for their efforts in this regard by imposing a greater risk of incurring liability with increased turbulence-detection capabilities.

Some proposed variations in the liability analysis include: (1) a strict liability scheme for all forms of turbulence; (2) a less rigid strict liability scheme that takes into account the type of turbulence encountered and thus differentiates a compensable injury, such as one associated with an encounter with weather-related or wake turbulence, from others not recoverable under strict liability, such as an encounter with pure clear air turbulence; or (3) a negligence system that permits the use of the doctrine of res ipsa loquitur to shift some of the burdens to the airline or government when the form of turbulence is initially shown to have been wake or weather-related.

Some medical malpractice analogies have arisen in the context of air turbulence litigation that warrant consideration. Application of the doctrine of informed consent in the air turbulence arena is attractive but presents a host of unresolved issues in its application and potential effect. Its attraction stems from a belief that, similar to the medical area, every person has a basic right of individual autonomy. Thus, they possess the ability to decide, before a flight begins, whether they want to proceed given the known potential for an encounter with turbulence or bad weather. A lot of unanswered questions exist regarding how this would affect the respective liabilities of the airline and its passengers and there are aspects of its application that could prove to be detrimental to both. Several cases have already addressed the issue and thus, its future application in this area warrants debate. Another medical malpractice doctrine that may apply in this area is the mandatory use of expert witnesses prior to a finding of liability. Even if applied here, however, this doctrine should not have much impact.

Causation issues, especially in wake turbulence encounters, have given courts difficulty in determining whether an airline or
ATC is liable for a particular encounter. Blanket use of the somewhat antiquated concept of “pilot in command” may place too great a responsibility on the pilots and a correspondingly small responsibility on the ATCs. ATCs, with their equipment, access to critical information, and ability to monitor the whole situation are in a very unique position to reduce the possibility of these fatal situations developing. Recognizing this, and imposing concurrent obligations on both the ATC and pilot, even in VFR landing situations, creates a greater incentive for ATCs to exercise extreme care and caution in their vital roles.

Finally, turbulence is not only a domestic concern, but is encountered quite frequently in international flights as well. This may require application of the Warsaw Convention. It is unclear exactly how its application will impact the analysis but it may preempt state law, limit liability, and require a different duty of care than expected.