

The epidemiology of blood-injection-injury phobia

O. JOSEPH BIENVENU¹ AND WILLIAM W. EATON

From the Department of Psychiatry and Behavioral Sciences, School of Medicine and Department of Mental Hygiene, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, MD, USA

ABSTRACT

Background. We report the prevalence, clinical characteristics, frequency of mental health treatment, demographic correlates, frequency of co-morbid psychiatric conditions, and general health ramifications of DSM-IV blood-injection-injury phobia in the general population.

Method. The Diagnostic Interview Schedule (version III-R), which included questions on blood-injection-injury phobia, was administered to 1920 subjects in the Baltimore ECA Follow-up Study.

Results. The estimated unweighted lifetime prevalence of blood-injection-injury phobia was 3.5%. The median age of onset was 5.5 years; 78% had had symptoms within the last 6 months. Subjects with blood-injection-injury phobia (cases) had higher lifetime histories of fainting and seizures than those without (non-cases). None reported seeking mental health treatment specifically for phobia. Prevalences were lower in the elderly and higher in females and persons with less education. Cases had significantly higher than expected lifetime prevalences of other psychiatric conditions, including marijuana abuse/dependence, major depression, obsessive-compulsive disorder, panic disorder, agoraphobia, social phobia and other simple phobia. Cases and non-cases did not differ with regard to usual health-care settings, regular care for specific medical conditions, numbers of out-patient visits or hospitalizations, or previous general anaesthesia or live births. However, diabetics with blood-injection-injury phobia had higher than expected rates of macrovascular complications.

Conclusion. Blood-injection-injury phobia is common, especially in females and those with less education, and it is associated with several co-morbid psychiatric conditions. No strong, broad general health ramifications of this phobia are apparent. However, diabetics with this phobia appear at particular risk for complications; this deserves further study.

INTRODUCTION

A decade ago, Marks (1988) reviewed what was known about what he called 'blood-injury phobia'. Most of the information came from clinical studies, as epidemiological studies of this condition predate modern diagnostic criteria or are limited to the female sex. In the present paper, we describe the epidemiology of DSM-IV blood-injection-injury phobia, ascertained in a large sample from eastern Baltimore.

Torgerson (1979) found that 'mutilation' fears cluster together in a factor analysis of phobic fears. These mutilation fears include fears of

hospitals, surgical operations, open wounds, injections, blood, the smell of medicine and hospitals, pain, and doctors. Persons with these fears have a propensity to faint in the phobic situation; this propensity is not found with other phobias (Connolly *et al.* 1976). Fainting in this situation has been associated with seizures (Marks, 1988). Some have argued that mutilation phobias should have their own diagnostic category, separate from other simple (specific) phobias (Thyer *et al.* 1985). They are grouped together in DSM-IV under specific phobia, blood-injection-injury type. Most authors have restricted their foci of study to one or several mutilation fears when discussing this phobia; we do the same here (we focus on fears of blood, injections and dentists, three of the most common mutilation fears).

¹ Address for correspondence: Dr O. Joseph Bienvenu, The Johns Hopkins Hospital, Meyer 4-181, 600 N. Wolfe Street, Baltimore, MD 21287, USA.

Previous epidemiological studies of blood-injection-injury phobia have included samples of less than 500 (total) subjects each, and none used DSM criteria for ascertainment. Lapouse & Monk (1959) found that fears of blood and injury are present in about one-third of children. In a study of women, Costello (1982) found that prevalences of mutilation fears and phobias are lower in older age groups. Agras *et al.* (1969) found that phobias of illness and injury have their onset in childhood and are present in about 3% of adults, more often in women than in men. The original Epidemiologic Catchment Area Program did not assess blood-injection-injury phobia (Boyd *et al.* 1990) and the National Comorbidity Survey did not have a section for blood-injection-injury phobia separate from other simple phobias (Magee *et al.* 1996).

In his 1988 review, Marks report that, except in one series (Thyer *et al.* 1985), most patients with blood-injury phobia have no excess of other anxiety disorders or depression. This is in contrast to what Neale *et al.* (1994) found in a population-based study of female twins. In that study, subjects with blood-needle-hospital-illness phobia had higher than expected lifetime prevalences of alcoholism, bulimia, major depression, panic and other phobias. As far as we know, there are no previous general population-based studies of psychiatric co-morbidity with blood-injection-injury phobia.

Possibly serious general health ramifications of blood-injection-injury phobia have been discussed in previous reports (Thyer *et al.* 1985; Marks, 1988); the most obvious of these is that these phobics may refuse vital medical procedures. Marks wrote that blood-injury phobics may eschew insulin injections for diabetes, shun surgery for cancer, avoid hospitals and sick people, and avoid becoming pregnant because of their fears. These health ramifications have not been addressed in previous population-based studies.

In the present study, we employ data from the Baltimore Epidemiologic Catchment Area (ECA) Follow-up Study to address several questions of relevance to blood-injection-injury phobia: (1) What is its prevalence in the community?; (2) What are its clinical characteristics?; (3) What proportion of persons with it seek mental health treatment?; (4) What demographic factors are associated with it?; (5) What

other lifetime psychiatric conditions are associated with it?; and (6) What are its general health ramifications?

METHOD

The ECA Program was an epidemiological investigation of psychopathology in adults (18 years of age and older) in five US communities, conducted in the early 1980s. It employed trained non-clinician interviewers who administered the National Institute of Mental Health Diagnostic Interview Schedule (DIS) (Robins *et al.* 1981). In the Baltimore ECA Follow-up Study, conducted from 1993–6, 88% of the 3481 subjects from the original Baltimore cohort were traced and 73% of those alive ($N = 1920$) were reinterviewed using the III-R version of the DIS (updated to make DSM-III-R diagnoses; in the case of blood-injection-injury phobia, the diagnostic criteria are similar in DSM-III-R and DSM-IV). Eaton *et al.* (1997) describe the methodology in more detail elsewhere.

The blood-injection-injury section of the DIS (III-R) starts by asking if the subject has ever had such an unreasonable fear of seeing blood, getting an injection, or going to the dentist that he or she tried to avoid it. Those who do not respond affirmatively are passed out of the section. In order to meet criteria for a DSM-IV specific phobia, the fear(s) have to be persistent (lasting months to years); almost always provoke extreme nervousness or panic; be recognized as unreasonable; and cause significant interference in social, occupational, or other routine activities (or the subject has to have marked distress about having the fear). The only DSM-IV (and DSM-III-R) criterion not addressed with this interview is that the anxiety or avoidance are not better accounted for by another mental disorder.

Lifetime prevalence estimates for blood-injection-injury phobia were calculated with and without a population weighting factor to duplicate census proportions by age, sex, and race (Kessler *et al.* 1985). Odds ratios for lifetime fainting and seizures given blood-injection-injury phobia were calculated with logistic regression, with and without adjustment for age group and sex. Demographic correlates and lifetime co-morbid psychiatric disorders (the latter ascertained using DSM-III-R criteria) were also assessed with logistic regression.

Avoidance of health-care settings was assessed using Fisher's exact test for homogeneity of cases (those with blood-injection-injury phobia) and non-cases (those without). Subjects were asked, 'When you want help with or care for a health problem, where do you usually go?'. Response choices included nowhere, a hospital out-patient department, a hospital emergency room, a company clinic, a health department clinic, a community health centre, a health maintenance organization, a physician's office/group, home, or some other place; each subject chose one response. Cases and non-cases were similarly compared with regard to regular medical care for the following conditions: diabetes mellitus, heart trouble, hypertension, arthritis, stroke and seizures. In addition, logistic regression was used to adjust for possibly confounding demographic variables in these comparisons. Finally, cases and non-cases were compared with regard to number of out-patient visits in the last 6 months, number of hospitalizations in the last 12 months and number of hospitalizations since 1981, using linear regression.

Cases were compared to non-cases regarding previous general anaesthesia for surgery or other medical procedures using logistic regression. Women with and without blood-injection-injury phobia were similarly compared with regard to previous live births, and diabetics with and without this phobia were compared with regard to use of insulin and diabetic complications.

RESULTS

The unweighted lifetime prevalence of blood-injection-injury phobia was estimated at 3.5% ((60/1724), 95% CI = 2.6%, 4.3%); the weighted estimate was 3.1% (95% CI = 2.2%, 4.0%). The mean age of onset was 10.5 years (s.d. = 13.8); however, the distribution was highly skewed, with only a few onsets at older ages. The median age of onset was 5.5 years. Fourteen of the 60 subjects with blood-injection-injury phobia (23%) reported fear of blood; 28 (47%) reported fear of injections; and 47 (78%) reported fear of dentists. Forty-seven of these subjects (78%) had had symptoms in the last 6 months. Subjects with blood-injection-injury phobia were significantly more likely than those without to have lifetime histories of fainting

(25% (15/60) v. 14% (232/1661)) and seizures (17% (4/60) v. 2% (38/1664)). Unadjusted odds ratios were 2.0 (95% CI = 1.1, 3.7) and 3.0 (95% CI = 1.0, 8.8), respectively. Adjusted for age group and sex, the odds ratios were 1.8 (95% CI = 1.0, 3.4) and 3.5 (95% CI = 1.2, 10), respectively.

Thirty-five subjects with blood-injection-injury phobia (58%) had told a physician or other health professional of their fears. Thirty-two (53%) had sought help for a mental health problem, 25 (42%) from mental health professionals. However, none of these subjects reported his or her phobia as a problem for which he or she sought mental health treatment. Their most common reasons for seeking such treatment were stress, relationship problems, depression, nervousness, and substance use problems.

The demographic characteristics of subjects with blood-injection-injury phobia are illustrated in Table 1. Subjects in older age groups generally reported lower lifetime prevalences. Females and those persons with lower levels of education generally reported higher lifetime prevalences. There were no significant differences by race, marital status, or household income. Adjustment for all demographic variables simultaneously did not markedly change odds ratios from those in univariate analyses.

The lifetime prevalences of other psychiatric conditions in subjects with and without blood-injection-injury phobia are illustrated in Table 2. Odds ratios for having lifetime histories of DSM-III-R marijuana abuse/dependence, major depression, obsessive-compulsive disorder, panic disorder, agoraphobia, social phobia and other simple phobia were significantly greater than 1.0 for subjects with blood-injection-injury phobia compared with non-cases, with or without adjustment for age group, sex and education group ($P < 0.05$). Only six subjects with blood-injection-injury phobia had no co-morbid diagnoses.

The distributions of usual health-care settings for subjects with and without blood-injection-injury phobia were not significantly different overall ($P = 0.93$) or in any specific setting (2% of 60 cases v. 4% of 1664 non-cases said they usually went nowhere when they wanted help with or care for a health problem; 13% v. 12% went to a hospital out-patient department; 5% v. 5% went to a hospital emergency room; 2%

Table 1. Demographic characteristics of subjects with and without lifetime blood-injection-injury phobia

	Non-cases <i>N</i>	Cases <i>N</i>	Prevalence %	Unadjusted		Adjusted*	
				OR	(95% CI)	OR	(95% CI)
Age							
27–39	427	13	3.0	1.4	(0.6, 3.3)	1.7	(0.6, 4.8)
40–49	438	24	5.2	2.6	(1.2, 5.4)	3.2	(1.2, 8.6)
50–64	333	13	3.8	1.8	(0.8, 4.2)	2.1	(0.8, 5.4)
≥ 65	466	10	2.1	1.0	—	1.0	—
Sex							
Male	634	12	1.8	1.0	—	1.0	—
Female	1030	48	4.4	2.4	(1.3, 4.6)	2.1	(1.0, 4.0)
Race							
White	1041	32	3.0	1.0	—	1.0	—
Black or other	623	28	4.3	1.5	(0.9, 2.4)	1.0	(0.6, 1.9)
Marital status							
Married	829	24	2.8	0.7	(0.3, 1.4)	0.8	(0.3, 2.0)
Widowed	290	8	2.7	0.6	(0.2, 1.6)	0.9	(0.3, 2.7)
Separated/divorced	317	18	5.4	1.3	(0.6, 2.8)	1.2	(0.5, 2.8)
Never married	228	10	4.2	1.0	—	1.0	—
Education							
≤ 8th grade	279	9	3.1	1.5	(0.6, 3.7)	2.2	(0.7, 6.4)
9th to 11th grade	411	24	5.5	2.6	(1.2, 5.8)	2.5	(1.0, 6.0)
12th grade	564	18	3.1	1.4	(0.6, 3.3)	1.3	(0.6, 3.0)
> 12th grade	410	9	2.1	1.0	—	1.0	—
Household income							
≤ \$12499/year	347	19	5.2	2.0	(0.9, 4.6)	1.4	(0.5, 3.9)
≤ \$24999/year	330	16	4.6	1.8	(0.8, 4.2)	1.4	(0.6, 3.8)
≤ \$49999/year	392	13	3.2	1.2	(0.5, 2.9)	1.2	(0.5, 2.8)
> \$50000/year	338	9	2.6	1.0	—	1.0	—

OR, odds ratio; CI, confidence interval.

* Adjusted for all other demographic variables (*N* = 1464).

Table 2. Lifetime prevalences of other psychiatric diagnoses in subjects with and without lifetime blood-injection-injury phobia

	Cases (<i>N</i> = 60)		Non-cases (<i>N</i> = 1664)		Unadjusted		Adjusted*	
	Frequency	(%)	Frequency	(%)	OR	(95% CI)	OR	(95% CI)
Alcohol abuse/dependence	10	(17)	247	(15)	1.1	(0.6, 2.3)	1.4	(0.7, 3.0)
Cocaine abuse/dependence	3	(5)	49	(3)	1.7	(0.5, 5.7)	1.5	(0.4, 5.3)
Marijuana abuse/dependence	6	(10)	72	(4)	2.4	(1.0, 5.9)	3.1	(1.2, 8.1)
Major depression	14	(23)	74	(4)	6.4	(3.4, 12)	5.8	(3.0, 11)
Generalized anxiety disorder	2	(3)	28	(2)	2.0	(0.5, 8.8)	1.7	(0.4, 7.4)
Obsessive-compulsive disorder	4	(7)	14	(1)	8.4	(2.7, 26)	6.8	(2.1, 22)
Panic disorder	6	(10)	30	(2)	6.0	(2.4, 15)	4.7	(1.8, 12)
Agoraphobia	9	(15)	54	(3)	5.3	(2.5, 11)	4.1	(1.8, 9.0)
Social phobia	12	(20)	89	(5)	4.4	(2.3, 8.6)	4.0	(2.0, 7.9)
Other simple phobia	23	(38)	125	(8)	7.6	(4.4, 13)	6.4	(3.6, 11)

OR, odds ratio; CI, confidence interval.

* Adjusted for age group, sex, and education group.

v. 1% went to a company clinic; 0% v. 1% went to a health department clinic; 17% v. 12% went to a community health centre; 15% v. 16% went to a health maintenance organization; 47% v. 48% went to a physician

office/group; 0% stayed at home; 0% v. 1% other; and 0% v. 0% respectively, did not know ($P > 0.05$ in all comparisons)). Similarly, there were no significant differences between groups with regard to regular care for diabetes

Table 3. Numbers of out-patient visits and hospitalizations in subjects with lifetime blood-injection-injury phobia, compared with non-cases

	Cases		Non-cases		Unadjusted		Adjusted	
	Mean	s.d.	Mean	s.d.	β^*	(95% CI)	β^{**}	(95% CI)
Out-patient visits in the last 6 months	3.42	6.85	2.81	5.76	0.60	(-0.89, 2.10)	0.46	(-1.04, 1.96)
Hospitalizations in the last 12 months	0.10	0.30	0.17	0.63	-0.07	(-0.24, 0.09)	-0.05	(-0.21, 0.11)
Hospitalizations since 1981	1.45	1.92	1.05	1.62	0.40	(-0.02, 0.82)	0.33	(-0.09, 0.75)

s.d., standard deviation; CI, confidence interval.

*Linear regression coefficient for subjects with blood-injection-injury phobia compared with non-cases, unadjusted.

**Linear regression coefficient for subjects with blood-injection-injury phobia compared to non-cases, adjusted for age group, sex, and education group.

Table 4. Complications and use of insulin in diabetics with and without lifetime blood-injection-injury phobia

	Cases (N = 8)		Non-cases (N = 138)		Unadjusted		Adjusted*	
	Frequency	(%)	Frequency	(%)	OR	(95% CI)	OR	(95% CI)
Retinopathy	4	(50)	56	(40)	1.4	(0.3, 5.7)	1.2	(0.2, 5.3)
Neuropathy	3	(38)	55	(40)	0.9	(0.2, 3.9)	0.7	(0.2, 3.5)
Peripheral vascular disease	3	(38)	15	(11)	4.8	(1.0, 22)	7.9	(1.4, 45)
Nephropathy	1	(12)	6	(4)	3.0	(0.3, 29)	3.8	(0.3, 55)
Cardiovascular disease	3	(38)	10	(7)	7.1	(1.5, 34)	13.6	(2.0, 93)
Taking insulin	2	(25)	58	(42)	0.5	(0.1, 2.4)	0.4	(0.1, 2.6)

OR, odds ratio; CI, confidence intervals.

*Adjusted for age group, sex, education group, and years diabetic.

mellitus (7/8 cases reported regular care, v. 126/137 non-cases), heart trouble (8/11 v. 152/182), hypertension (14/14 v. 383/395), arthritis (18/25 v. 289/499), stroke (2/2 v. 43/74), or seizures (2/4 v. 15/37) ($P > 0.05$ in all comparisons); similar findings were obtained with logistic regression, with or without adjustment for age group, sex, and education group (not shown). There were also no statistically significant differences between groups with regard to number of out-patient visits in the last 6 months, number of hospitalizations in the last 12 months, or number of hospitalizations since 1981 (Table 3). The distributions of these continuous outcome variables were not normal; rather, they were skewed, with most subjects having few or no visits or hospitalizations. Therefore, their log transformations were used in otherwise similar models; in each case, the coefficient for blood-injection-injury phobia was similar in direction to that in Table 3 and not statistically significant.

Cases did not differ significantly from non-cases with regard to previous general anaesthesia

or live births. Eighty-eight per cent of cases (53/60) had had general anaesthesia, compared with 82% of non-cases (1357/1663). The unadjusted odds ratio was 1.7 (95% CI = 0.8, 3.8); adjusted for age group, sex, and education group, it was 1.5 (0.7, 3.5). Eight-five per cent of female cases (41/48) had given birth to live infants, the same percentage as female non-cases (876/1030). The unadjusted odds ratio was 1.0 (95% CI = 0.4, 2.3); adjusted for age and education groups, it was 0.8 (95% CI = 0.4, 1.9).

There were 148 diabetics among the 1920 subjects. Diabetics with blood-injection-injury phobia had significantly elevated rates of macrovascular complications (peripheral vascular disease and cardiovascular disease) compared with those without (Table 4). There were no significant differences between groups with regard to other complications of diabetes assessed – nephropathy, neuropathy, or retinopathy. There was a slight trend for diabetics with blood-injection-injury phobia to be on insulin less frequently than other diabetics (not statistically

significant). These results were similar adjusted for number of years diabetic, age group, sex and education group.

DISCUSSION

This is the first report we know of regarding the epidemiology of blood-injection-injury phobia in the general population using modern diagnostic criteria. Importantly, neither the DSM-IV version of the DIS nor the Composite International Diagnostic Interview (used in the National Comorbidity Survey) have separate sections for this phobia (i.e. not grouped with other specific phobias); therefore, this study provides a unique opportunity to investigate the epidemiology of this condition. We estimate that slightly over 3% of the population suffers with blood-injection-injury phobia at some point in life. It is important to point out that we assessed only three of the most common mutilation fears; our prevalence estimate would probably be slightly higher had we used more questions. Nevertheless, our weighted estimate is identical to that for illness and injury phobia as reported by Agras *et al.* (1969), i.e. 3.1%. The early age of onset reported here is consistent with those previously reported for clinical samples of blood and dental phobics (Ost, 1987). On the other hand, though our group of blood-injection-injury phobics had a greater proportion than expected with histories of fainting (compared with non-cases), this proportion (25%) was low compared with those in a clinical sample of blood and injection phobics (77% and 48% of which, respectively, had histories of fainting in the phobic situation) (Ost, 1992). If a history of fainting is a measure of phobic severity, our group appears less severely affected.

It is interesting that, although more than half of the subjects with blood-injection-injury phobia reported telling a health professional of their fears, and more than half had sought help for a mental health problem, none reported his or her phobia as a problem for which he or she sought mental health treatment. It is possible that some of these subjects did get specific treatment for their fears, but that they did not consider them mental health problems; this is conceivable since the section on mental health treatment was separate from the section on phobias. It is also possible that many of these subjects learned to

adapt to their fears without specific treatment. Interestingly in this regard, Chapman *et al.* (1993) compared subjects with treated and untreated simple phobias uncomplicated by other anxiety disorders, and they found that the untreated group had significantly more subjects with blood-injury phobias, while the treated group had more subjects with animal and situational phobias.

Consistent with previous reports, we found higher prevalences in females (Agras *et al.* 1969) and lower prevalences in older subjects (Costello, 1982). The latter finding is surprising, since we assessed lifetime and not point prevalence. We feel that the likely explanation for the difference in age groups is not a cohort effect but, rather, a result of recall problems in the older subjects; this is a common problem in cross-sectional surveys such as this, and it suggests, again, that our lifetime prevalence estimate is rather low. We found higher prevalences in subjects with less education. We do not know of any other epidemiological studies that have assessed the relationship between education and blood-injection-injury phobia; however, it is interesting to speculate about this relationship. Exposure to feared situations is associated with improvement (Agras *et al.* 1972), and it may be that less educated subjects have had less exposure to health-care settings in which their phobias could be extinguished.

We found high rates of lifetime co-morbidity between blood-injection-injury phobia and other psychiatric disorders. The odds ratios for other psychiatric disorders given blood-injection-injury phobia were greater than 1.0 for all the disorders listed in Table 2, significantly so for most of them. This is a different pattern from that reported by Marks (1988) in clinical samples, but it is similar to what Neale *et al.* (1994) found in a population-based study of female twins. Blood-injection-injury phobia appears similar to other specific phobias with its high rates of psychiatric co-morbidity (Kessler, 1995). However, it should be recalled that our interview did not address whether or not the anxiety or avoidance with blood-injection-injury phobia could be accounted for by another mental disorder. Therefore, however unlikely, it is possible that some of this apparent co-morbidity is actually artefactual.

No strong and broad general health rami-

fications of blood-injection-injury phobia emerged in our analyses, despite a range of data on the issue. Subjects with and without this phobia did not differ with regard to usual health-care settings, regular care for specific medical conditions, numbers of out-patient visits in the last 6 months, numbers of hospitalizations in the past year, or numbers of hospitalizations since 1981. Therefore, subjects with blood-injection-injury phobia do not appear to avoid doctors, out-patient health centres, or hospitals.

Subjects with blood-injection-injury phobia also do not appear to avoid surgery or other painful medical procedures (at least those requiring general anaesthesia). In fact, there was a trend toward greater use of general anaesthesia in these phobics; one could speculate that this may represent avoidance of local anaesthesia in some cases. Though it is possible that women with blood-injection-injury phobia have fewer children than those without (not addressed here), they do not appear to avoid having at least one child.

Diabetics with blood-injection-injury phobia reported higher than expected rates of macrovascular complications. It is possible that these subjects had sufficient fear of doctors or insulin injections to delay or refuse treatment; this was not directly addressed. However, it is noteworthy that only one of the three diabetics with macrovascular complications and blood-injection-injury phobia was taking insulin. Microvascular complications may have been underappreciated in our study, due to reliance on subject reporting and not more sensitive measures (like stereoscopic fundus photography for assessing retinopathy) (Cohen *et al.* 1997). Thus, the effect of blood-injection-injury phobia on diabetic complications may be underestimated; this likelihood underscores the need for recognition and treatment of this phobia in diabetic patients (for approaches, see Marks, 1988).

Three additional limitations of this study deserve mention. The first involves the use of non-clinician interviewers, which precludes free-ranging 'cross-examination' and unstructured interrogation (Anthony *et al.* 1985). Wittchen *et al.* (1996) found that a similar DSM-III-R non-clinician interview underdiagnosed simple phobias. The second limitation is that our sample was limited to subjects who were 27 years old or older at interview, so the findings may not

generalize to all adults. We doubt the latter introduces substantial bias. The third limitation is that we have relatively small numbers of subjects for some of the comparisons, such as those assessing the effect of blood-injection-injury phobia in diabetics; case-control studies are better suited, in some ways, to address such issues.

In conclusion, blood-injection-injury phobia is common, especially in females and in people with less education, and it is associated with several co-morbid psychiatric conditions. No strong, broad general health ramifications of this phobia are apparent. However, diabetics with this phobia appear at particular risk for complications; this deserves further study.

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