

## EASILY MISSED?

## Lisfranc injuries

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This is one of a series of occasional articles highlighting conditions that may be more common than many doctors realise or may be missed at first presentation. The series advisers are Anthony Harnden, university lecturer in general practice, Department of Primary Health Care, University of Oxford, and Richard Lehman, general practitioner, Banbury. To suggest a topic for this series, please email us at [easilymissed@bmj.com](mailto:easilymissed@bmj.com).

A 38 year old office manager presented to the emergency department with pain in her right foot one day after tripping while jogging. She had difficulty bearing full weight, with pain and swelling over the dorsal foot, and tenderness over the dorsal first and second tarsometatarsal joints. Non-weight bearing radiographs of the right foot were read as normal (fig 1, left). A midfoot sprain was diagnosed and the patient was instructed to return for follow-up in two weeks. Her symptoms persisted and weight bearing radiographs were obtained (fig 1, middle). No abnormalities were noted, and she was referred to an orthopaedic surgeon, who did not think the radiographs were true anteroposterior views of the midfoot and so had them repeated. The new radiographs (fig 1, right) showed subtle widening of the medial midtarsal and intermetatarsal space, indicative of a Lisfranc injury. She had surgical reduction and internal fixation of her first and second tarsometatarsals.

**What are Lisfranc injuries?**

A Lisfranc injury is a disruption of the tarsometatarsal ligamentous joint complex in the foot. The key anatomi-



**Fig 1 | Radiographs showing the importance of obtaining the correct positioning to detect a subtle disruption of the Lisfranc joint. The white arrow indicates the medial base of the second metatarsal, the black arrow the proximal medial corner of the intermediate cuneiform, and the small grey arrows where the second tarsometatarsal joint line should be seen. Left:** Anteroposterior radiograph of non-weight bearing right foot shows normal anatomical alignment in a patient with a Lisfranc injury. Note that the second tarsometatarsal joint line is not visible, indicating that the radiograph is not a true anteroposterior view. **Middle:** Anteroposterior weight bearing radiograph shows no widening of the medial tarsal-second metatarsal space. Again, the second tarsometatarsal joint line is not visible because of incorrect positioning of the x ray beam. **Right:** Weight bearing radiograph of the same patient with the correct x ray projection. The lateral shift of the second tarsometatarsal joint indicates disruption of the Lisfranc ligament

**HOW COMMON ARE LISFRANC INJURIES?**

- Although Lisfranc injuries are reported to represent 0.2% of orthopaedic injuries,<sup>2</sup> the actual incidence is probably higher because they are often misdiagnosed
- A recent literature review by van Rijn et al found that Lisfranc injuries are missed on initial presentation in one third of cases<sup>3</sup>
- These injuries often accompany tarsal or metatarsal fractures, which comprise 6% of all fractures in the primary care setting<sup>4</sup>
- Certain subgroups have an increased risk of Lisfranc injuries—for example, the incidence is 4% among collegiate American football players<sup>5</sup>

cal structure is the Lisfranc ligament, an interosseous ligament spanning the medial cuneiform and the base of the second metatarsal that provides most of the stability to the joint complex. Disruption usually results in displacement of the joint, most commonly of the second, third, or first tarsometatarsal articulations. A Lisfranc injury can result from isolated tarsometatarsal ligamentous disruption, osseous disruption, or a combination of both.

Lisfranc injuries occur by both high energy mechanisms such as motor vehicle collisions and low energy mechanisms such as tripping or landing awkwardly during recreational sports. Although the injury can occur after a direct dorsal blow to the foot, it is more commonly a consequence of axially loading the foot from the back of the heel while the ankle is plantar flexed and the forefoot is on the ground, causing the midfoot to buckle dorsally.<sup>1</sup>

**Why are Lisfranc injuries missed?**

Although Lisfranc injuries are often associated with high energy trauma, up to one third occur by low energy mechanisms,<sup>6</sup> and these are more likely to be misdiagnosed.<sup>3-7</sup> This is because the subtle radiographic displacements are easily missed.<sup>8-9</sup> It is also common for them to be overlooked when patients have multiple injuries.

**Why does this matter?**

Without prompt diagnosis and intervention, Lisfranc injuries can lead to tarsometatarsal instability, pain, and post-traumatic midfoot arthritis. The articular contact area of the joint is significantly diminished with as little as 3 mm of displacement, which causes increased joint pressures and subsequent cartilage degeneration.<sup>10</sup>

**How are Lisfranc injuries diagnosed?****Clinical**

Accurate diagnosis of Lisfranc injuries requires a high index of suspicion. Patients present with tenderness or swelling over the dorsal-medial tarsometatarsal joint complex and are unable to bear weight on the affected foot. The presence of ecchymosis over the plantar mid-

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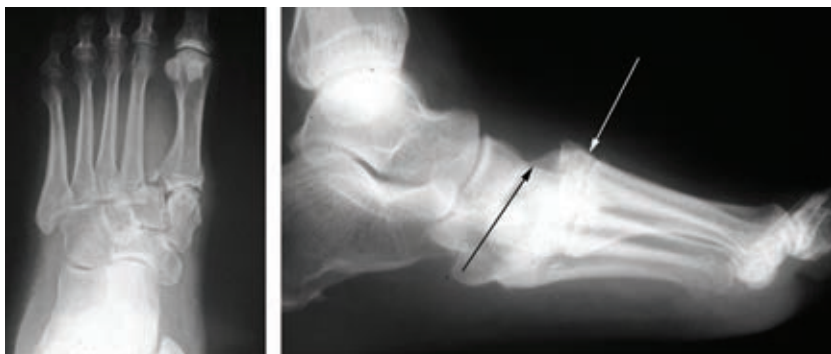


**Fig 2** | Radiograph of a normal Lisfranc joint. The line of small grey arrows indicates the second tarsometatarsal joint line. The medial base of the second metatarsal (white arrow) and the medial aspect of the intermediate cuneiform (black arrow) line up exactly

foot should raise clinical suspicion of Lisfranc injury. With more severe disruption of the tarsometatarsal joint, plantar or dorsal bony malalignment of the metatarsal is palpable.

### Investigations

Non-weight bearing radiographs may appear normal in up to half of patients with proved Lisfranc disruption.<sup>11</sup> Weight bearing foot radiographs (anteroposterior, lateral, and 30° oblique views) should be obtained in any patient with a suspected Lisfranc injury if initial non-weight



**Fig 3** | Widely displaced Lisfranc injury. *Left:* Anteroposterior view showing lateral displacement of the Lisfranc articulations. *Right:* Lateral view showing the dorsal displacement of the metatarsals (white arrow) relative to the midfoot (black arrow)

bearing radiographs appear normal. Diastasis or displacement of the second metatarsal-medial cuneiform space is diagnostic of disruption of the Lisfranc joint complex.<sup>12</sup> In weight bearing anteroposterior radiographs, the medial border of the second metatarsal base should be co-linear with the medial border of the intermediate cuneiform when the joint is uninjured (fig 2). In some cases, malalignment is obvious in the radiography (fig 3). Adequate anteroposterior radiographs must show a tangential view of the second tarsometatarsal joint (fig 1, right) since views oblique to the joint may miss subtle displacements (fig 1, middle). Radiographs may show a small bony avulsion type fracture between the first and second tarsometatarsal joints (fig 3, left).<sup>13</sup> If weight bearing radiographs show no abnormality and clinical suspicion remains high, computed tomography or magnetic resonance imaging is indicated.<sup>12</sup> A weight bearing radiograph of the non-injured leg may also be useful for comparison when diagnosing subtle Lisfranc injuries.

### How are they managed?

Anatomical reduction of the Lisfranc joint complex is required to prevent subsequent midfoot arthritis. In displaced injuries, this requires surgical reduction and stabilisation. Acutely, patients with Lisfranc injuries should have their foot splinted and kept non-weight bearing and be referred to an orthopaedic surgeon for ongoing treatment.

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All authors have completed the unified competing interest form at [www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf) (available on request from the corresponding author) and declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; and no other relationships or activities that could appear to have influenced the submitted work.

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Patient consent not required. The case is hypothetical.

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## PRACTICE POINTER

## Assessing risk of suicide or self harm in adults

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This review discusses how general practitioners and non-psychiatric specialists can assess suicide risk and self harm

A middle aged man presents to his general practitioner having just lost his job. He seems to be low in mood and asks for something to help him to “pick myself up.” He is reluctant to talk. Meanwhile, a teenage girl presents to the local emergency department having made a third drug overdose in the past two months. In both situations the attending doctor wants to know what factors would suggest that the person was more likely or less likely to be at risk of suicide or repeat self harm.

**The clinical problem**

Suicide is one of the top three causes of death in people aged 10-44 years throughout the world. In the UK, suicide rates fell from a peak in the 1980s in men and women, but they have started to rise again in the past few years (11.8 per 100 000 in 2011) ([www.ons.gov.uk/ons/dcp171778\\_295718.pdf](http://www.ons.gov.uk/ons/dcp171778_295718.pdf)), with the highest rates in men aged 30-59 years. Self harm is defined here as any act of self poisoning or self injury irrespective of motivation<sup>1</sup> but generally excludes habitual behaviours such as hair pulling and the consequences of excessive consumption of alcohol or drugs. Self harm is one of the five leading causes of hospital admission<sup>2</sup> and is associated with a significantly increased risk of subsequent death, much of it by suicide.<sup>3</sup>

This article will concentrate on the general clinical assessment of suicide<sup>7</sup> and self harm.

**How to assess suicide risk**

NICE recommended that none of the current simple risk measurement tools or checklists should be used in isolation to determine treatment decisions (because of their poor predictive ability), and a comprehensive clinical interview should be the main basis of assessment.<sup>4</sup> We suggest that assessments by non-specialists could follow a structured pattern as described below, paying attention to risk factors but more importantly creating a coherent narrative summary of the risk that informs further action or referral.

**Whom to assess**

The non-mental health specialist should ask about suicide and self harm in people with established risk factors such as any history of mental disorder or self harm and those with current heightened emotional distress, depressive symptoms, unpredictable behaviour (especially if it is impulsive and associated with irritability or violence<sup>8</sup>), or an unstable social situation. Sometimes significant suicide risk can be ruled out quickly, or the need for specialist involvement is immediately obvious, but otherwise the clinician should carry out a more thorough clinical assessment to formulate a plan.<sup>9</sup> When accurate information cannot be obtained from the patient directly, information from others can be sought, but clinicians should be mindful of confidentiality.<sup>4</sup> Situations may arise where patients are reluctant to engage in assessments, but their level of risk remains unclear. Specialist advice is needed when this occurs.

**Engagement and general assessment**

Box 1 summarises the steps described here. Suicide risk assessment is part of an individual's overall care: practitioners should start their assessment by paying attention to rapport, generating a trusting relationship, demonstrating acceptance of the patient, and engendering hope whenever possible. This approach will help when later asking direct questions about suicide. Elicit current problems using open questions, clarify any ambiguities, and then

**Box 1 | Summary of clinical assessment of risk of suicide and self harm (see text for details)****General**

- Establish rapport
- Clarify current problems

**Assess mental illness**

- Observe verbal and non-verbal features of mental state
- Check for symptoms of mental illness (odds ratio for suicide 2.20 (95% CI 1.05 to 4.60) with severe depression,\* odds ratio for self harm 2.63 (1.72 to 4.04) with depressive symptom†)
- Check for psychiatric history (odds ratio for self harm 3.46 (2.26 to 5.30))
- Misuse of alcohol and drugs (odds ratio for suicide if also depressed 2.17 (1.77 to 2.66)\*)

**Assess current thoughts, plans, and intent**

- Explore feelings of hopelessness (odds ratio for suicide 2.20 (1.49 to 3.23) if depressed\*)
- Wishes to be dead
- Suicidal ideas
- Suicidal plans
- Other self harming behaviour such as cutting or burning
- Assess current suicide intent (odds ratio 2.70 (3.26 to 7.20)†)

**Consider other risk factors**

- Sex (odds ratio for suicide 2.66 (1.72 to 4.11) for men, odds ratio for self harm 1.96 (1.22 to 3.15) for women‡); occupation (such as farmers, healthcare practitioners); unemployment (relative risk for suicide 1.70 (1.22 to 2.18)§)
- Previous self harm (odds ratio for suicide 4.84 (3.26 to 7.20) if depressed,\* odds ratio for self harm 2.17 (1.53 to 3.09)†), previous suicide attempts, and other risk taking behaviour
- Other factors that make suicide more likely—access to lethal means, accessing internet sites, living in social isolation or fragmentation,<sup>11</sup> contact with mental health services<sup>5</sup>
- Factors that make suicide less likely—such as dependent children, other family who would be upset, religious beliefs

**Suggested narrative summary and action**

- Draw up a summary of risk, bringing parts of the assessment together to form a coherent narrative (who the individual is, what problems he or she faces, his or her perception of risk, the balance of risk and protective factors, and a concluding statement about suicide and self harm intent)
- If uncertain, discuss with a colleague (and document shared decision) or contact a specialist mental health practitioner for advice
- Make a plan based on the individual's needs drawn from the narrative summary but also integrating other needs (treatment, referral, follow-up, contingencies (including information on sources of help))
- End by continuing to show compassion, engendering hope, and summarising shared agreement for a plan

\*Meta-analysis of cohort and case-control studies, unadjusted odds ratios, 3-9 studies for each factor.<sup>6</sup>

†Meta-analysis of pooled cohort data, adjusted odds ratios, 2-3 studies for each factor.<sup>4</sup>

‡Meta-analysis of pooled cohort data, unadjusted odds ratio, 2 studies.<sup>4</sup>

§Meta-analysis of 6 cohort studies.<sup>10</sup>



I N C R E A S I N G R I S K	Clinical assessment	Potential actions
	Definite plan of suicide and current intent or escalating suicidal behaviour (seriousness, frequency) Significant mental illness or unstable psychosocial situation with impending crisis No protective factors	Immediate attempt to ensure safety 24 hour support and review with follow-up Remove access to lethal means of suicide Defuse emotional crisis (let the person express emotion but not to point of extreme distress, maintain hope, show acceptance of person and situation) Full assessment of mental health, psychosocial problems, and crisis prevention
	Frequent or fixed suicidal ideas Has considered methods of suicide and has access to preferred means of suicide, but no intent Lack of fear of death or increasing loss of hope Significant mental illness or unstable psychosocial situation with impending crisis	Consider 24 hour care or follow up at intervals in next 24 hours, with review Remove access to preferred means of suicide that person may impulsively use Defuse emotional crisis Full assessment of mental health, psychosocial problems, and crisis prevention
	Intense or more sustained thoughts of suicide, but no suicide plan or intent History of impulsive or dangerous behaviour (not just suicidal attempts), including recent self discharge or absconding from psychiatric hospital Evidence of mental illness or unstable psychosocial situation with impending crisis	Follow up at intervals in next 24 hours Consider removing or restricting access to means of suicide, particularly if history of suddenly self harming with it Defuse emotional crisis Full assessment of mental health, psychosocial problems, crisis prevention (for example, offer counselling aimed at solving underlying problem or explore alternative coping strategies in crisis such as contacting family or friends, not drinking, etc)
	Any significant mental illness requiring admission or crisis intervention, even if no suicidal ideation Any distressing or new suicidal ideation (without a plan) on first assessment or escalation of suicidal ideation Any severe depression at first assessment	Follow up within 24 hours Full assessment of mental health, psychosocial problems, and crisis prevention
	Fleeting thoughts of suicide which are soon dismissed	No specific action in relation to suicide risk Address any underlying physical or psychological health problems

Levels of suicide risk and potential actions

**Box 2 | Narrative summaries of suicide risk and care plans in case examples**

**Case 1**

*Who*—Middle aged man, recently unemployed farm worker.  
*Problems*—In debt, feels humiliated, depression, strong urge to drink alcohol.  
*Perception of risk*—Needs a tonic, not going to accept any other help. Family would be better off without him.  
*Risk factors for suicide and self harm*—Highest risk demographic group, history of severe alcohol problems and violence to family at times of crisis. Recently made a will. Evasive when asked directly about suicide. May have access to gun and lethal pesticides.  
*Protective factors*—Family want to help him. Scared of what he might do, especially if he starts drinking.  
*Conclusion about suicide and self harm intent*—Difficult to assess suicide risk precisely but there are strong grounds to suspect high suicide risk (and possibly risk to others) with possible mental illness, unpredictable behaviour, and unstable social situation.  
*Plan*—Immediate referral to on call psychiatrist or crisis resolution and home treatment team.

**Case 2**

*Who*—Young woman in late teens, seen every month in casualty after cutting her wrists.  
*Problems*—Taken a large overdose, but paracetamol levels now do not require further medical intervention. Addicted to many different types of street drug. Made homeless.  
*Perception of risk*—Doesn't care whether she lives or dies.  
*Risk factors*—Change in nature of self harm. Vulnerable. No social support. Staff in casualty consider her an attention seeker and pressuring doctor to discharge without further assessment.  
*Protective factors*—"Streetwise," resourceful in the past when needed help.  
*Conclusion about suicide and self harm intent*—Need more comprehensive assessment of suicide risk and of health and social care needs.  
*Plan*—Refer for urgent psychiatric and social care assessment and resist staff pressure to discharge.

summarise back to the patient. The assessment of risk must be individualised and take into account the patient's mental state and social context. During the interview, look for non-verbal signs of depression (facial expression, eye contact, signs of agitation or excessive slowing of speech and movement, mood, tone and volume of speech), abnormal behaviour, or emotional distress. If there are verbal or non-verbal cues indicating any mental disorder or psychological problem, check directly for symptoms of depression, other mental disorders including delusions and hallucinations, and alcohol or drug misuse.

**Current suicide thoughts, plans, and intent**

If there is any indication of possible suicide risk, explore the person's feelings of hopelessness (such as "How do you see the future?") and any wishes to be dead, and whether such thoughts are fleeting or persistent (such as "Have you been feeling that life is not worth living?"). If the answer to either question is "yes" or there are other grounds to suspect possible suicide risk (such as self harm, depression, any other mental illness, or unpredictable behaviour) ask directly about the presence, intensity, and persistence of suicidal ideas (such as "Have you thought about ending your life? Please tell me about what you have been thinking.").

Any admission of suicidal ideas should lead to direct questioning about suicidal plans—that is, how, where, when (such as "Have you made any plans to end your life?"). Asking the question in this way gives permission for respondents to give answers indicating high risk of suicide and should be followed by "Please tell me more about your plans." Ask about any other self harming behaviour such as cutting, burning, etc. Escalation in the frequency or intensity of such behaviour (such as a teenage girl who changes from self cutting of wrists once a month to twice in a week or cutting her thigh as well) may indicate imminent risk of suicide. Assess immediate intent of suicide by direct questioning—"Would you carry out these plans?" "What would make this more (and less) likely?"—and indirectly by talking about other plans for the near future. Evidence of general life plans unrelated to suicide may indicate lower risk.

Consider the social context (the person's age, sex, occupation, stability of life situation, availability and reliability of support of significant others); previous suicide attempts and other risk taking behaviour; if the person has been discharged from mental health services or hospital in the past 12 months; if the person is under 25 years old and prescribed antidepressants; and factors that make suicide more likely (such as access to lethal means, suicide notes, changes to will, access to internet sites) or less likely (such as dependent children, other family members who would be upset, religious beliefs).

**Suicide risk after self harm**

Additional information about imminent suicide risk can be obtained when a person has self harmed recently. Good clinical practice might involve the health professional asking about the 24 hour period immediately before the self harm episode (such as events leading to the episode, the degree of planning), the act of self harm (for example, the lethality or dangerousness of the attempt, the patient's expectations of outcome from the self harm, precautions against discovery,

## METHODS

Data on the assessment of suicide risk and self harm have been compiled primarily from recent systematic reviews of risk factors for guidelines developed by the National Institute for Health and Care Excellence (NICE),<sup>4</sup> a review of 15 years of findings from the UK National Confidential Inquiry into Suicide,<sup>5</sup> a systematic review of risk factors for suicide in people with depression,<sup>6</sup> and a Medline search on risk factors for suicide in non-depressed groups and for repetition of self harm (updating the NICE review). These data have limitations—for example, many of the risk factors in the general population are common in clinical patients (such as unemployment, living alone, alcohol misuse).

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or seeking help), and the person's mental state at the time of self harm and afterward (such as mood, alcohol or drug consumption). If the same antecedents, mental state, and opportunities for self harm arise, then the risk of suicide or self harm may well be increased.<sup>12</sup>

## Overall assessment of suicide risk

The degree of suicide risk that a person presents should ideally become clear after assessment (box 2 shows the narrative summaries for the two case examples). The balance of the risk and protective factors that are identified during the assessment will vary from patient to patient. Two people of the same age and social background may have a radically different perspective concerning the same life situation. For example, a middle aged man may see unemployment as an opportunity to make a new start in life, albeit one carrying financial risk for a while, whereas another may see it as a catastrophe leading to personal humiliation and financial ruin. On the whole, the former might be at lower suicide risk than the latter, but not necessarily—for example, if the former person also had a history of self harm, alcoholism, and depression at times of change, while the latter had no history of self harm or mental disorder, had good family support, and strong religious beliefs that suicide was sinful.

The figure presents clinical descriptors grouped according to the degree of risk that clinicians might ascribe to patients with those characteristics. Different levels of risk will require

different interventions on the part of health professionals, but even low risk ratings are occasionally associated with adverse outcomes. In recognition of this, many guidelines have moved away from simple risk assessments and instead suggest joint assessments of risks and needs.<sup>4</sup> The more a person is at risk in the figure, then the lower should be the threshold for seeking specialist help and the more urgently it should be sought. If a person refuses to accept such help, suicide risk or the potential to rapidly reach such risk may be grounds for seeking urgent specialist help from mental health services for involuntary detention. There should be reasonable grounds to suspect a mental disorder (including personality disorder), and other possible ways of getting help to that person should have been exhausted. In England, if the person's mental state is related to drug or alcohol intoxication alone, then involuntary detention cannot be used.

## Conclusion

In practice, assessment of suicide risk in an individual is not precise. General risk factors for suicide may be common in clinical populations. Combinations of risk factors for suicide may be more important in determining outcome than individual characteristics.<sup>13</sup> Risk factors for suicide and self harm may change rapidly over short periods (for example, from changing life events, fluctuation in severity of mood, alcohol consumption). Despite these limitations, assessment of suicide risk may be life saving when it is coupled with clinical action.

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Competing interests: NK chaired the NICE longer term management of self harm guidelines. He currently chairs the NICE self harm quality standards and the NICE self harm update. He is a member of the Department of Health's National Suicide Prevention Strategy Advisory Group. The views expressed in this paper are those of the authors and not those of NICE or the Department of Health.

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## Too late

Years ago, I read in the *New England Journal of Medicine* how one of my best teachers at medical school felt when his hospital colleagues crossed the road to avoid him after he had been diagnosed with amyotrophic lateral sclerosis. I was shocked, but now I am ashamed to admit that I have been guilty of the same behaviour, not noticing until it was too late.

We all knew at the hospital that our friend's daughter had been diagnosed with metastatic cancer. A couple of years later we learnt via the rumour mill that she was very sick. My friend and I continued working at the same hospital, meeting occasionally to consult on difficult patients. He did not mention his daughter. The trouble was that neither did I. My friend, with whom I used to play chess in the odd free hour during medical school and who shared with me a particularly demanding residency, was the embodiment of a caring physician. It was common knowledge in our hospital that, no matter how old or sick his patient was, he would fight for the patient, and go on fighting. "As if it was his family," we used to say, part joking, part admiring.

Yet he did not speak of his daughter, who must have been on his mind daily as he was caring for patients three times

her age and healthier too. Worse, I never asked, fearing and assuming that there was nothing I could do. I preferred to "let sleeping dogs lie" ... to avoid an unpleasant, despairing, unbearable issue. How wrong I had been all this time.

Suddenly, I heard it. My friend could no longer stand his daughter's pain and despair, her pleas to end it all. He killed her and then himself. His family had suspected nothing. Neither had his hospital colleagues—not even after he had told them the day before that he was going on a long leave, distributing his patients among them so that none would be left without a physician.

I could not have foreseen it. I could not have prevented it. But I could have behaved as a "mentsch." I could, should have spoken to him. We all knew of his beloved daughter's grave illness. Yet it was always easier to discuss another mutual patient than mention the unmentionable. I never did. I have failed miserably, with no chance to try again.

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