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Detection of Fatal Therapeutic Misadventures by an Urban Medico-Legal System

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ABSTRACT: Very few population-based studies have evaluated fatal therapeutic misadventures, in particular the adequacy of their detection. We therefore assessed the adequacy of the reporting and detection of fatal therapeutic misadventures in an urban setting medico-legal system. The coroner's files and the related hospital records were reviewed as to the circumstances of the incidents and the adequacy of notification by the care providers in Allegheny County, Pennsylvania, for the period of January 1, 1982 through December 31, 1991. The annual average rate of fatal misadventures was 2.2 per 100 000 hospital admissions or 4.7 per million inhabitants (total 63 cases). The survival time from the occurrence of the misadventure was within 24 h in 60% of the cases. University-related hospitals had double the rate of misadventure fatalities (118.2 per 100 000 beds per year), compared to that in community-based hospitals (53.9 per 100 000 bed per year). In more than half of the cases, the hospitals reported the incidents within an hour from the pronouncement of death, 28.6% within 5 h, and 19% after more than 5 h. In 10 cases (15.9%), the notification by the hospitals was clearly deficient in determining the manner of death. In a few cases, the incident was initially reported by the relatives, by the hospital pathologists, or by the media.

A high likelihood of under-reporting of fatal misadventures to the medico-legal system is substantiated by comparing with the results reported by others. The possible measures to increase the monitoring and reporting, and to reduce the related mortality are further discussed.

KEYWORDS: pathology and biology, iatrogenic death, fatal, therapeutic misadventure, under-reporting

Fatal therapeutic misadventures are primarily reported in the medical literature as case histories [1,2,3], limited hospital series [4,5], or as risk studies associated with specific medical conditions, procedures, or medications [6-12]. Very few population-based epidemiological studies have addressed the problems of therapeutic misadventures in general, and fatal misadventures in particular [13-16]. This is not because of the fact that therapeutic misadventures are a rare source of injuries in the world of modern medicine. Rather, the opposite is true.

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Most observers would agree that the powerful medical armamentarium available to the modern physician, the complexities of combined administration of multiple and potent medications, the multiplicity of the modern invasive techniques from coronary catheterization to laparoscopy surgery, the increase in size of hospitals to medical factory dimensions, the often impersonal character of medical care in large medical facilities, the increase in size of a geriatric population of patients who are more susceptible to medical injuries, and the effort to reduce hospital stays, are all factors that tend to increase the number of fatalities associated with medical care.

This study was intended to determine the incidence and characteristics of fatal therapeutic misadventures in an urban setting, to evaluate the adequacy of the reporting and detection capabilities of the related medico-legal system, and to suggest ways designed to improve the monitoring and control of medical care related mortality.

Methods

Study Population

Allegheny County is located in Western Pennsylvania, and has a population of approximately 1.4 million, including the city of Pittsburgh, with a population of 370 000. The area has 30 acute-care hospitals, with a total of 9718 beds, including 1931 beds at the University Medical Center and 592 beds at Children's, Eye and Ear, and Women's Hospitals, which are directly related to the University Center. Most of the hospitals have modern facilities, and some are nationally and internationally recognized for their pioneering work in the transplantation of organs, surgical emergency care, gynecological, obstetric and pediatric care, and in many other fields.

Under the Pennsylvania law (16 Purdon Statute § 1237), "any death in which trauma, chemical injury, drug overdose or reaction to drugs or medication or medical treatment was a primary or secondary, direct or indirect, contributory, aggravating or precipitating cause of death" and "operative and peri-operative deaths in which the death is not readily explainable on the basis of prior disease" are to be reported to and investigated by the Office of the Coroner. Over the ten year period, between January 1, 1982 and December 31, 1991, a total of 63 fatalities were determined by the Allegheny County Coroner's Office to be medical-care related accidents or therapeutic misadventures.

The hospital records and the coroner's files were reviewed as to the circumstances and types of the incidents, the autopsy and toxicology findings, the demographic characteristics of the deceased patients, the identity of the provider of care responsible for the incident, and the adequacy of notification of fatal therapeutic misadventure by the providers of care.

We defined a therapeutic misadventure as an unexpected medical-care related injury or adverse outcome, which is not an inherent disability, side effect, or natural complication of the involved procedure or medication.

Under this definition, fatal therapeutic misadventures were considered as such when they were caused by a diagnostic or therapeutic mechanical manipulation; by an incorrect, mistaken, or substandard medical procedure; by an inappropriate, mistaken or overdose of medication; by incorrect use of medical equipment; or by the use of inappropriate, malfunctioning or inadequate medical equipment.

Fatal therapeutic misadventures were also considered to occur when the death occurred during or immediately following the medical procedure, and was not reasonably explainable on the basis of the patient's prior conditions. On the other hand, deaths resulting from inherent side effects or natural complications of the diagnostic or therapeutic procedure such as a cardiac arrest occurring during a monitored stress exercise, a pneumonia developing after a surgical procedure or aplastic anemia occurring following treatment with chemotherapeutic agents, were not considered therapeutic misadventures.

Results

Incidence of Reported Fatal Therapeutic Misadventures

In the past decade, between January 1, 1982 and December 31, 1991, the Allegheny County Coroner's Office has identified 63 fatalities due to therapeutic misadventures, amounting to an annual average rate of 2.2 per 100 000 hospital admissions or 4.7 per million inhabitants. The total number of cases fluctuated between one and seven in the years 1982 through 1989, and then increased to nine cases in 1990 and 23 cases in 1991 (Table 1).

Characteristics of Fatalities

Among the 63 fatal therapeutic misadventures, women accounted for 39 (62.9%) and men for 24 (38.1%). Blacks, who account only for 10.5% of the Allegheny County population, were also over-represented with 17 deaths (27.0%). More than half of the fatalities occurred in people aged 65 and above, with 33 deaths (52.4%).

The survival time from the occurrence of the fatal therapeutic misadventures was variable, with the majority surviving only 24 h or less (38 or 60.3%), including 13, or 20.6%, who survived less than an hour (Table 2).

Characteristics of Fatal Misadventure Incidents

The purpose of the medical intervention resulting in death was therapeutic in more than three-fourths of the cases (48 or 76.2%) and diagnostic in the remaining one-fourth (15 or 23.8%). Most of the fatalities, 30 or 47.6%, were caused by traumatic medical injuries. The remaining fatal misadventures were chiefly due to an overdose of medication (11 or 17.5%), obstruction of airways (9 or 14.3%) and anaphylactic reactions (8 or 12.7%). In addition, there were two anesthesia-related deaths (3.2%), a death due to a

TABLE 1—*Fatal misadventures Allegheny County Coroner's Office 1982–1991.*

Year	Number
1982	1
1983	3
1984	2
1985	7
1986	4
1987	3
1988	6
1989	5
1990	9
1991	23

TABLE 2—*Time period (h) between misadventure and death.*

Time interval	Number	Percentage
<1	13	20.6
1–5	14	22.2
6–24	11	17.5
25–168	11	17.5
≥169	14	22.2
Total	63	100

mismatched blood transfusion (1.6%), a death due to a delayed diagnosis of abdominal trauma (1.6%), and a death due to combined drug toxicity (1.6%).

The specific medical activity or agent involved in the fatal therapeutic misadventures varied according to the type of medical care (Table 3). Perforations and bleeding by intravascular catheters or balloons accounted for most of the medically induced trauma (14 or 46.7%), followed by bleeding from liver biopsy and injuries associated with thoracostomy. There were nine deaths with perioperative bleeding, for which the exact source of bleeding could not be specified. Among those nine perioperative bleeding incidents, four followed abdominal surgery including a lobectomy of liver due to metastatic cancer, a hysteroscopic removal of leiomyoma, a laparoscopic lysis of intra-abdominal adhesions, and an exploratory laparotomy for a suspected ovarian tumor. The other procedures included two cardiac valvuloplasties, two spinal operations, and a tonsillectomy. Misplacement of tracheostomy tubes was the most common cause of fatal obstruction of airways. Those incidents included delays in the reinsertion of a tracheostomy tube in a patient with laryngeal edema, in an infant with broncho-pulmonary dysplasia, and in a patient with a chronically placed tracheostomy tube who was unable to locate the back-up for the damaged tracheostomy tube outlet. Also, there was an incident in which a tracheostomy tube was accidentally obstructed by surgical drape. The fatal anaphylactic reactions were primarily induced by antibiotics and X-ray contrast dyes. Overdose of medication included administration of excessive amounts of potassium infusions, lidocaine, morphine, oxytocin, and others.

Site of Occurrence of Misadventures

Almost all of the incidents (58 or 92.1%) occurred in hospitals, with only three occurring in nursing homes and two incidents occurring at the patient's home. There were differences in the frequency of fatal misadventures between university-related and community-

TABLE 3—*Type of agent by selected misadventure type.*

Traumatic		
Catheter/Balloon	14	46.7%
Liver biopsy	3	10.0%
Thoracostomy tube	3	10.0%
Electrode of pacemaker	1	3.3%
Other postoperative bleeding	9	30.0%
Total	30	100.0%
Overdose of medication		
Potassium	3	27.3%
Lidocaine	2	18.2%
Morphine	1	9.1%
Oxytocin	1	9.1%
Other	4	36.4%
Total	11	100.0%
Anaphylactic reaction		
Antibiotics	3	37.5%
Contrast material for radiology	3	37.5%
Other	2	25.0%
Total	8	100.0%
Obstruction of airway		
Tracheostomy tube	4	44.4%
Gastric tube	1	11.1%
Other	4	44.4%
Total	9	100.0%

based hospitals, according to the size of the hospital. When hospitals with at least one fatal misadventure during the study period were included in the denominator, university-related hospitals had double the rate of misadventure fatalities than community-based hospitals (118.2 per 100 000 beds per year versus 53.9 per 100 000 beds per year) (Table 4).

All university-related hospitals reported at least one fatal case. However, six nonuniversity-related hospitals, five with less than 400 beds, reported no cases during the ten year study periods.

Within hospitals, the incidents occurred most frequently in operating rooms (36 or 57.1%) and hospital wards (17 or 27.0%) followed by X-ray rooms, catheterization rooms, and intensive care units.

Among the persons who initiated the fatal therapeutic misadventures, 43 or 68.3% were physicians, 17 or 27.0% were nursing staff and three or 4.8% were the patients themselves.

Promptness of Reporting the Incidents to the Coroner's Office

In more than half of the cases (33 or 52.4%), the hospitals reported the incidents within an hour from the pronouncement of death, in 18 cases, or 28.6%, the report was made between 1 to 5 h, in nine cases between 6 to 24 h and in three cases (4.8%) after more than two weeks (Table 5). The reporting was usually made by the treating physician, by the physician who pronounced the person dead or by a hospital nurse. It should be noted that in 10 cases (17.2%) the notification by the hospital was clearly deficient either because the initial notification was misleading by omitting essential information, or by denying that the death was related to the involved medical procedure, by delaying reporting or by failure to report altogether. In the latter instance the Coroner's Office was informed of the incident by relatives, by the hospital pathologist prior to the autopsy, by the media or by others (Table 6).

TABLE 4—*Fatal misadventures by university affiliation and size of hospital.*^a

University affiliation	Number of beds	Average annual rate per 100 000 beds
Yes	≤400	117.0
	>400	120.1
	All	118.2
No	≤400	68.1
	>400	40.0
	All	53.9

^aIncludes only hospitals that reported at least one fatal misadventure.

TABLE 5—*Time period (h) between therapeutic misadventure death and report to coroner.*

Time interval	Number	Percentage
<1	33	52.4
1–5	18	28.6
6–24	9	14.3
≥25	3	4.8
Total	63	100.0

TABLE 6—Hospital's omission of notification to coroner.

Case #	Age	Circumstances of death	Notification
90-0903	41	Neck compression by hematoma postsurgery for cervical disk	Family
91-1679	77	Lung perforation with bleeding by chest tube in patient with pneumonia	Hospital pathologist asked (after completing autopsy) how he should sign certificate
91-1768	72	Lidocaine overdose in patient with arrhythmia	Body released to funeral director
88-2222	74	Bowel injury during lysis of pelvic adhesions	Notification by hospital 24 h later Hospital pathologist 24 h later
88-711	52	Mislabeled blood transfusions of patient with diabetes chronic renal disease and ASCVD	Consultant pathologist performing private post after review of hospital records
89-0968	69	Perforation of heart by thoracotomy tube in patient with bronchopneumonia emphysema and ASCVD	Family
89-0726	64	Perforation of carotid artery during angiography for CVA	Physician reported natural disease due to ruptured aneurysm Hospital pathologist called before post and relayed events
88-4202	60	Bleeding from liver biopsy	Physician reported death but stated that bleeding was not connected to death
91-2108	24	Uncontrolled bleeding during tonsillectomy	Family
91-1857	4 days	Newborn died of hypoxemia because of pitocin during induced labor	Notification by transfer hospital pathologist Incident not reported in records of occurrence hospital

Negligence-Related Therapeutic Misadventures

Among the 63 fatal therapeutic misadventures, 29 cases (46.0%) were attributed to negligent conduct, with the remainder showing either no evidence of negligence, or lacking sufficient information to make a determination. Among the cases showing clear evidence of negligence, 13 (44.8%) were related to medication, six (20.7%) related to traumatic misadventures, five (17.2%) related to airway obstruction and five (17.2%) to other causes. The typical examples of the negligent and non-negligent therapeutic misadventures are shown in Tables 7 and 8.

The most frequent conditions for which the medical intervention was performed were cardiovascular conditions (20 or 31.7%), including 13 cases with atherosclerotic cardiovascular disease. Other conditions which were frequently found were cancer (nine or 14.3%), and chronic or acute pulmonary diseases (nine or 14.3%). The clinical condition of the patients, prior to the occurrence of the therapeutic misadventures, was serious but stable in 34 cases (54.0%), critical in 22 (34.9%) and excellent in seven (11.1%) patients with only minor or non life-threatening conditions.

The patients who were 65 years and above had a critical condition more frequently than the younger patients (17 or 51.5%, compared to five or 16.7%; *P* value by Fisher's exact test = 0.01). However, the proportion of cases with negligence did not differ by the age group.

TABLE 7—Typical examples of negligent therapeutic misadventures.

Case #	Age	Primary condition	Cause of death	Circumstances	Nature of negligence
84-0666	80	Paraplegic ASCVD	Massive interstitial emphysema	O ₂ perfusion tube left in anaerobic wound	Forgetting to remove tube in time
86-1374	52	Surgery for insertion of metal knee prosthesis	Asphyxia	Obstructive plastic airway device	Forgetting to remove the device after surgery
86-0114	69	Septicemia	Anaphylactic shock	Injection of penicillin	Administering the medication mistakenly, while failing to check the record for known penicillin allergy. Failing to heed the protest of patient that she is allergic to penicillin
86-2049	7 mos	Acute leukemia	Fluid overload	Intravenous administration of K/D50	Failing to regulate the rate of intravenous infusion
88-0391	82	Acute myocardial infarction	Potassium overdose	Intravenous administration of potassium	Failing to regulate the rate of intravenous infusion
88-0711	52	Diabetes Mellitus Chronic Renal Failure ASCVD	Fatal transfusion reaction	Blood transfusion for anemia	Failure to match blood bag to patient when bags arrived simultaneously to ward
90-1428	61	ASCVD Arrhythmia	Lidocaine overdose	Administration of lidocaine for arrhythmia	Mistakenly using a lidocaine bottle of 2000 mg, instead of 100 mg
91-1857	4 days	Hypoxemia shock	Pitocin overdose	Administration of pitocin to induce pregnancy	Pitocin pump disconnected from electrical outlet, but was not shut off

TABLE 8—*Typical examples of nonnegligent or undetermined therapeutic misadventures.*

Case #	Age	Primary condition(s)	Cause	Circumstances	Justification
82-0684	72	ASCVD Septic Infarct	Hemopericardium due to myocardial rupture	Perforation of heart by pacemaker wire	Easily ruptured infarcted myocardium
91-2825	75	ASCVD	Hemopericardium due to perforated coronary artery	Perforation of coronary artery during angioplasty	Rupture occurring during atherectomy
87-1015	78	ASCVD with old and recent myocardial infarct	Hemoperitoneum due to lacerated aorta	Perforation of aorta by balloon	Easily ruptured severely arteriosclerotic aorta
90-2717	85	Pneumonia ASCVD	Stevens-Johnson Syndrome	Allergic reaction to vancomycin	Unexpected allergic reaction

A critical clinical condition was found more frequently in the negligent cases (eleven or 37.9%) as compared to the non-negligent cases (eleven or 32.4%), although this difference did not reach statistical significance.

Discussion

The general characteristics of the above reported fatalities of therapeutic misadventures were consistent with those described in other studies, with the majority of the patients being older and markedly sick [4,5,15]. This may be due, at least in part, to the increased morbidity in the geriatric group and an increased susceptibility to succumb to injury. Invasive diagnostic or therapeutic procedures were the most common causes of fatalities, and much more frequent than medication-associated deaths. Hospital-based studies have shown a similar pattern in non-fatal iatrogenic injuries [4].

A higher rate of fatal therapeutic misadventures was noted in university or teaching hospitals than in community-based hospitals (118.2 per 100 000 beds per year, versus 53.9 per 100 000 per year). Similar findings were reported in the Harvard Medical Practice Study in regard to therapeutic misadventures in general, though the study did not specifically report differences in the rate of *fatal* therapeutic misadventures in particular [17]. This higher rate is most likely due to the greater intensity of medical care, more complex treatments and better reporting.

The rate of fatal therapeutic misadventures in university nonaffiliated hospitals differed according to the hospital size. Facilities with 400 beds or less had a higher misadventure mortality rate than those with more than a 400 bed capacity. (68.1 per 100 000 beds per year, versus 40.0 per 100 000 beds per year).

The term "therapeutic misadventure" is not identical with medical negligence or malpractice. Medical negligence is held to occur only when the injury or death is a result of a potentially preventable medical error, that is, an injury that would not have occurred if the provider of care would have acted according to the standards of accepted medical care.

We found out that in some cases it was a difficult task to determine negligence. Cases of fatal therapeutic misadventures due to mistakenly administered medication or blood were easily assigned to negligence by their very obvious preventable nature. In many cases, the hospital records or the coroner's investigation, or both, pointed to, or reliably excluded, negligence. However, the determination of the fault in fatalities due to bleeding from mechanical perforations of blood vessels or viscera, or in deaths occurring during anesthesia was much more difficult to substantiate. A perforation occurring at a weakened site of an arteriosclerotic vascular lesion permitted the timely exclusion of negligence as a factor in the absence of other information pointing to the contrary. In most vascular trauma cases, however, there was not sufficient information to either exclude or confirm negligence. None of the fatalities could be directly assigned to equipment failure or faulty equipment design. However, the overdoses of lidocaine could be traced in part to the faulty design of the commercial containers of the drug, which had a packaging appearance virtually identical in design and color for both high and low concentrations solutions, and therefore could be easily confused and interchanged.

Furthermore, in a newborn death due to hypoxia because of an overdose drip of pitocin administered to the mother, during induction of labor, the death would have been prevented by the use of a more modern pitocin pump prototype, capable of shutting itself off automatically when disconnected from the electrical outlet, even while still attached to a fully open IV line.

The most important finding of our study is its substantiation of a high likelihood of under-reporting of therapeutic misadventures, including those due to preventable medical error. The increase in the number of fatal therapeutic misadventures certified by the

Coroner's Office in Allegheny County in the past two years, 1990 and 1991 cannot be explained on the basis of population increase, as the population of Allegheny County has decreased in the past decade, nor by an increase in the number of hospitals or available beds. There are no indications that the quality of provided medical care has decreased, the contrary is more likely. The apparent explanation is that an increase in reporting by the hospitals, an increased scrutiny by the Coroner's Office and a number of highly publicized therapeutic misadventures, have all converged to increase the reporting and detection index. However, even at this time the reporting of such cases remains inadequate. It is very difficult, if not impossible, to believe that with the many hundreds of elderly patients receiving care in nursing homes in Allegheny County there were only three fatalities due to therapeutic misadventures in nursing homes, that out of many thousands of anesthetic procedures over a decade, there were only two therapeutic misadventure deaths due to anesthetic procedures, and that hospitals with many hundreds of beds and a considerable turnover of patients, would encounter only one therapeutic misadventure in a decade. Furthermore, the fact that we identified only one fatality, related to an unjustified delayed diagnosis of traumatic intestinal perforation, in which incidentally the involved hospital denied any fault in the face of overwhelming evidence to the contrary, strongly suggests that therapeutic misadventures due to delayed or mistaken diagnosis are practically unreported to the Coroner's Office. The high proportion (17.2%) of absent or markedly flawed notifications to the Coroner's Office reinforces the probability of under-reporting.

In the 1991 Harvard Medical Practice Study, the largest and most comprehensive study of therapeutic misadventures to date, involving the screening of a random sample of more than 31 000 hospital records, estimated among 2 671 863 patients discharged from New York hospitals in 1984, a total of 98 609 adverse events, including 13 451 fatalities, that is an annual mortality rate of 503 per 100 000 discharges [15].

As mentioned, our study indicated an annual average mortality rate in Allegheny County over the past decade, of only 2.2 per 100 000 admissions. Though the quality of medical care in Allegheny County is admittedly excellent, it is unlikely that it could account for the tremendous discrepancy in the respective mortality rates. The inescapable conclusion is that the under-reporting of fatal therapeutic misadventures in Allegheny County is considerable.

Other studies have found a similar rate of under-reporting. A study reporting on fatal therapeutic misadventures certified by the Office of the Coroner of Montgomery County, Ohio, with a population area of 771 000, reported 44 cases during the 1973 to 1983 period [18]. Though the report does not mention the rate of therapeutic misadventures per hospital admissions or per hospital beds, the average yearly rate per 1 000 000 population can be calculated to be 5.1, a figure similar to that of Allegheny County (4.7 per 1 000 000).

The major culprit for the under-reporting of therapeutic misadventures appears to be the secretive method by which adverse incidents occurring in the hospitals are internally handled. Current Pennsylvania law does not require the reporting of nonfatal medical misadventures that occur in health-care facilities. The incident reports that are filed following such happenings in hospitals or other health care facilities are secret and available only to administration officials. In some hospitals even the very existence of an incident report is not mentioned in the patient's medical record. Though state regulations require that all evaluations and treatment be accurately and completely reflected in the patient's medical records, the hospital administration is not specifically directed to ensure and correct inaccurate or misleading records, beyond a general requirement of providing adequate guidelines and activating quality control committees. Even therapeutic misadventures that end in the death of a patient may remain undisclosed and unreported to the local coroner or medical examiner. This is particularly true when the death caused

by medical care is delayed, or when the involved patient was transferred from one medical facility to another. Such situations are obviously adverse to the public interest and to the rendering of optimal medical care. Though the absolute confidentiality of internal quality review procedures is clearly justifiable and beneficial to the continuous improvement of medical care, the nondisclosure of the very occurrence of the fatal or disabling medical accidents is unethical and illegal. The under-reporting of severe cases of fatal therapeutic misadventures in general, and of fatal incidents is bound to result in erroneous certification of the cause and manner of death, failure to identify medical procedures with a high risk of fatal therapeutic misadventure, lack of awareness of providers of care as to such risks, failure to identify medical personnel responsible for an inordinate or unjustified number of fatal therapeutic misadventures, and denial of accidental death benefits or the right of the estate to sue for a wrongful death.

To correct this situation, the Allegheny County Coroner's Office has proposed legislation that would mandate:

- Prompt and adequate recording of therapeutic misadventures in the patient's medical records.
- Prompt notification of the State Board of Health and State Board of Medicine (within 48 h) of disabling or fatal therapeutic misadventures occurring in hospitals and other medical care facilities.
- The State Board of Health to notify biannually the health care providers of the number, types and circumstances of such therapeutic misadventures, without disclosing the identity of the patients or the institution and providers involved.
- Prompt notification of the Coroner's or Medical Examiner's Office (within 6 h) of any therapeutic misadventure that results in the death of a patient.

In order to assure its effectiveness, the proposed bill imposes a variety of fines and penalties on violators.

We believe that under-reporting is not unique to Allegheny County and that other regions of the country should also consider similar educational and legislative measures designed to increase the monitoring and reporting of therapeutic misadventures and to reduce the related morbidity and mortality.

Since 1984, the Food and Drug Administration (FDA) has required the manufacturers and importers of medical devices to report device-related deaths and serious injuries. However, in the past years reports by the General Accounting Office (GAO), the Office of Technology Assessment (OTA) and the Congressional hearings have shown that this reporting is unsatisfactory.

A 1986 GAO study found that "less than one per cent of device problems occurring in hospitals were reported to the FDA and that the more serious problem with the device, the less likely it was to be reported [19,20].

These findings prompted Congress to enact the Safe Medical Device Act (SMOA) (1990), which became effective on November 28, 1991, and under which both the medical device industry and the users of medical devices must report device-related illness or injuries, and includes severe penalties for violators. Though obviously such legislation will greatly assist in the detection of disabling and fatal therapeutic misadventures, it is not exhaustive enough, and will require supplementation by state laws more specifically oriented towards the detection and reporting of significant medical care accidents.

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