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Patterns in Sharp Force Fatalities— A Comprehensive Forensic Medical Study

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ABSTRACT: A ten-year series of 142 homicidal fatalities caused by sharp force injury was studied with the aim to systematize information inherent in the characteristics of the victim and the pattern of injuries. The population of victims consisted of 112 males (79%) and 30 females (21%); among perpetrators, 125 (88%) were males. Among victims as well as among perpetrators, persons of non-Swedish origin were overrepresented in relation to their share of the nonselected population. In 82 cases (58%), one or two wounds had been inflicted; in 23 cases (16%), ten or more wounds. In the latter group, eleven victims but no perpetrators were female.

In the majority of cases victim and perpetrator were known to each other, and in instances of multiple wounding, a close relationship between the two was clearly more common than in the group of one- to two-wound fatalities. Tests for blood alcohol were positive in 86 of 116 victims (74%), the majority being in elimination phase. Furthermore, 96 of 120 perpetrators (80%) had positive tests or were known to be drunk at the time of the killing. In multiple wound fatalities, alcohol inebriation was less common both among victims and perpetrators. In these cases, the two persons involved were usually closely related or intimately known to each other, and in the absence of psychiatric disorder in the assailant, the motive was of a passionate type.

KEYWORDS: pathology and biology, stab wounds, injuries, homicide

Sharp force injuries constitute a well-defined group of wounds inflicted by directed use of an obviously dangerous object. In all cases some sharp tool, weapon, or piece of equipment has perforated a body's surface, and occasionally has left characteristic marks suggesting its identity. Moreover, the number, pattern, size, and localization of wounds may be suggestive of the etiology, that is, whether the act was accidental, a self-inflicted cry for help, suicidal, or homicidal (offensive or defensive). The injuries illustrated in Fig. 1 occurred as a consequence of alcohol inebriation and epilepsy, religious fanaticism, existential desperation, ethnic animosity/hatred, homosexual rage, or during fight for life, respectively. The pattern of injuries may thus be suggestive of the attack style, perpetrator's motivation, and mental and somatic properties. Additionally, characteristic psychophysical features of the victim as a person may complete the jigsaw puzzle of fragmentary or cryptic messages whose semantic interpretation, according to all textbooks of forensic medicine, is one of the tasks of a forensic pathologist.

In the present study, we have aimed at a systematic analysis of the objective findings and the descriptive language of sharp force injuries. Our hypothesis is that the information achieved

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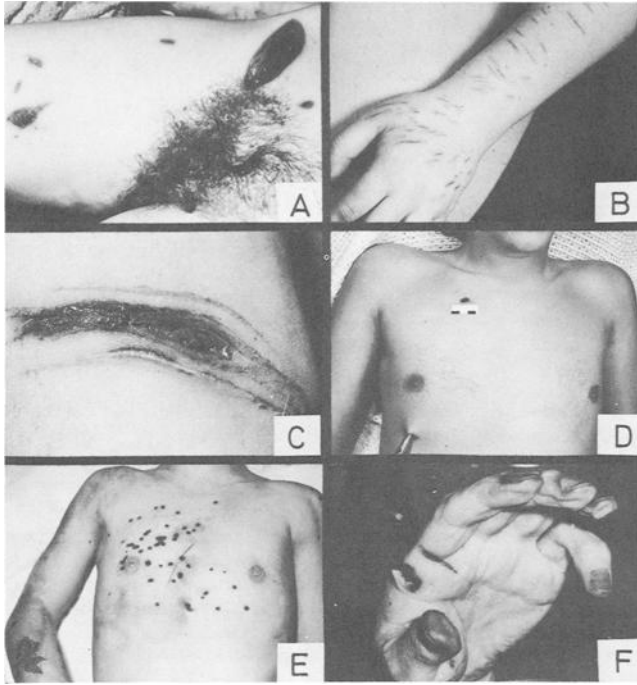


FIG. 1—(a) Accidental stab and cut wounds with transection of the right femoral artery resulting in fatal hemorrhage. The injuries were caused by a beer bottle that was carried in the right trouser pocket of an alcoholic and was shattered as she fell down a staircase during an epileptic seizure. (b) Multiple slashes, all superficial and parallel, located on the dorsum of the left forearm of a 21-year-old woman. She was a religious fanatic and told the police that two strangers had attacked her face and arm with a long knife because they disliked members of her sect. The criminal investigation disclosed that the wounds were self-inflicted. (c) Suicidal cut wounds on the volar surface of the left forearm of a 36-year-old woman. Note numerous tentative incisions. No major blood vessel was severed, and she jumped into a lake and drowned. She had undergone hospital treatment for a depressive reaction. (d) One single homicidal stab wound of the anterior chest wall of a 21-year-old male Swede. Queuing with his girlfriend outside an amusement park he scolded a young South European immigrant who was jumping the line and who replied by stabbing the Swede to death. Blood alcohol concentration in the victim was 900 mg/L. (e) Multiple homicidal stab wounds of the anterior chest wall of a 20-year-old male bisexual. He had taken a prostitute home for heterosexual activity for himself and his homosexual partner. However, although the partner was unable to perform he was requested to pay the ordinary fee. This made the homosexual partner outrageous, and he dealt his friend numerous stabs with a knife and a serving fork. (f) Self defense cut wounds on the right hand of a 34-year-old male alcoholic who was stabbed to death by his likewise alcoholic brother. Blood alcohol in the victim was 2900 mg/L, urine alcohol 3200 mg/L.

by observation and interpretation of the pattern of injury in each particular case conveys important information about the assailant and the victim, their mutual relationship, the situation leading up to the stabbing, and, eventually, psychological factors that may have created or precipitated the acute burst of violence.

Materials and Methods

The data presented here about homicidal sharp force injuries are part of an extensive study comprising all cases of fatal sharp force injury examined at the National Institute of Forensic Medicine in Stockholm during the ten-year period 1973 to 1982. Sources of information have been autopsy reports, results of toxicological examination, police records, forensic psychiatric

records, and verdicts from court. Altogether, data are obtained from 142 victims and 141 perpetrators of homicidal stabbing or cutting.

At the National Institute of Forensic Medicine in Stockholm, forensic medical examinations are performed on deceased and live persons having been involved in criminal acts in a region comprising the counties of Stockholm, Södermanland, and Gotland. All victims of unnatural death in the region are subjected to medicolegal autopsy. Thus, our data on sharp force fatalities represent a nonselected quantitative population of victims to stabbing and cutting. The total population of the region was about 1 700 000 in 1973 and 1 800 000 in 1982. The city of Stockholm in 1978 comprised 658 400 inhabitants, the total area 1 380 426. Besides Stockholm city, our region comprises 22 towns and rural communities. In 1978 in this total area there were about 128 500 foreigners, that is, about 7% of the total population (Finns [57 205], Greeks [8153], Turks [8000], and Yugoslavs [6611] constituting major groups, and about 16 000 from other European and 30 000 from non-European countries like South-East Asia, Africa, Arab countries, and South America).

Results

Incidence

In our region of the country, the incidence of fatalities caused by sharp force injuries has been steadily increasing during the period investigated. Figure 2 demonstrates that the increase in our series exclusively is accounted for by homicidal stabbing and cutting, whereas suicidal and accidental cases show no systematic trend.

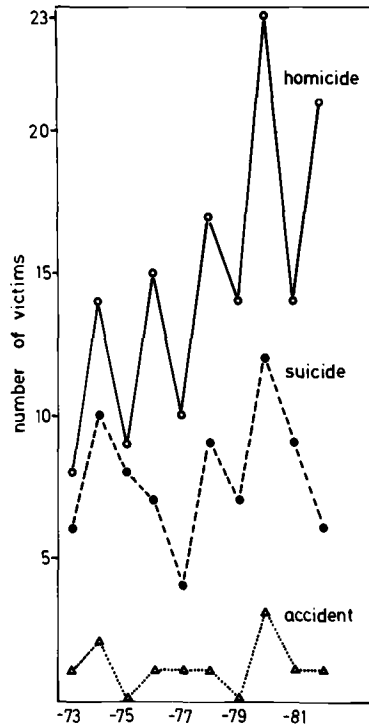


FIG. 2—Incidence of fatalities caused by sharp force injuries in the Stockholm area, 1973 to 1982.

Victims

The majority of victims to fatal stabbing and cutting in our material are males (Fig. 3). Their age distribution ranges from about 1 to > 80 years with the majority between 20 and 40 years. The annual number of female victims is fairly constant over the period, and thus the percent representation of females has fallen from > 30% in 1973 to < 20% in 1982. The age distribution for female victims was similar to that of males with a slight shift towards younger age groups.

A parameter which presumably conveys information pertinent to the reconstruction of the fatal event is the number of wounds inflicted upon the victim. On recording these data, we have not included wounds of a typical "defense injury" character; thus, the numerals presented refer to injuries inflicted by directed hits of the assailant's weapon. We found that victims with one injury were by far most common (Fig. 4), 62 of 142 cases (44%). The number of cases exhibiting one or two injuries amounted to 58% of the total material. Relatively, there were fewer females among victims having sustained few injuries, more among those with several injuries.

In the majority of our cases, deep or penetrating injuries were found in the anterior thoracic or abdominal region, inflicted upon direct confrontation. Injuries in the back were uncommon in victims of one-wound killings, but quite frequently found in victims of multiple wounding (Fig. 5). Injuries to the buttocks and genitals occurred in only one case—a middle-aged woman stabbed by a teenage boy who dealt her more than 50 injuries with a screwdriver. Facial injuries only occurred in cases of multiple wounding.

Classical deep cut-throat lesions were found in four victims, all of which had suffered multi-

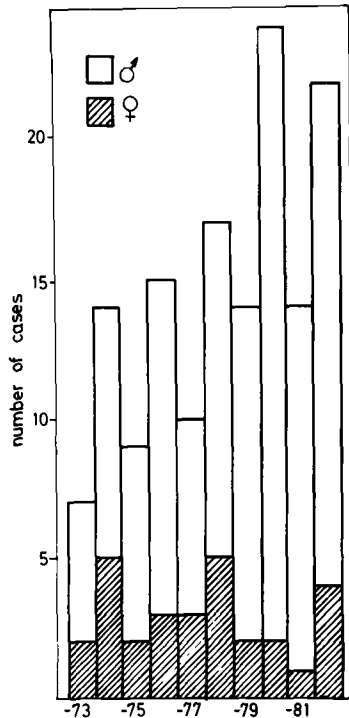


FIG. 3—Incidence and relative representation of sexes in victims of homicidal sharp force violence in the Stockholm area 1973 to 1982.

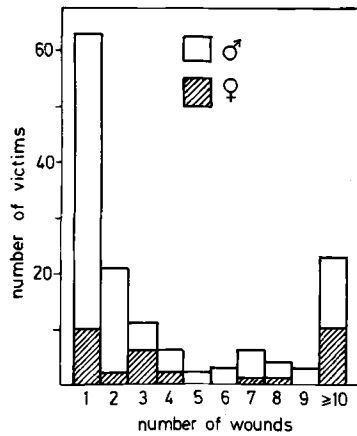


FIG. 4—Variation in the number of stab or cut wounds (except defense injuries) in victims of homicidal sharp force violence in the Stockholm area 1973 to 1982.

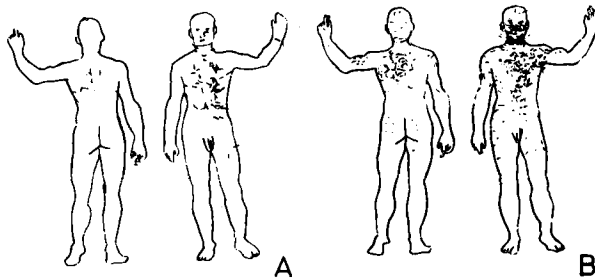


FIG. 5—Schematic superimposed representation of wound localization in victims of homicidal sharp force violence. (a) One-wound cases (N = 62) and (b) ≥ ten-wound cases (N = 23).

ple wounds. Thus, a cut throat did not occur as a single injury in our series. Only one of these four perpetrators was Swedish; two of the victims were females who had been killed by a jealous husband or fiancé, respectively. One of these couples were Greeks, the other from Bangladesh.

Nonlethal injuries suggesting a ritualistic or symbolic pattern were found in three victims, all of which exhibited a set of two parallel, superficial slashes running horizontally across the left side of the neck as well as superficial or penetrating wounds of the cheeks. In these cases the victims as well as the perpetrators were Finnish gypsies. Cases of more gross maiming or dismemberment did not occur in the present series of persons killed by sharp force.

Assailants

In our series, 141 perpetrators of 142 cases of homicidal sharp force violence are known; 140 have been subjected to police investigation and 132 taken to court. One man killed his wife and his daughter and committed suicide immediately afterwards; in another case there are strong indications as to the identity of the perpetrator (a sailor who disappeared simultaneously as one of his colleagues was found dead on board their ship in open sea). In the remaining material of 132 perpetrators there was a strong male dominance (≈ 80%) (Fig. 6). Female perpetrators were exclusively found in cases where one to three wounds had been inflicted, with the only exception—a woman who had dealt her victim (her lover's father) seven stabs—having been heavily intoxicated by narcotic drugs at the time of the killing.

In 30 cases (21%), the perpetrator was a male and the victim a female. Among these 30 women, 11 (37%) had received ≥ 10 wounds.

The combination of a female perpetrator and a male victim is found in 16 cases. The combination of a female perpetrator and a female victim does not occur in our series and thus probably is fairly uncommon. In twelve cases the victim had sustained only one wound, in two cases two wounds, in one case three; in the remaining case a heavily drugged woman dealt her victim seven stabs. All the instances where the woman and her victim were closely related fall within the group exhibiting only one wound. Most of these cases were the ultimate result of domestic quarrels or fights over alcohol. In four cases, that is, every fourth case, a female perpetrator claimed that she had been attacked or felt threatened by her victim-to-be, and had seized and used a knife—which was within reach on the premises—to defend herself or to get even with her opponent. However, in no case where a female perpetrator claimed that the victim stumbled or walked into the knife she was clutching could reconstruction corroborate such a version (Fig. 8).

In the majority of cases, the participants in the fatal drama were known to each other (Fig. 9). Only about 20% were not acquainted, about 30% knew each other well, that is, had an emotionally/socially close relationship (family, lovers, ex-partners, close friends). In the group of cases ($N = 23$) where multiple (≥ 10) wounds had been inflicted, 11 pairs (47%) were closely related according to our definition as given above; whereas among 62 victims having suffered only 1 wound, 16 (26%) had a close relationship to the perpetrator, and in 12 (20%) of those cases, victim and assailant were strangers to each other. Furthermore, the distribution of wounds seems to convey information on the relationship between victim and assailant. Among 29 cases of facial injury they had an emotionally close relationship in 13 cases, were acquainted in another 13 cases, and unknown to each other in 3 cases. Among the four cases of deep cut-throat lesions, three perpetrators were closely acquainted to their victim, one less closely but still known. In all three cases of presumably ritualistic injury, the assailants knew their victims. On the other hand, in the only case of genital injury encountered in our series, victim and assailant were totally unknown to each other.

The relationship between assailant and victim is also reflected by the location of the incident: Among a total of 142 fatal knifings, 74 incidents (52%) had taken place at one of the par-



FIG. 8—These two photographs were taken during reconstruction of the circumstances preceding a fatal knife injury. The woman claimed that she had been carving a chicken in the kitchen and just briefly went into the living room to look up some sport result in the newspaper (a). Suddenly her husband lost his balance, fell upon her knife (b), and died within minutes. The location of the wound was correctly given, but the direction and the length of the wound channel (broken line) did not fit with the woman's description. Consequently, it was concluded that she had actively stabbed the man to death. He was an alcoholic and had beaten her several times. Postmortem blood alcohol concentration was 2800 mg/L, urinary concentration 4000 mg/L. The perpetrator was sober.

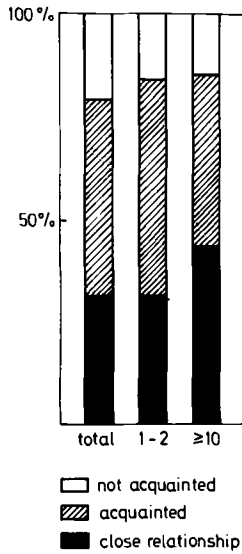


FIG. 9—Schematic representation of relationship between victims and perpetrators of homicidal sharp force violence in the Stockholm area, 1973 to 1982. Left column: total series. Middle column: victims having suffered one to two injuries. Right column: victims having suffered ≥ 10 injuries.

ticipants' home. Among 23 cases where ≥ 10 wounds had been inflicted, 16 (70%) occurred in domestic environments, whereas 1-wound homicidal stabbings ($N = 62$) occurred outdoors in 16 cases (26%), indoors (staircases, restaurants) in 17 cases (27%), and at the perpetrator's or victim's home in 29 cases (47%).

Ethnic Groups

At the end of the period investigated, inhabitants of non-Swedish origin had reached about 162 000, thus constituting about 9% of the total population.

In the Stockholm area, about 4% of the present population are Finnish immigrants and approximately another 5% come from other, non-Nordic countries. Among the total group of victims as well as that of assailants, native Swedes comprised about 70%, which is less than their de facto representation (about 91%) in the nonselected population (Fig. 10). Irrespective

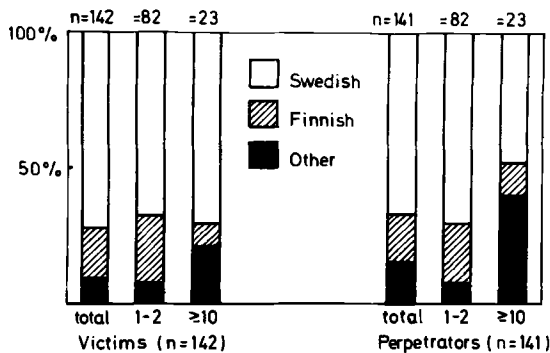


FIG. 10—Relative representation of major ethnic groups among victims (left) and perpetrators (right) of homicidal sharp force violence in the Stockholm area 1973 to 1982.

of the number of wounds inflicted, the proportion of native Swedish victims was fairly constant. Among the assailants, Swedes were even more clearly underrepresented in the group having dealt \geq ten wounds. Finns were relatively overrepresented among the total population of assailants; even more so among those in the one- to two-wounds group, but clearly less among those having dealt multiple wounds. Non-Nordic citizens were particularly overrepresented among assailants as well as victims in the group of $>$ ten wounds.

Role of Alcohol

Alcoholism and acute alcohol inebriation are well-known catalysts for violent behavior. Not surprisingly, we found that alcohol was explicitly mentioned in a majority of the police records on our cases. In 116 of the victims, samples for blood ethanol determination had been obtained—either upon arrival to hospital or at autopsy. A blood ethanol concentration above 300 mg/L was found in 86 persons; 78 of the 89 males (88%), but only 8 (30%) of the 27 females (Fig. 11).

In 89 victims, data for alcohol concentrations in both peripheral blood and urine were available. As shown in Fig. 12, in the vast majority of cases blood alcohol was lower than urinary alcohol, that is, the victim had died during the excretory phase. This may indicate that at the moment of stabbing the victim was approaching a state of hangover and thus—because of slow reflexes and bad general condition—was unable to fight off the attack or run for safety. In a minor number of cases a decrease of blood alcohol concentration may have occurred during the interval between fatal injury and hospital admission or moment of death.

In 120 cases the perpetrator was subjected to medical examination within the first hours after the fatal incident, or it was subsequently witnessed that he/she had been drunk at the time (Fig. 13). Similar to what was found in the victims, about 80% had measurable concentrations of alcohol in peripheral blood or admitted to having been drunk when the crime was performed. This was even more common in the group having dealt one to two wounds (\cong 90%), but clearly less so (\cong 50%) among those having inflicted multiple wounds. Data on urinary alcohol concentration are not available in the perpetrators; thus, we are unable to comment on the phase of alcohol metabolism they may have been in.

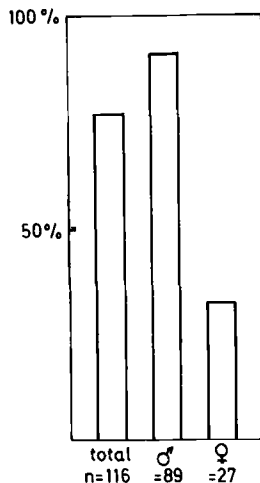


FIG. 11—Incidence of blood alcohol concentration above 300 mg/L in victims of homicidal sharp force violence in the Stockholm area 1973 to 1982.

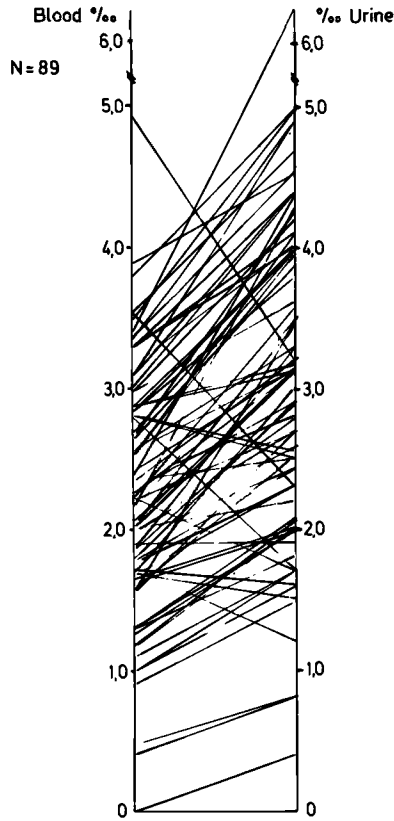


FIG. 12—Schematic representation of blood (left) and urinary (right) alcohol concentrations in 89 victims of homicidal sharp force violence in the Stockholm area 1973 to 1982.

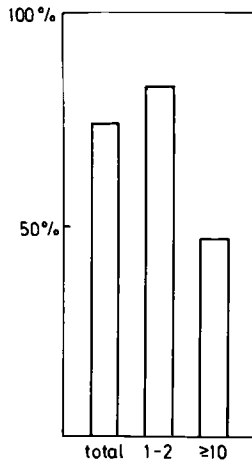


FIG. 13—Incidence of alcohol inebriation (witnessed or measured ≥ 300 mg/L) in 120 perpetrators of homicidal sharp force violence in the Stockholm area 1973 to 1982.

Drug addiction or intoxication was explicitly mentioned in the police records of eight cases (6%) of victims and perpetrators. This incidence must be regarded as a minimal value since no systematic investigation of drug habits has been done.

Weapons Used

Information on the type of knife or tool used to inflict the fatal injuries is available in 128 cases. In 80 cases (62%), a knife had been picked up at the site of the killing. These fatalities occurred indoors in domestic environment and the knives were mainly of an ordinary household type (carving knife, bread saw, paper knife). In the remaining 48 cases (38%), the perpetrator or the victim had brought a knife or a sharp tool in order to attack or to defend himself, and among these, sports knives, carpenters' knives, or clasp knives dominated. Screwdrivers, scissors, stilettos, bayonets, and serving forks were used in one or two cases each.

Motives

A wide variety of circumstances and interpersonal settings surrounded the situations culminating in fatal sharp force wounding. Based upon the assumption that one-wound killings were different from multiple wounding fatalities, we have compared the alleged motives stated by perpetrators or by witnesses in these two groups of fatal knifing (Table 2). From these data it is evident that whereas one-wound cases often (55%) are a result of a quarrel or fight between drinking buddies and less often have a closer emotional or sexual background, the reverse is true for multiple-wound cases where an emotionally laden situation existed between victim and perpetrator in 60%. Obscure motives were more common in the latter group—5 of 23 cases (22%) as compared to merely 5 of 62 cases (8%) in one-wound killings.

Discussion

Stab and cut wounds always have potential legal implications, and in addition to the obvious necessity of therapeutic intervention, it is a task of the attending physician to assist in the police investigation of the situation leading to wounding and in fatal cases to death.

During the period investigated, the incidence of sharp force fatalities has shown a marked increase (see Fig. 1), which solely is accounted for by homicidal violence. Similar trends have

TABLE 2—*Alleged motives for homicidal sharp force violence in the Stockholm area 1973 to 1982.*

Circumstances/Motive	1 Injury N = 62	≥ 10 Injuries N = 23
Quarrel, fight over alcohol or money	34	4
Jealousy	6	6
Unknown	5	5
Psychiatric disorder	3	4
Alcoholic psychosis	3	0
Ethnic animosity	3	1
Assailant felt threatened	3	0
Revenge, punishment	2	0
Assault	1	0
Rape/homosex	1	3
Extended suicide	1	0

also been reported from London by Lambrianides and Rosin [1] and from Oslo, Norway by Thoresen.²

According to a recent study by Rammer and Somander [2], stabbing and cutting are the most common forms of violence involved in homicidal fatalities in Sweden, that is, 130 cases (33%) among a total of 391 homicides from 1973 to 1976, blunt force violence ranking second (120 cases). According to Kua et al [3] sharp instruments as murder weapons are even more common in Singapore where 55% of homicides were a result of sharp force injury.

Data from the last five years of our study yield a mean annual incidence of homicidal sharp force fatalities of about 1 per 100 000 inhabitants in the Stockholm region. According to Fig. 1, the incidence is likely to continue rising and medicolegal interpretation of these kind of injuries may become increasingly important in optimizing criminal law enforcement.

The present series of victims comprised 30 females and 112 males, that is, an overall female representation of about 21% showing a decreasing tendency during the ten-year period. This is in good agreement with the data of Frazer [4] who reported about 20% females among a series of homicide victims in Oklahoma, USA, and those of Lambrianides and Rosin [1] who recorded 20 females among 100 cases admitted to hospital in London with penetrating stab injuries. Furthermore, it fits reasonably well with the observations reported by Blomqvist et al [5] on 192 hospital-treated cases of sharp force injuries in Stockholm in the 1970s among which only 11 (6%) were females, but where the women generally were more seriously injured than the male victims.

Our observation of one single wound in almost half the cases (see Fig. 3) is in good agreement with the data reported by Blomqvist et al [5] who found that about 67% of their series of victims had sustained only one stab. However, it is at variance with the opinion voiced by Mason [6]: "single homicidal stab wounds are comparatively rare. . . ." Still we agree with his further comment that: "it may be reasonable in such atypical cases to question the intention to kill and to accept them as instances of involuntary murder, manslaughter or culpable homicide."

It is a common experience in criminology that females are less apt than males to be involved in criminal acts of violence as perpetrators, with the possible exception of child abuse. Thus, we were not surprised to find that only 16 of 141 perpetrators (11.3%) were females. In all these cases, the victim was male (see Table 1), closely related to the perpetrator in 11 cases, less closely—but still acquainted—in 5 cases. Consequently, our series contains no case where one woman has knifed another and no case where a woman has knifed someone unknown to her. In one case known to us—which is not included in this series because it occurred outside the time period investigated—a prostitute was killed by more than 10 slashes and stabs. It was assumed that the perpetrator was male. The investigation indicated, however, that the killer was a female bisexual, and this woman committed one more—practically identical—murder of another female prostitute several years later.

According to our findings, one may conclude that in cases of fatal stabbing of a female, an unknown perpetrator is less likely to be another woman. Furthermore, if a perpetrator of fatal knifing is witnessed to be female, she should be sought for among the victim's closer acquaintances or within his family.

The relative overrepresentation of non-Swedish persons among perpetrators as well as among victims probably has a multifactorial explanation [7]: A wide variety of cultural, socio-economic, and psychological mechanisms tend to distinguish first generation immigrants from the native population of their host country: Circumstances before, during, and after the moving are often arduous; the majority of recently arrived immigrants belong to the relatively crime-prone age groups (20 to 50 years), and may represent a selection of personalities prepared literally to fight for their existence. Moreover, the immigrants may experience frustrat-

²S. Thoresen, M.D., Ph.D. personal communication, Department of Forensic Medicine, University of Oslo Medical School, Oslo, Norway, 1984.

TABLE 3—Nationality of persons involved in homicidal violence.

	All Homicides ^a				Stabbing/Cutting ^b			
	Victims N = 391		Perpetrators N = 383		Victims N = 142		Perpetrators N = 141	
	N	%	N	%	N	%	N	%
Swedish	336	86	320	84	102	72	93	66
Other Nordic ^c	34	9	31	8	28	20	26	18
Non-Nordic	19	5	32	8	12	8	22	16
Unknown	2	1	0	0	0	0	0	0

^aData from 1973 to 1976 [2].

^bData from 1973 to 1982 (present study).

^cThe term Nordic countries comprises Denmark, Finland, Iceland, Norway, and Sweden.

ing conflicts between the rules of behavior, concepts of honor, and social roles in their native country and those of Sweden. Furthermore, political and ethnic feuds may be continued after immigration, and our series contain a couple of cases where disagreements on political matters among immigrants culminated in fatal stabbing.

A comparison of our data to those of Rammer and Somander [2] discloses interesting differences regarding the relative representation of major ethnic groups. Whereas non-Swedes are overrepresented among victims as well as among perpetrators in both series, this tendency is clearly more marked among persons involved in sharp force violence (Table 3). In our series, the group of non-Swedes of Nordic origin comprised solely Finns, which also constituted the bulk of Rammer and Somander's "Other Scandinavians" group.³ Thus, in Sweden, Finns as well as immigrants of more exotic origin are more apt to be involved in fatal knifing than in other forms of homicidal violence.

The prevalent pattern concerning the ethnic origin of victims and perpetrators is that they are of the same nationality. The most common combination was that of a Swede stabbing a Swede, and among Finnish perpetrators there was a dominance of Finnish victims (data not explicitly shown).

The high incidence of alcohol inebriation in victims as well as in perpetrators reflects the well-known experience "when alcohol goes in, sanity goes out." Among 85 cases where alcohol was detected in the victim's blood at autopsy, 78 perpetrators had also been drunk at the time of infliction. Thus, it seems that sobriety is a protective factor against becoming involved in sharp force violence at both ends of the knife—at least for males (see Fig. 11). However, whereas alcohol may be a risk factor for pulling the knife, it does not seem to contribute to the repeated use of it: in cases where \geq ten wounds had been inflicted, the incidence of positive blood alcohol tests was lower in victims (see Fig. 13) as well as in perpetrators as compared to the group of one- to two-wound killings.

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