

These 22 facilitators were the first CST facilitators in Taiwan and conducted CST in this study. To match the Japanese SHARE model CST to the medical culture of Taiwan, all teaching materials provided by JPOS were revised by all TPOS directors on the basis of local data in Taiwan, feedback from CST facilitators and participants, and suggestions of clinical experts. However, the CST process, training of facilitators and standard patients, and use of teaching strategies meet JPOS recommendations.

Considering the positive effects of CST, the Bureau of Health Promotion in Taiwan has sponsored and supported high-quality CST training programs held by the TPOS at various medical institutions in Taiwan since 2011. SHARE CST uses small classes (four participants, two facilitators, and one standard patient). Role play is used to enable participants to learn the important skills of truth telling (Table 2). In Japan, SHARE CST was designed with 1-day and 2-day versions. Although the TPOS tried to promote the 2-day CST, it was not well received in Taiwan's busy medical environment. However, one of our study aims was to compare the effectiveness of 1-day and 2-day CST programs; thus, this study provided two CST programs as options for healthcare personnel (Table 2). Both versions included the same class modules and standard teaching materials and were led by the same facilitators. The only difference was that the 1-day and 2-day versions included 1 and 2 h of role playing for each participant, respectively (Table 2). Participants chose the CST programs according to their needs.

Truth-telling questionnaire

Participants' truth-telling preference was assessed using the 70-item Japanese truth-telling questionnaire [12], which has four subscales: method of disclosing bad news, providing emotional support, providing additional information, and setting. Self-reported responses are scored on a 5-point Likert scale from 1 (extremely unimportant) to 5 (extremely important). Higher scores indicate greater respondent preference for truth telling except for the setting subscale. The questionnaire was shown to have good internal consistency among 529 outpatients with cancer; subscale reliabilities were 0.77–0.93 [12]. The scale was translated into Chinese by Dr. Tang, with Dr. Fujimori's authorization, and found to have good reliability and validity with Taiwanese medical students and attending physicians [15].

Questionnaire scores were used in this study to indicate CST effectiveness. We reasoned that if healthcare personnel's truth-telling perceptions changed after SHARE model-centered CST to more closely match cancer patients' preferences for truth telling, as embodied in the SHARE model, the CST would have been effective, and healthcare personnel's future truth telling would be successful with patients. Dr. Fujimori agreed with this

reasoning. The questionnaire was administered as the pretest to all participants before the introduction to the CST program (Table 2). The questionnaire was again completed as the posttest after the last role play and before group feedback. Participants completed questionnaires in 10–30 min. In this study, the internal consistencies (Cronbach's alphas) of the overall truth-telling scale and its subscales were 0.92–0.94 and 0.79–0.91, respectively.

Statistical methods

Data were analyzed by descriptive statistics. For continuous data, such as age and clinical experience, variables were described by means and SDs. For categorical data, such as gender and education level, variables were described by frequency distribution and percentage. These descriptive statistics were used to analyze participants' preference for truth telling. The difference between participants' pretest and posttest truth-telling scores (before and after participating in CST programs) was analyzed by paired-sample *t*-test. Cohen's $d = \frac{M1 - M2}{\sigma}$ was calculated to determine the effect size of the CST [16]. The difference between the truth-telling preferences of participants in the 1-day and 2-day CST programs was analyzed by multiple regression analysis.

Results

Participants' characteristics

The 257 participating healthcare personnel were on average 38.60 years old (SD = 8.09). The majority were women (52.5%) and had graduated from college (61.1%), with half having abundant clinical experience (≥ 10 years, 50.2%). The largest proportion was doctors (57.2%), followed by nurses (22.2%). The majority served in medical centers (52.8%). Nearly two-thirds of participants took the 2-day CST program ($n = 163$, 63.4%), whereas the rest took the 1-day CST program ($n = 94$, 36.6%). Most participants were satisfied with the programs (93.8%) and were willing to recommend them to other colleagues (98.5%) (Table 3).

Participants' truth-telling preferences

Comparison of all participants' truth-telling scores before and after participating in the CST programs shows that their overall truth-telling scores and subscale scores improved significantly ($p < 0.001$) (Table 4). The effect size was 0.91 ($d = \frac{281.89 - 263.88}{19.89}$).

We also compared the effect of CST program dose (1-day vs. 2-day program) on participants' truth-telling preference. Because healthcare personnel in the 1-day and 2-day CST programs differed in some basic demographic variables (e.g., age, gender, education level, marital status, clinical experience, and workplace hospital level) (data not shown), these were treated as confounding variables.

Table 2. SHARE model-centered communication skills training programs

Time	1-day CST program (6 h)		2-day CST program (12 h)	
	Procedures	Note	Procedures	Note
Day one morning	Facilitators' preworkshop meeting and participant check-in (30 min)	A large-scale classroom is required with a capacity of 50.	Facilitators' preworkshop meeting and participant check-in (30 min)	A large-scale classroom is required with a capacity of 50.
	Participant pretest (10 min)	Each group has four participants assigned to one classroom. Participants assemble in the large classroom to complete truth-telling questionnaire and basic demographic data.	Participant pretest (30 min)	Each group has four participants assigned to one classroom. Participants assemble in the large classroom to complete truth-telling questionnaire and basic demographic data.
	Introduction to workshop (10 min)	The principal investigator gives the introduction in the large classroom.	Introduction to workshop (10 min)	The principal investigator gives the introduction in the large classroom.
	Grouping; introduction to SHARE modules (50 min)	The facilitator of each group starts grouping participants. Facilitators introduce the SHARE model in small-group teaching. SP complete check-in procedure.	Grouping; introduction to SHARE modules (50 min)	The facilitator of each group starts grouping the participants. Facilitators introduce the SHARE model in small-group teaching. SP complete check-in procedure.
Day one afternoon	First role-playing practice (60 min)	Each role-playing practice includes only one participant and one SP. The participant and SP practice the truth-telling process, whereas the other three participants observe.	First role-playing practice (60 min)	Each role-playing practice includes only one participant and one SP. The participant and SP practice the truth-telling process, whereas the other three participants observe.
	Second role-playing practice (60 min)			
	Third role-playing practice (60 min)		Second role-playing practice (60 min)	Day 1 includes four role-playing practice sessions, with each participant practicing once.
	Fourth role-playing practice (60 min)		Third role-playing practice (60 min)	
Day two morning	Participant posttest (10 min)	Participants return to large classroom to complete truth-telling questionnaire and survey on program satisfaction.	Fourth role-playing practice (60 min)	
	Group feedback (50 min)	Mutual feedback from SP, participants, and facilitators. Sharing of feedback.		
	Certificates issued (10 min)	Facilitators personally issue certificates to participants in their groups. The workshop closes for participants.		
Day two afternoon			Participant, SP, and facilitator check-in	Grouping is initiated right after check-in.
			Fifth role-playing practice (60 min)	Day 2 includes four role-playing practice sessions so all participants can practice again.
			Sixth role-playing practice (60 min)	
			Seventh role-playing practice (60 min)	
Day two afternoon			Eighth role-playing practice (60 min)	
			Participant posttest (30 min)	Participants return to large classroom to complete truth-telling questionnaire and survey on program satisfaction.
			Group feedback (80 min)	Mutual feedback from SP, participants, and facilitators. Sharing of feedback.
			Certificates issued (10 min)	Facilitators personally issue certificates to participants in their groups. The workshop closes for participants.
			Facilitators' postworkshop meeting (30 min)	Facilitators share CST experiences with each other. If any incident happened during CST, facilitators should reach a consensus on how to manage the situation in the future.

CST, communication skills training; SP, standard patients.

Descriptive analysis showed that participants in the 2-day program had better posttest truth-telling scores (Table 4),

but this difference was not significant ($p > 0.05$) in multiple regression analysis when confounding variables were controlled, except for the setting subscale (Table 5).

Table 3. Participant characteristics ($N = 257$)

Characteristic	Mean \pm standard deviation (range)	n (%)
Age (years)	38.60 \pm 8.09 (24–64)	
Gender		
Male		122 (47.5)
Female		135 (52.5)
Education level		
Junior college		12 (4.7)
College		157 (61.1)
\geq Graduate school		88 (34.2)
Marital status		
Never married		94 (36.6)
Married		161 (62.6)
Divorced		2 (0.8)
Clinical experience (years)		
1–3		39 (15.2)
4–6		55 (21.4)
7–9		34 (13.2)
≥ 10		129 (50.2)
Job title		
Doctor		147 (57.2)
Psychologist		19 (7.4)
Nurse		57 (22.2)
Social worker		21 (8.2)
Other		13 (5.0)
Workplace hospital level		
Medical center		131 (52.8)
Nonmedical center		117 (47.2)
Motivation to participate in CST		
Personal interest		180 (70.0)
Assigned		77 (30.0)
CST program (hours)		
6		94 (36.6)
12		163 (63.4)
Satisfaction with the program		
Extremely dissatisfied		7 (2.7)
Neutral		9 (3.5)
Satisfied		82 (31.9)
Extremely satisfied		159 (61.9)
Willing to recommend CST to colleagues		
Yes		253 (98.5)
No		4 (1.5)

CST, communication skills training.

Discussion

Our results show that, after participating in the CST program, healthcare personnel's preference for truth-telling improved significantly, consistent with previous reports on the effectiveness of CST [3,6,17–22]. However, our study evaluated CST effectiveness on the basis of participants' truth-telling preference, whereas other studies assessed participants' self-efficacy [3], confidence in truth telling [17], communication skills with patients [22], and confidence in communication [9,10]. Although the outcomes measured are different, the effectiveness of CST was verified. To more objectively compare the effectiveness of CST in cross-institutional and cross-national studies, future studies should develop and apply consistent assessment outcomes.

Moreover, our results show that the CST had a large ($d = 0.91$), significant effect. This large effect might have been associated with our theoretical framework (SHARE model-centered CST), facilitator quality (facilitators were certified after receiving at least 50 h training), low ratio of facilitators to participants (2:4), quality of standard patients (standard patients received intense training and were assessed regularly), and solid, standard teaching materials that were regularly revised according to empirical evidence or experts' comments.

Moreover, 70% of participants had volunteered to attend the CST program. Their motivation to learn may have been stronger than in previous studies. In addition, our participants included doctors with abundant clinical experience and other healthcare personnel, such as psychologists, nurses, and social workers. Including professionals from different fields has been suggested as preferable in CST programs because these professionals provide different perspectives that may enable participants to learn from one another [23]. These reasons may have contributed to the large effect of CST in our study.

Table 4. Comparison of pretest and posttest truth-telling scores ($N = 257$)

	Total sample		1-day CST ($n = 94$)		2-day CST ($n = 163$)	
	Pretest (mean \pm SD)	Posttest (mean \pm SD)	Pretest (mean \pm SD)	Posttest (mean \pm SD)	Pretest (mean \pm SD)	Posttest (mean \pm SD)
Overall scale	263.88 \pm 27.0	281.89 \pm 22.9*	263.56 \pm 30.63	283.56 \pm 25.12	264.00 \pm 24.62	280.86 \pm 21.45
Method of disclosure	77.37 \pm 8.87	83.48 \pm 7.46*	77.23 \pm 9.81	83.52 \pm 7.87	77.49 \pm 8.29	83.41 \pm 7.23
Emotional support	70.78 \pm 8.54	76.74 \pm 7.08*	70.33 \pm 9.10	76.61 \pm 7.01	71.01 \pm 8.18	76.79 \pm 7.13
Additional information	68.26 \pm 8.16	72.94 \pm 6.91*	67.91 \pm 8.72	73.00 \pm 6.68	68.45 \pm 7.80	72.87 \pm 7.05
Setting	47.46 \pm 8.50	48.73 \pm 9.00*	48.09 \pm 10.27	50.44 \pm 11.31	47.04 \pm 7.32	47.79 \pm 7.19

CST, communication skills training; SD, standard deviation.

* $p < 0.001$.

Table 5. Multiple regression on truth-telling preference by communication skills training dose ($N=257$)

	CST dose β (2-day vs. 1-day)	P
Overall scale	-3.325	0.168
Method of disclosure	-0.108	0.892
Emotional support	-0.281	0.706
Additional information	-0.961	0.183
Setting	-1.736	0.046

CST, communication skills training.

1-day CST is used as the baseline value.

Adjusted for age, gender, education level, marital status, clinical experience, and workplace hospital level.

Our study did not find a significant difference in the truth-telling preference of participants in the 1-day and 2-day CST programs ($p > 0.05$), except for the setting subscale. This finding contrasts with a previous finding that the communication skills of oncologists participating in a 3-day CST program were significantly superior to those of participants in a 1.5-day CST program [19]. The setting subscale items (e.g., ensuring that the telephone does not ring, using technical words, and breaking bad news at the first meeting) are basic communication skills but are often neglected by physicians in Taiwan [15]. Thus, Taiwanese clinicians may need more practice in long CST programs to change their truth-telling preference related to the setting. Our findings suggest that a shorter training program is as equally effective as a longer training program. If this hypothesis is supported in future empirical studies, shorter CST programs can be promoted, which will be particularly beneficial in extremely busy medical environments, such as in Taiwan.

However, our finding that the effectiveness of the two CST programs did not differ significantly may be explained by the selection of assessment times and inadequate selection of outcome variables. We measured participants' outcomes immediately after the programs, but the effectiveness of the two CST programs might differ if the outcomes were measured at longer times, for example, 3 or 6 months after CST. Unfortunately, our plan for long-term assessments was hindered by the difficulty and expense of passing Institutional Review Board (IRB) review at the 62 hospitals across Taiwan from which our participants were recruited. In Taiwan, IRB approval is needed for studies on hospital personnel [24].

Another reason for failure to detect a difference in effectiveness of the 1-day and 2-day CST programs might be inadequate selection of outcome variables. In addition to measuring participants' truth-telling preference, future studies are advised to concurrently assess their self-efficacy [3], confidence in communication [9,10], or anxiety while truth telling. We also suggest that other researchers refer to specific suggestions proposed in a review of CST programs [25] using Kirkpatrick's Triangle to evaluate CST effectiveness at four levels: participants' reactions, participants' learning, participants' behavior, and patients' outcomes. At the first level, participants' satisfaction with the

CST (each module) can be assessed. At the second level, standard patients can be invited to assess the truth-telling skills of participants before/after their participation in the CST programs. At the third level, actual clinical situations before/after the CST program can be videotaped to record participants' actual consultations for patients with cancer. At the fourth level, cancer patients can be invited to assess doctors' truth-telling skills, their understanding of the patients' needs, and the fit of their responses. In this study, we used only first-level assessment. Future studies may gradually expand the scope to second-level, third-level, or even fourth-level assessment to more effectively and comprehensively evaluate CST effectiveness.

This study had some limitations. First, participants only completed one posttest immediately after the end of the CST programs. Therefore, the long-term CST effectiveness (e.g., at 3 or 6 months) is unknown. Second, because of time and equipment limitations at the study sites, we did not videotape the participants' truth-telling process and did not include standard patients' assessment of participants' truth-telling skills. Instead, we used only first-level assessment. Future researchers may choose higher-level assessments as suggested [24] to evaluate the benefit of CST more completely. Third, 70% of our participants had volunteered to participate in the CST program. Their self-selection and motivation to learn may have biased our assessment of the effectiveness of the CST program. However, this possibility is minimized by our findings that voluntary and nonvoluntary (assigned) participants did not differ significantly in either their overall truth-telling preference scores or most subscale scores and by the 1-day and 2-day CST programs having the same percentage of voluntary and assigned participants (data not shown).

Conclusions

SHARE model CST improved Taiwanese healthcare providers' preferences for cancer truth telling. Truth-telling knowledge and skills should be replenished every 2 years for all healthcare personnel, including clinically experienced attending physicians. Further studies are needed to assess the long-term benefit of CST on patients' outcomes and to compare the effectiveness of different CST programs and the factors affecting physicians' method of truth telling.

Acknowledgments

This work was supported by the Bureau of Health Promotion Department of Health, Taiwan, ROC (grant no. 9911009C). We thank all facilitators from the Taiwan Psycho-Oncology Society for promoting and conducting the CST programs. Special thanks to all the healthcare providers who participated in this project.

Conflict of interest

The authors have declared that there is no conflict of interest.

References

- Baile WF, Buckman R, Lenzi R, Glober G, Beale EA, Kudelka AP. SPIKES—a six-step protocol for delivering bad news: application to the patient with cancer. *Oncologist* 2000;**5**:302–311.
- Parker PA, Baile WF, de Moor C, Lenzi R, Kudelka AP, Cohen L. Breaking bad news about cancer: patients' preferences for communication. *J Clin Oncol* 2001;**19**:2049–2056.
- Baile WF, Kudelka AP, Beale EA *et al*. Communication skills training in oncology. Description and preliminary outcomes of workshops on breaking bad news and managing patient reactions to illness. *Cancer* 1999;**86**:887–897.
- Kiluk JV, Dessureault S, Quinn G. Teaching medical students how to break bad news with standardized patients. *J Cancer Educ* 2012;**27**:277–280.
- Lee CA, Chang A, Chou CL, Boscardin C, Hauer KE. Standardized patient-narrated web-based learning modules improve students' communication skills on a high-stakes clinical skills examination. *J Gen Intern Med* 2011;**26**:1374–1377.
- Fallowfield L, Jenkins V, Farewell V, Solis-Trapala I. Enduring impact of communication skills training: results of a 12-month follow-up. *Br J Cancer* 2003;**89**:1445–1449.
- Jenkins V, Fallowfield L. Can communication skills training alter physicians' beliefs and behavior in clinics? *J Clin Oncol* 2002;**20**:765–769.
- Goelz T, Wuensch A, Stubenrauch S *et al*. Specific training program improves oncologists' palliative care communication skills in a randomized controlled trial. *J Clin Oncol* 2011;**29**:3402–3407.
- Fujimori M, Oba A, Koike M *et al*. Communication skills training for Japanese oncologists on how to break bad news. *J Cancer Educ* 2003;**18**:194–201.
- Fukui S, Ogawa K, Fukui N. Communication skills training on how to break bad news for Japanese nurses in oncology: effects of training on nurses' confidence and perceived effectiveness. *J Cancer Educ* 2010;**25**:116–119.
- Wuensch A, Tang L, Goelz T *et al*. Breaking bad news in China—the dilemma of patients' autonomy and traditional norms. A first communication skills training for Chinese oncologists and caretakers. *Psycho-Oncology* 2013;**22**:1192–1195.
- Fujimori M, Akechi T, Morita T *et al*. Preferences of cancer patients regarding the disclosure of bad news. *Psycho-Oncology* 2007;**16**:573–581.
- Fujimori M, Parker PA, Akechi T, Sakano Y, Baile WF, Uchitomi Y. Japanese cancer patients' communication style preferences when receiving bad news. *Psycho-Oncology* 2007;**16**:617–625.
- Tang WR, Chen GY, Hsu SH, Fang JK. Preliminary effects of truth telling training. *J Cancer Res Pract* 2010;**26**:112–124.
- Tang WR, Fang JT, Fang CK, Fujimori M. Truth telling in medical practice: students' opinions versus their observations of attending physicians' clinical practice. *Psycho-Oncology* 2013;**22**:1605–1610.
- Cohen J. A power primer. *Psychol Bull* 1992;**112**:155–159.
- Abel J, Dennison S, Senior-Smith G, Dolley T, Lovett J, Cassidy S. Breaking bad news—development of a hospital-based training workshop. *Lancet Oncol* 2001;**2**:380–384.
- Delvaux N, Razavi D, Marchal S, Bredart A, Farvacques C, Slachmuylder JL. Effects of a 105 hours psychological training program on attitudes, communication skills and occupational stress in oncology a randomised study. *Br J Cancer* 2004;**90**:106–114.
- Fallowfield L, Jenkins V, Farewell V, Saul J, Duffy A, Eves R. Efficacy of a cancer research UK communication skills training model for oncologists a randomised controlled trial. *Lancet* 2002;**359**:650–656.
- Fukui S, Ogawa K, Ohtsuka M, Fukui N. A randomized study assessing the efficacy of communication skill training on patients' psychologic distress and coping: nurses' communication with patients just after being diagnosed with cancer. *Cancer* 2008;**113**:1462–1470.
- Goelz T, Wuensch A, Stubenrauch S, Bertz H, Wirsching M, Fritzsche K. Addressing the transition from curative to palliative care: concept and acceptance of a specific communication skills training for physicians in oncology—COM-ON-p. *Onkologie* 2010;**33**:65–69.
- Maguire P, Booth K, Elliott C, Jones B. Helping health professionals involved in cancer care acquire key interviewing skills—the impact of workshops. *Eur J Cancer* 1996;**32A**:1486–1489.
- Stiefel F, Bernhard J, Bianchi G *et al*. Chapter 55. The Swiss Model. *Handbook of Communication in Oncology and Palliative Care*. Kissane DW, Bultz BD, Butow PM, Finlay IG (eds). Oxford University Press: New York, 2011; 641–648.
- Chang Gung Medical Foundation Institutional Review Board. IRB specifications. 2004. <http://www.l.cgmh.org.tw/intr/intr1/c0040/web/C/C.htm> [Accessed 09 July 2013]
- Kissane DW, Bylund CL, Banerjee SC *et al*. Communication skills training for oncology professionals. *J Clin Oncol* 2012;**30**:1242–1247.

Copyright of Psycho-Oncology is the property of John Wiley & Sons, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.





Original communication

Suicide of physicians in the special wards of Tokyo Metropolitan area



Wakako Hikiji, MD, PhD, Medical Examiner*, Tatsushige Fukunaga, MD, PhD, Director

Tokyo Medical Examiner's Office, Tokyo Metropolitan Government, 4-21-18 Otsuka, Bunkyo-ku, Tokyo 112-0012, Japan

ARTICLE INFO

Article history:

Received 27 July 2013

Received in revised form

1 December 2013

Accepted 7 December 2013

Available online 18 December 2013

Keywords:

Suicide

Physician

ABSTRACT

Numerous studies on physician suicide in various countries have been reported but no data from Japan on the issue can be found to date. In this study, physician suicides in the special wards of Tokyo Metropolitan area in 1996–2010 were investigated retrospectively. A total of 87 cases were enrolled. The results suggested that physician suicide has been linked to pre-existing psychiatric illnesses and occupational problems, and that psychiatrists have a relatively higher suicide risk compared to those majoring in other specialities of medicine. A distinctive feature was that 19 cases had used either drugs or devices which were accessible due to their profession some time during the process of committing suicide. Another notable feature was that 4 out of 5 anaesthesiologists enrolled in the study had chosen poisoning for their suicide method, with the drugs frequently used in their speciality. The findings advocate strongly for efficient suicide prevention measures for physicians including an early detection and treatment of psychiatric illnesses, as well as an urgent need for a more effective pharmacy management in applicable institutions together with the implementation of self discipline on each physician. This is the first broad academic study on physician suicide in Japan.

© 2013 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

1. Introduction

Suicides numbered 32,863 in Japan in 1998 and have exceeded 30,000 in every subsequent year, which accounts for the highest rate in the world.¹ Various analyses, researches and measures have been taken by professionals in various fields to stop such a long lasting trend of a complex public health problem. However, an absence of central institution to manage the detailed data on suicide has been making it difficult to grasp the actual condition through a large scale epidemiological study nationwide.

On the other hand, the shortage of physicians in Japan has become a serious social problem in recent years.^{2,3} It is a great loss for the whole society to lose a physician by suicide, even though the number of cases is expected to be relatively small. It should be an issue to be dealt with not only by the professionals of forensic science or epidemiology, but by those from a variety of academic fields. No broad academic study on physician suicide from Japan can be found to date, due to the lack of academic epidemiological data.

The main objective of the present study was to examine the characteristics of physician suicide cases in the special wards of Tokyo Metropolitan area in 1996–2010, as the first broad academic study on the issue in Japan.

2. Methods

Data on suicides of physicians and non-physicians handled in the Tokyo Medical Examiner's Office during 1996–2010 were extracted for descriptive analysis retrospectively. The Tokyo Medical Examiner's Office is an institution in which all unnatural deaths, including suicide, occurring in the special wards of Tokyo Metropolitan area are reported and the inquests are performed. This therefore provides that all suicide cases occurring in the area are processed by this institution. Death certificates and supplementary documents were examined which included age, gender, professional speciality, past and present illness/es, device/s used, proposed motive and other relevant information of each case. The ethical committee of the Tokyo Medical Examiner's Office approved the protocol of this study.

3. Results

The total number of suicides handled in the Tokyo Medical Examiner's Office during the study period was 28248 and 87 were physicians (0.31%). Of these 87 cases, the age varied from 25 to 82 (mean = 47.97, median = 47.00) and the male to female ratio was 68:19 (the percentage of female physicians = 21.84%). The suicide methods consisted of 49 hanging, 14 poisoning, 12 jumping, 3 diving, 3 hypoxia, 3 cutting, 1 hydrogen sulfide intoxication, 1 carbon monoxide intoxication and 1 drowning. The percentage of

* Corresponding author. Tel.: +81 3 3944 1481; fax: +81 3 3944 7585.

E-mail addresses: hikiji@kyudai.jp (W. Hikiji), fukutatu@b-star.jp (T. Fukunaga).

methods chosen by physicians and non-physicians are shown in Fig. 1. Regardless to the suicide method, 19 physicians (21.84%) were found to have used either drugs or devices which were accessible due to their profession at some time during the process of committing suicide. Forty five cases (51.72%) had been diagnosed with a psychiatric illness, and the main motives of suicide of each case were psychiatric illnesses, occupational problems and non-psychiatric illnesses. The area of speciality of physicians consisted of 21 internists, 16 psychiatrists, 6 paediatricians, 5 anaesthesiologists, 4 dermatologists, 3 otolaryngologists, 2 radiologists, 2 surgeons, 2 obstetricians/gynaecologists, 1 orthopaedist, 1 plastic surgeon, 1 ophthalmologist, 1 pathologist, 1 researcher, 1 freelance, 1 industrial physician and 4 unknown, while 6 were junior residents (Table 1). Out of 5 anaesthesiologists, only 1 had chosen hanging as a suicide method but the remaining 4 had chosen poisoning with anaesthetics, using the devices most likely to have been taken out from their workplace (Table 2).

4. Discussion

Several studies have been carried out on the issue of suicide of physicians in various countries,^{4–10} presenting notable findings in the distribution of suicidal methods and specialities in medicine. The present study revealed numerous noteworthy findings on the issue, some of which were unique in characteristics.

The mean and median age of physician suicides enrolled in the present study, 47.97 and 47.00 respectively, had no statistical difference compared to those of non-physician suicides in the equivalent period (mean = 49.69, median = 51.00, $p > 0.05$). The

Table 1

The speciality of physicians on the national registry and those in the present study.

	Percentage in physicians over 15 years	Number of physician suicide	%
Internists	37.15–40.65%	21	24.14
Dermatologists	2.95–3.06%	4	4.60
Paediatricians	5.58–5.98%	6	6.90
Psychiatrists	4.64–5.06%	16	18.39
Surgeons	9.54–12.03%	2	2.30
Orthopaedists	7.09–7.44%	1	1.15
Plastic surgeons	0.57–0.78%	1	1.15
Ophthalmologists	4.56–4.99%	1	1.15
Otolaryngologists	3.22–3.84%	3	3.45
Obstetricians/gynaecologists	4.40–5.39%	2	2.30
Radiologists	1.82–2.00%	2	2.30
Anaesthesiologists	2.19–2.75%	5	5.75
Unknown	0.47–0.77%	13	16.09
Others	7.32–13.96%	10	11.49

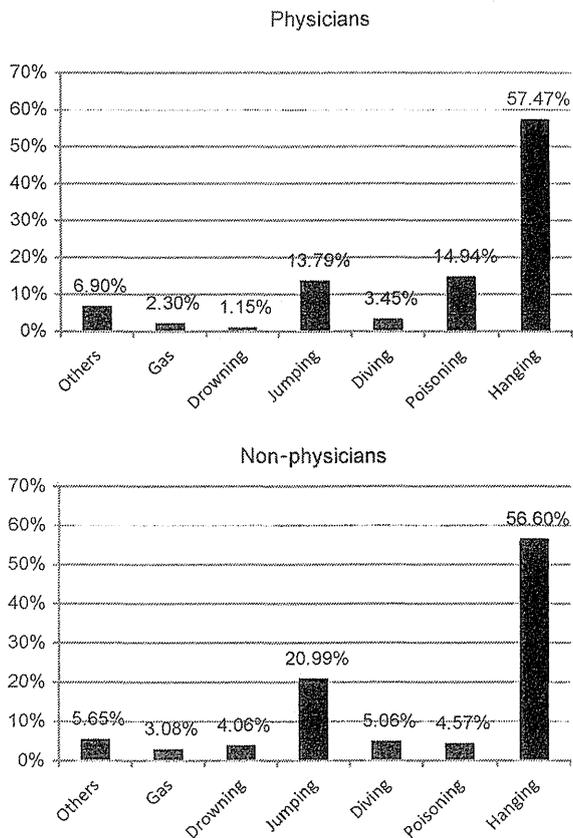


Fig. 1. The suicide method of physicians and non-physicians in 1996–2010 in the Tokyo Metropolitan area.

percentage of female physicians enrolled in the study (21.84%) was slightly higher compared to the percentage of females accounting for whole physicians; which increased from 13.39% in 1996 and 18.94% in 2010.^{11,12}

It was found that 45 out of 87 cases had been diagnosed and received some kind of treatment for a psychiatric illness. Furthermore, a closer examination of supplementary documents revealed that the most common motives of suicide were pre-existing psychiatric illnesses, mostly depression, followed by occupational problems and non-psychiatric illnesses. There has been some evidence that depression, drug abuse, and alcoholism are often associated with suicides of physicians according to the studies conducted in other countries,^{8,9} which is in accordance with the results of present study. The most common motive among non-physician suicides during the equivalent period was also psychiatric illnesses [data not shown], which indicates that an early detection and an appropriate treatment of psychiatric illnesses would be a key factor in the prevention of suicides, regardless of the occupational background.

It has been pointed out that psychiatrists and anaesthesiologists have a relatively higher risk of suicide compared to physicians majoring in other specialities.^{10,13,14} According to the biennial reports released by the Ministry of Health, Labour and Welfare of Japan in 1996–2010, psychiatrists accounted for 4.64–5.06% of the whole registered physicians respectively.^{11,15–21} On the other hand, there were 16 psychiatrists (18.39%) enrolled in the present study, which accounted for a distinctly higher percentage compared to the proportion of physicians in the national registry over the equivalent period; the assumption that the speciality distribution is the same in the Tokyo Metropolitan area. It is unknown whether there are occupational stresses particular to the psychiatric fields of medicine, or if the choice of speciality is influenced by factors that might differentially influence risk. However, there is a study reporting high levels of stress and dissatisfaction for psychiatrists.²²

The present study revealed that the most common suicide method was hanging for physicians. Although the percentage of suicidal poisoning for physicians was relatively high compared to that of non-physicians, it only accounted for about a quarter of that of hanging (Fig. 1). On the other hand, poisoning was found to be the most common suicide method among physicians in some previous studies.^{4,7} Some authors suggested that this phenomenon is due to physicians being rich in knowledge on lethal drugs and doses, as well as accessibility to them. While these factors may have had effects to the results, another factor

Table 2
The method of suicide by the speciality of physicians.

Speciality/ method of suicide	Internists	Dermatologists	Paediatricians	Psychiatrists	Surgeons	Orthopaedists	Plastic surgeons	Ophthalmologists	Otolaryngologists	Obstetricians/ gynaecologists	Radiologists	Anaesthesiologists	Unknown	Others	Total
Hanging	14	2	4	12			1	1	1	2	1	1	6	4	49
Poisoning	3	1		3								4	1	2	14
Diving	1													1	3
Jumping	1		2					1					3	3	12
Drowning	1													1	1
Gas	1														2
Others		4	6	1	2	1	1	1	3	2	2	5	2	10	6
Total	21	4	6	16	2	1	1	1	3	2	2	5	13	10	87

for consideration was established through the cases noted in the present study.

Physicians generally have more knowledge of effective suicide methods than those with less medical knowledge. It is notable that either drugs or devices only accessible to medical professionals had been used during the process of committing suicide in 19 out of 87 cases (21.84%). Furthermore, it is concerning to note that 4 out of 5 anaesthesiologists had chosen poisoning for their method of suicide, using anaesthetics; droperidol, vecuronium bromide, midazolam, barbiturate and propofol. This is a distinct contrast to internists, with only 4 out of 21 using accessible medical drugs or devices during the suicidal process. Anyhow, these results indicate that an easy access to and a substantial knowledge of potentially dangerous drugs may lead to an inappropriate usage. For example, it is well known to medical professionals that propofol has sedative and relaxing properties, and brings euphoric feelings.²³ Quite a number of lethal cases have been reported on those dying from the misuse of propofol on themselves.^{24–27} Medical institutions are responsible in managing potentially dangerous drugs and devices appropriately, but it also strongly depends on the moral of each professional involved. Every member of staff, not only those with management responsibilities, should be aware that there is a possibility that they might be used for unintended purposes other than suicide, such as addiction and homicide. There are case reports in which anaesthetics were suspected of having been accessories in homicides.^{28,29}

It is clear that measures need to be taken to address the current problem of drug and device misuse by physicians. With the availability and ease of obtaining them along with the difficulty of detection, the use of prescribed drugs for wrong purposes, including suicide, will probably continue in the future. However, the best solution may not be to place restrictions on their circulation as the majority would be used for their intended purpose. Instead, a more strict pharmacy accounting of potentially dangerous drugs and devices in applicable institutions, together with the implementation of self-discipline on physicians should be encouraged to prevent their illicit diversion.

There are a number of limitations to this study. Due to the extremely small number of cases covered despite 15 years of study period, it is impossible to draw a reliable conclusion on the trends on physician suicide by age and period. A new distinctive characteristic may be revealed by continuous research on the issue and the accumulation of further cases of this nature. Furthermore, the study is based only on the physician suicides occurred in the Tokyo Metropolitan area. A different trend, such as the distribution in the speciality of medicine, may be observed in the other areas of the nation, particularly in the rural area.

5. Conclusion

Although the number of physician suicide accounted for less than 1% of whole suicides in the Tokyo Metropolitan area, numerous distinctive features were observed by background analyses. The results of the present study should encourage physicians and all physician associated co-workers to pay attention to the need for early intervention for psychiatric illness among themselves, and also to review of pharmacological management in their workplace and their morals as professionals handling potentially dangerous drugs and devices.

Conflict of interest

The authors have no conflict of interest.

References

- Analytical data on suicide released by the National Police Agency [Japanese]. <http://www1-pec.co.jp/mental/2002-08-4.htm>.
- Toyabe S. Trend in geographic distribution of physicians in Japan. *Int J Equity Health* 2009;**8**:5.
- Nomura K. Physician shortage in Japan: the new postgraduate medical education program and physicians as a human medical resource. *Nihon Eiseigaku Zasshi* 2011;**66**:22–8.
- Aasland OG, Ekeberg O, Schweder T. Suicide rates from 1960 to 1989 in Norwegian physicians compared with other educational groups. *Soc Sci Med* 2001;**52**:259–65.
- Hawton K, Clements A, Sakarovich C, Simkin S, Deeks JJ. Suicide in doctors: a study of risk according to gender, seniority and specialty in medical practitioners in England and Wales, 1979–1995. *J Epidemiol Community Health* 2001;**55**:296–300.
- Hawton K, Clements A, Simkin S, Malmberg A. Doctors who kill themselves: a study of the methods used for suicide. *QJM* 2000;**93**:351–7.
- Lindeman S, Läärä E, Vuori E, Lönnqvist J. Suicides among physicians, engineers and teachers: the prevalence of reported depression, admissions to hospital and contributory causes of death. *Acta Psychiatr Scand* 1997;**96**:68–71.
- Simon W. Suicide among physicians: prevention and postvention. *Crisis* 1986;**7**:1–13.
- Roy A. Suicide in doctors. *Psychiatr Clin North Am* 1985;**8**:377–87.
- Rich C, Pitts F. Suicide by psychiatrists: a study of medical specialists among 18730 consecutive deaths during a 5-year period 1967–1972. *J Clin Psychiatry* 1980;**41**:261–3.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. http://www.mhlw.go.jp/toukei/saikin/hw/jishi/10/dl/kekka_1.pdf.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www1.mhlw.go.jp/toukei/sansi/1-2.html>.
- Carpenter LM, Swerdlow AJ, Fear NT. Mortality of doctors in different specialties: findings from a cohort of 20000 NHS hospital consultants. *Occup Environ Med* 1997;**54**:388–95.
- Lew EA. Mortality experience among anesthesiologists, 1954–1976. *Anesthesiology* 1979;**51**:195–9.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www.mhlw.go.jp/toukei/saikin/hw/jishi/08/dl/gaikyo1.pdf>.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www.mhlw.go.jp/toukei/saikin/hw/jishi/06/kekka1-2-3.html>.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www.mhlw.go.jp/toukei/saikin/hw/jishi/04/kekka1-2-3.html>.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www.mhlw.go.jp/toukei/saikin/hw/jishi/02/kekka1-2-3.html>.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www.mhlw.go.jp/toukei/saikin/hw/jishi/00/kekka1-2-3.html>.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. http://www1.mhlw.go.jp/toukei/h10sansi_3/sec15.html.
- Analytical data on medical doctors released by the Ministry of Health, Labour and Welfare [Japanese]. <http://www1.mhlw.go.jp/toukei/sansi/1-3.html>.
- Benbow SM, Jolley DJ. Burnout and stress amongst old age psychiatrists. *Int J Geriatr Psychiatry* 2002;**17**:710–4.
- Kirby RR, Colaw JM, Douglas MM. Death from propofol: accident, suicide, or murder? *Anesth Analg* 2009;**108**:1182–4.
- Kranioti EF, Mavroforou A, Mylonakis P, Michalodimitrakis M. Lethal self administration of propofol (Diprivan). A case report and review of the literature. *Forensic Sci Int* 2007;**167**:56–8.
- Iwersen-Bergmann S, Rösner P, Kühnau HC, Junge M, Schmoldt A. Death after excessive propofol abuse. *Int J Legal Med* 2001;**114**:248–51.
- Chao TC, Lo DS, Chui PP, Koh TH. The first fatal 2,6-di-isopropylphenol (propofol) poisoning in Singapore: a case report. *Forensic Sci Int* 1994;**66**:1–7.
- Drummer OH. A fatality due to propofol poisoning. *J Forensic Sci* 1992;**37**:1186–9.
- Balasubramaniam B, Park GR. Sexual hallucinations during and after sedation and anaesthesia. *Anaesthesia* 2003;**58**:549–53. Review.
- Madea B, Musshoff F. Homicidal poisoning with halothane. *Int J Legal Med* 1999;**113**:47–9.

RESEARCH ARTICLE

Open Access

Gender differences in suicide attempters: a retrospective study of precipitating factors for suicide attempts at a critical emergency unit in Japan

Ryuichiro Narishige¹, Yoshitaka Kawashima^{1,2}, Yasushi Otaka¹, Takuya Saito^{1,3} and Yoshiro Okubo^{1*}

Abstract

Background: There is a shortage of empirical data concerning precipitating factors for suicides in Japan. The purpose of the present study was to clarify gender differences of precipitating factors for suicide attempts in Japan.

Methods: The subjects were high-lethality suicide attempters who were admitted to the Nippon Medical School Hospital Critical Care Medical Center between March 1, 2010 and March 31, 2012. Precipitating factors for suicide attempt, method of suicide attempt, psychiatric diagnoses and other sociodemographic data were collected from the patients' medical records retrospectively, and statistical analyses were performed for categorical variables of male/female.

Results: The total number of subjects was 193 (88 males and 105 females). The rate of subjects attempting suicide by poisonous gas was significantly higher in males while that of subjects attempting suicide by drug overdose was significantly higher in females. The rate of subjects diagnosed with "major depressive disorder, bipolar disorder" was significantly higher in males while that of subjects diagnosed with "personality disorders" or "dysthymic disorder" was significantly higher in females. Subjects with "health problems", "financial problems", "work problems", "debts (others)" or "unwanted transfer" were significantly more numerous among males; subjects with "family problems", "parent-child relations" or "loneliness" were significantly more frequently found among females.

Conclusions: Mental disorders were the most common precipitating factor for suicide attempts regardless of gender. Significant gender differences were observed in psychiatric diagnoses, methods of suicide attempt and psychosocial problems. This indicates the necessity of suicide prevention measures corresponding to these gender differences.

Keywords: Suicide attempters, Precipitating factors for suicides, Gender differences, Critical care medical center

Background

In Japan, the number of suicides has been decreasing in recent years but has remained at around 30,000 annually after a sudden increase in 1998. Suicide prevention measures have been taken by the whole nation to reduce suicides after the Basic Act on Suicide Prevention was enacted in 2006. On the other hand, it is difficult to narrow down which measures should be taken intensively

because empirical data regarding precipitating factors for suicides are insufficient in Japan.

Some previous studies have endeavored to clarify the characteristics of suicide-related behaviors in Japan by investigating suicide attempts [1-4]. However, in those studies, investigations focused only on psychiatric diagnoses or sociodemographic data of suicide attempters, and precipitating factors for suicide attempts were not examined. Pompili argued that suicide is better understood as a phenomenon centered in the individual [5]. Analysis of subjective motives as well as analysis of objective risk factors is useful for understanding suicide. The National Police Agency (NPA) yearly announces the

* Correspondence: okubo-y@nms.ac.jp

¹Department of Neuropsychiatry, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-ku, Tokyo 113-8603, Japan

Full list of author information is available at the end of the article

annual number of suicides, and analysis of the precipitating factors for suicides based on the NPA's suicide statistics is made public simultaneously. However, it is possible that the actual state of suicides has not been grasped correctly in this analysis due to inadequate psychiatric assessment, and precipitating factors for suicides were specified in only about 70% of suicide committers in the NPA's suicide statistics [6].

Gender differences in suicide-related behavior are well-known. Females have a higher rate of suicide attempts than males, while males have a higher rate of mortality from suicide than females [7-9]. The male/female ratio of suicide attempts is 0.65-0.81 according to previous studies in Japan [1-4]. Females are more likely to attempt suicide by poisoning than males, while males are more likely to use methods of suicide with high lethality like hanging than females [8,9]. In addition to these characteristics, some gender differences in sociodemographic characteristics of suicide committers or attempters are known. Regarding the sociodemographic characteristics of suicide committers in Denmark, Qin et al. reported that being single, unemployed and having a low income were associated with higher suicide risk in males, whereas having a young child was associated with lower suicide risk in females [10]. Fekete et al. reported sociodemographic characteristics of suicide attempters in Hungary, including that females were economically inactive or widowed and males were unemployed or living alone [11]. Zhang et al. studied the sociodemographic characteristics of suicide attempters in American young adults, reporting that low income and smoking were associated with suicide attempts in males, and poor self-evaluated health, low educational attainment and drug use were associated with suicide attempts in females [12]. However, gender differences of precipitating factors for suicide-related behavior have been insufficiently investigated. Wu et al. reported that unemployment or economic problems were regarded as significant precipitating factors for suicide attempts to a greater extent in males than in females in Taiwan, but the sample consisted mainly of people with a suicide lethality ranging from mild to moderate [13]. Tóth et al. reported that interpersonal conflict was found to be the most frequent precipitating factor for suicide attempts by deliberate self-poisoning in Hungary and also that male suicide attempters with interpersonal conflicts had lower levels of depression [14].

In the present study, we investigated precipitating factors for suicide attempts from the data of suicide attempters admitted to the Nippon Medical School Hospital Critical Care Medical Center. Gender differences in Japanese suicide-related behavior have not been clarified. Thus, we aimed to clarify the gender differences in precipitating factors for suicide attempts in Japan.

We previously reported a study concerning precipitating factors for suicide attempts based on a preliminary

psychiatric assessment of suicide attempters, in which we explored the precipitating factors for suicide attempts among adolescent suicide attempters [15]. In the present study, we comprehensively investigated precipitating factors for suicide attempts via an approach unprecedented in Japan.

Methods

Study design and sample

The subjects were suicide attempters with high lethality who were admitted to the Nippon Medical School Hospital Critical Care Medical Center. All patients admitted to this facility are in medically serious and fatal condition. About 2,000 patients are admitted every year, and about 5% of them are suicide attempters excluding suicide committers. The study period was from March 1, 2010 to March 31, 2012.

In this report, the term "suicide attempt" follows the Columbia Classification Algorithm of Suicide Assessment (C-CASA), i.e., it is defined as a potentially self-injurious behavior, associated with at least some intent to die, as a result of the act [16]. We adopted this definition of the term "suicide attempt" because it is often clinically used. Silverman et al. proposed the nomenclature for suicidology, defining "suicide attempt" as a self-inflicted, potentially injurious behavior with a non-fatal outcome for which there is evidence of intent to die [17,18]. There is no essential difference between C-CASA and the nomenclature proposed by Silverman et al. in respect to the definition of the term "suicide attempt".

At the Nippon Medical School Hospital Critical Care Medical Center, psychiatrists examine all suicide attempters and confirm their intent to die when they attempted suicide. Psychiatrists assess their mental state and problems that precipitated their suicide attempt. Psychiatric diagnoses were made according to the DSM-IV-TR criteria [19] by agreement among two or more experienced psychiatrists. Psychiatrists also assessed precipitating factors for the suicide attempts. Precipitating factors for suicide attempt, methods of suicide attempt, psychiatric diagnoses and other sociodemographic data were collected from the patients' medical records retrospectively. If the subject had attempted suicide by two or more methods, we only presented the most lethal one.

Precipitating factors for suicide attempts were classified in accordance with the items used for the classification of precipitating factors for suicides by the NPA's 2010 suicide statistics (Table 1) [6]. These are the only official statistics that include data on precipitating factors for suicides, and they are widely used as the basic data for suicide prevention in Japan. This is why the classification by the NPA's suicide statistics was used in the present study. Three items or less were presented as precipitating factors for

Table 1 Items used for classification in NPA's suicide statistics, 2010

Major category	Sub-classification
Family problems	Parent-child relations, marital relations, relations with other family members, death in the family, pessimism over family's future, scolding from family members, worries about parenting, abuse, exhaustion from nursing or care, others
Health problems	Disease, depression, schizophrenia, alcohol dependence, drug abuse, other mental disorders, physical handicaps, others
Financial problems	Bankruptcy, business slump, redundancy, failure to find employment, poverty, debts (accumulated loans), debts (joint liability), debts (others), repayment pressure from creditors, insurance paid by suicide, others
Work problems	Failure in business, workplace relationship, unwanted transfer, work overload, others
Love problems	Marriage problems, broken heart, worries about adultery, trouble with boyfriend or girlfriend, others
School problems	Entrance examinations, career decisions, academic failure, relationship with teachers, bullying, relationship with schoolmates, others
Other problems	Having ones' crime revealed, crime victim, suicide over someone's death, loneliness, relationship with neighbors, others

suicides in the NPA's 2010 suicide statistics, while more than three items were also presented as precipitating factors of suicide attempts in the present study in order to show the background of suicide attempts more accurately. The items for mental disorders in the NPA's 2010 suicide statistics ("depression", "schizophrenia", "alcohol dependence", "drug abuse" and "other mental disorders") were removed from the items in the present study because psychiatric diagnoses were made according to the DSM-IV-TR criteria independently.

If there were two or more precipitating factors belonging to the same major category in one subject, the number of precipitating factors in that major category was considered to be one only when the analysis was performed between major categories.

Statistical analyses

Statistical analyses were conducted using PASW Statistics 18 (SPSS Inc., Chicago, IL, USA). Welch's t-test was used to compare the variables of age and the number of precipitating factors between males and females. Chi-square test or Fisher's exact test was used to determine the categorical variables of being under psychiatric treatment, employment status, method of suicide attempt, psychiatric diagnosis and precipitating factors for suicide attempt between males and females. Chi-square test or Fisher's exact test was also used to determine the categorical variables of method of suicide attempt between under psychiatric treatment and no psychiatric treatment. We used a significance level of $p < 0.05$ and two-sided probability.

Ethics

The present study was approved by the Ethics Committee of Nippon Medical School Hospital and conforms to the provisions of the Declaration of Helsinki.

Results

Characteristics of subjects

The results are shown in Table 2.

The total number of subjects was 193 (88 males and 105 females), with the male/female ratio being 0.84. Their mean age was 41.1 ± 16.3 SD years (range: 15–91 years). Sixty of the subjects (31.1%) were employed.

Those attempting suicide by drug overdose comprised the largest group, with 101 cases (52.3%). The second largest group, 33 cases (17.1%), consisted of those attempting suicide by jumping from a high place. Hanging is the most common method among suicide committers in Japan, but the subjects who attempted suicide by hanging were the fifth most, with 11 cases (5.7%).

182 of the 193 subjects (94.3%) had mental disorders and 131 of the 193 subjects (67.9%) were under psychiatric treatment. Those diagnosed with "mood disorders" were the most, with 68 cases (35.2%): 36 of them were diagnosed with "major depressive disorder", 6 with "bipolar disorder", and 26 with "dysthymic disorder". The subjects diagnosed with "schizophrenia and other psychotic disorders" were the second largest group, with 45 cases (23.3%). The third largest group, 27 cases (14.0%), consisted of those diagnosed with "adjustment disorders". The fourth largest group consisted of "personality disorders", with 22 cases (11.4%): 18 of them were diagnosed with "borderline personality disorder" and 4 with "personality disorder not otherwise specified".

The mean number of precipitating factors, except mental disorders, was 1.11 ± 0.78 SD per subject (range: 0–4). The subjects with "family problems" made up the largest group, with 62 cases (32.1%). Those with "financial problems" comprised the second largest, with 40 cases (20.7%), and those with "other problems" the third largest, with 29 cases (15.0%).

Gender differences

There was no significant difference in mean age and mean number of precipitating factors between males and females. The proportion of employed subjects was significantly larger among males (chi-square test, $\chi^2 = 13.216$, $p = 0.000$). 16.2% of the female subjects were housewives, and there were no house-husbands among the male subjects; the rate of subjects who were housewives or house-husbands

Table 2 Precipitating factors of suicide attempts and gender differences

	Total (N = 193)	Males (N = 88)	Females (N = 105)	Significance	
Age ± SD	41.1 ± 16.3	42.4 ± 16.3	40.1 ± 16.4	NS [§]	
Mean number of precipitating factors ± SD	1.11 ± 0.78	1.20 ± 0.87	1.04 ± 0.69	NS [§]	
Under psychiatric treatment	131	50	81	$p = 0.003^{\S}$	$\chi^2 = 9.070$
Employment status					
Employed	60	39	21	$p = 0.000^{\S}$	$\chi^2 = 13.216$
Unemployed	97	39	58	NS [§]	
Housewife or house-husband	17	0	17	$p = 0.000^{\S}$	$\chi^2 = 15.624$
Student	19	10	9	NS [§]	
Methods of suicide attempt					
Drug overdose	101	36	65	$p = 0.004^{\S}$	$\chi^2 = 8.460$
Jumping from a high place	33	17	16	NS [§]	
Cutting	16	10	6	NS [§]	
Poisonous gas	15	13	2	$p = 0.001^{\S}$	$\chi^2 = 11.060$
Hanging	11	7	4	NS [§]	
Poisoning	9	4	5	NS [†]	
Other methods	11	2	9	NS [§]	
DSM-IV-TR					
Substance-induced disorders	16	11	5	NS [§]	
Schizophrenia and other psychotic disorders	45	22	23	NS [§]	
Major depressive disorder, bipolar disorder	42	26	16	$p = 0.016^{\S}$	$\chi^2 = 5.756$
Dysthymic disorder	26	7	19	$p = 0.040^{\S}$	$\chi^2 = 4.224$
Adjustment disorders	27	13	14	NS [§]	
Personality disorders	22	2	20	$p = 0.000^{\S}$	$\chi^2 = 13.339$
Other psychiatric disorders	14	6	8	NS [§]	
None	11	6	5	NS [§]	
Precipitating factors					
Family problems	62	20	42	$p = 0.010^{\S}$	$\chi^2 = 6.551$
Parent-child relations	14	2	12	$p = 0.015^{\S}$	$\chi^2 = 5.965$
Health problems	8	7	1	$p = 0.024^{\dagger}$	
Financial problems	40	24	16	$p = 0.040^{\S}$	$\chi^2 = 4.220$
Debt (others)	4	4	0	$p = 0.042^{\dagger}$	
Work problems	27	18	9	$p = 0.018^{\S}$	$\chi^2 = 5.618$
Unwanted transfer	4	4	0	$p = 0.042^{\dagger}$	
Love problems	20	7	13	NS [§]	
School problems	6	3	3	NS [†]	
Other problems	29	12	17	NS [§]	
Loneliness	12	2	10	$p = 0.038^{\S}$	$\chi^2 = 4.317$

[§]Welch's t-test, [§]chi-square test, [†]Fisher's exact test.

was significantly higher in females (chi-square test, $\chi^2 = 15.624$, $p = 0.000$).

The rate of subjects attempting suicide by drug overdose was significantly higher in females (chi-square test, $\chi^2 = 8.460$, $p = 0.004$), and the rate of those attempting

suicide by poisonous gas was significantly higher in males (chi-square test, $\chi^2 = 11.060$, $p = 0.001$).

The number of subjects under psychiatric treatment was 50 in males (56.8%) and 81 in females (77.1%), with the rate being significantly higher in females (chi-square

test, $\chi^2 = 9.070$, $p = 0.003$). Table 3 shows the differences in the methods of suicide attempt due to the presence or absence of psychiatric treatment. The rate of subjects attempting suicide by drug overdose was significantly higher in the subjects under psychiatric treatment (chi-square test, $\chi^2 = 12.479$, $p = 0.000$). On the other hand, the rates of those attempting suicide by cutting (chi-square test, $\chi^2 = 4.657$, $p = 0.031$) and poisoning (Fisher's exact test, $p = 0.032$) were significantly lower in the subjects under psychiatric treatment.

The rate of subjects diagnosed with "major depressive disorder" or "bipolar disorder" (chi-square test, $\chi^2 = 5.756$, $p = 0.016$) was significantly higher in males, and the rate of those diagnosed with "personality disorders" (chi-square test, $\chi^2 = 13.339$, $p = 0.000$) or "dysthymic disorder" (chi-square test, $\chi^2 = 4.224$, $p = 0.040$) was significantly higher in females.

Among major categories of precipitating factors, the rates of subjects with "health problems" (Fisher's exact test, $p = 0.024$), "financial problems" (chi-square test, $\chi^2 = 4.220$, $p = 0.040$) and "work problems" (chi-square test, $\chi^2 = 5.618$, $p = 0.018$) were significantly higher in males, whereas the rate of those with "family problems" (chi-square test, $\chi^2 = 6.551$, $p = 0.010$) was significantly higher in females. Among sub-classifications of precipitating factors, the rate of subjects who had "debts (others)" ("financial problems") (Fisher's exact test, $p = 0.042$) or "unwanted transfer" ("work problems") (Fisher's exact test, $p = 0.042$) was significantly larger in males; the rate of subjects with "parent-child relations" ("family problems") (chi-square test, $\chi^2 = 5.965$, $p = 0.015$) or "loneliness" ("other problems") (chi-square test, $\chi^2 = 4.317$, $p = 0.038$) was significantly higher in females.

Discussion

Previous studies have shown that mental disorders are the most common precipitating factor for suicide-related

behavior regardless of gender [3,20,21]. Yamada et al. reported that 95% and 65% of suicide attempters had mental disorders and were under psychiatric treatment, respectively [3]. In the present study, 94.3% of the subjects had mental disorders and 67.9% were under psychiatric treatment, percentages similar to those of the previous study. Pompili et al. reported that suicide in eating disorders is a major cause of death [22], but there was no subject with eating disorders in the present study.

The rate of subjects diagnosed with "major depressive disorder, bipolar disorder" was significantly lower, and that of subjects diagnosed with "personality disorders" and "dysthymic disorder" was significantly higher in females. Isometsä et al. compared suicide committers with unipolar depression not fulfilling the criteria of major depressive disorder with those with major depressive disorder [23]. They reported that problems in recent life events were observed more commonly among suicide committers with non-major depressive disorders, and particularly during the final week. Further, patients with personality disorder, especially borderline personality disorder, typically have high impulsivity. Considering these findings, it is possible that females might tend to attempt suicide without major depressive disorder but rather in connection with life events or impulsivity.

In the present study, the rate of subjects attempting suicide by drug overdose was significantly higher in females. It is known that females are more likely to attempt suicide by poisoning than males [8,9], but we can infer from the high rate of female subjects under psychiatric treatment that they could get drugs for suicide attempts more easily than acquire items for other suicidal methods.

Male suicide attempters tend to be influenced by societal problems like "financial problems" or "work problems" and female suicide attempters by social problems

Table 3 Differences in methods of suicide attempt due to the presence or absence of psychiatric treatment

	Total (N = 184)	Under psychiatric treatment (N = 131)	No psychiatric treatment (N = 62)	Significance	
Methods of suicide attempt					
Drug overdose	101	80*	21	$p = 0.000^{\ddagger}$	$\chi^2 = 12.479$
Jumping from a high place	33	24	9	NS [§]	
Cutting	16	7	9	$p = 0.031^{\ddagger}$	$\chi^2 = 4.657$
Poisonous gas	15	7	8	NS [†]	
Hanging	11	5	6	NS [†]	
Poisoning	9	3	6	$p = 0.032^{\ddagger}$	
Other methods	11	6	5	NS [†]	

[§]chi-square test, [†]Fisher's exact test.

*53 females (81.5%) and 27 males (75.0%) under psychiatric treatment attempted suicide by drug overdose.

like “parent–child relations” or “loneliness.” These findings indicate that male suicide attempters tended to attempt suicide in societal situations, while female suicide attempters tended to attempt suicide in social situations. This difference between males and females may reflect the structure of Japanese society, in which social participation of females is still insufficient — the recent labor force participation rate of those aged 15–64 years is about 80% in males and about 60% in females [24]. In the present study, the rate of those who were employed was significantly higher in males and the rate of the subjects who were housewives or house-husbands was significantly higher in females.

In the present study, the distinct gender differences were confirmed in psychiatric diagnoses, methods of suicide attempt and psychosocial problems, indicating the necessity of suicide prevention measures corresponding to these gender differences, e.g., support for solving societal problems for males and preventing psychosocial isolation for females.

Limitations

The main limitation of the present study is that the subjects were suicide attempters, i.e., they did not commit suicide. It could be argued, therefore, that the results may not accurately reflect the characteristics of suicide committers. However, suicide attempt, and especially repetitive suicide attempts, is known as a high-risk factor for subsequent suicide [25–27]. Furthermore, all of the subjects were high-lethality suicide attempters and clearly intended to kill themselves (most suicide attempters admitted to the critical care medical center use highly lethal methods in their suicide attempts), so we believe that they had very similar characteristics to those of persons who committed suicide, indicating that our results truly reflect the characteristics of suicide committers in Japan. In addition, the advantage of investigating suicide attempters is that we can directly confirm precipitating factors for suicide attempts from the attempters themselves, as well as perform psychiatric assessment regarding their mental state at the time of their suicide attempts. Therefore, investigating suicide attempters such as in the present study is considered to be an effective method for clarifying the characteristics of suicide-related behaviors.

Another limitation of the present study is that we collected the subjects’ information from their medical records and did not use objective methods like structured interviews when we assessed their psychiatric diagnoses and precipitating factors for suicide attempts. Instead, we assessed the subjects’ psychiatric diagnoses and precipitating factors for suicide attempts by agreement among two or more psychiatrists.

Previous suicide attempt is known as a risk factor for suicide, while it is not considered to be a precipitating

factor for suicide and is not included in the classification items of the NPA’s suicide statistics. Therefore, we did not include previous suicide attempt in the analysis of the present study. This might be a limitation of the present study.

Conclusions

Mental disorders were the most common precipitating factor for suicide attempts regardless of gender. This indicates the necessity for reinforcement of the mental health system as a basic suicide prevention measure. Gender differences were significantly observed in psychiatric diagnoses, methods of suicide attempt and psychosocial problems. Suicide prevention measures based on these gender differences should be performed.

Abbreviations

NPA: National police agency; C-CASA: Columbia classification algorithm of suicide assessment.

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

All authors contributed to the conception and design of the study. RN, YK and YO contributed to data collection. RN performed the statistical analyses and wrote the first and final drafts based on a review and comments from all authors listed. All authors read and approved the final manuscript.

Acknowledgements

The present study was supported by a Health and Labour Sciences Research Grant (Comprehensive Research on Disability, Health and Welfare) from the Ministry of Health, Labour and Welfare, 2012.

Author details

¹Department of Neuropsychiatry, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-ku, Tokyo 113-8603, Japan. ²Department of Neuropsychopharmacology, National Institute of Mental Health, National Center of Neurology and Psychiatry, 4-1-1 Ogawahigashi-cho, Kodaira-shi, Tokyo, Japan. ³Department of Child and Adolescent Psychiatry, Graduate School of Medicine, Hokkaido University, North 15, West 7, Kita-ku, Sapporo-shi, Japan.

Received: 18 January 2014 Accepted: 13 May 2014

Published: 19 May 2014

References

1. Ichimura A, Matsumoto H, Aoki T, Andoh H, Yano H, Nakagawa Y, Yamamoto I, Inokuchi S: Characteristics of suicide attempters with depressive disorders. *Psychiatry Clin Neurosci* 2005, **59**:590–594.
2. Ichimura A, Matsumoto H, Kimura T, Okuyama T, Watanabe T, Nakagawa Y, Yamamoto I, Inokuchi S, Hosaka T: Changes in mental disorder distribution among suicide attempters in mid-west area of Kanagawa. *Psychiatry Clin Neurosci* 2005, **59**:113–118.
3. Yamada T, Kawanishi C, Hasegawa H, Sato R, Konishi A, Kato D, Furuno T, Kishida I, Odawara T, Sugiyama M, Hirayasu Y: Psychiatric assessment of suicide in Japan: a pilot study at a critical emergency unit in an urban area. *BMC Psychiatry* 2007, **7**:64.
4. Nakagawa M, Kawanishi C, Yamada T, Sugiura K, Iwamoto Y, Sato R, Morita S, Odawara T, Hirayasu Y: Comparison of characteristics of suicide attempters with schizophrenia spectrum disorders and those with mood disorders in Japan. *Psychiatry Res* 2011, **188**:78–82.
5. Pompili M: Exploring the Phenomenology of Suicide. *Suicide Life Threat Behav* 2010, **40**:234–244.
6. National Police Agency: Statistics of suicide victims in Japan in 2010. (in Japanese). http://www.npa.go.jp/safetylife/seianki/jisatsu/H22/H22_jisatunogaiyou.pdf.

7. Canetto SS, Sakinofsky I: The gender paradox in suicide. *Suicide Life Threat Behav* 1998, **28**:1–23.
8. Tsigotis K, Gruszczynski W, Tsigotis M: Gender differentiation in methods of suicide attempts. *Med Sci Monit* 2011, **17**:H65–70.
9. Callanan VJ, Davis MS: Gender differences in suicide methods. *Soc Psychiatry Psychiatr Epidemiol* 2012, **47**:857–869.
10. Qin P, Agerbo E, Motensen PB: Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors a national register-based study of all suicides in Denmark, 1981–1997. *Am J Psychiatry* 2003, **160**:765–772.
11. Fekete S, Voros V, Osvath P: Gender differences in suicide attempters in Hungary: retrospective epidemiological study. *Croat Med J* 2005, **46**:288–293.
12. Zhang J, McKeown RE, Hussey JR, Thompson SJ, Woods JR: Gender differences in risk factors for attempted suicide among young adults: findings from the Third National Health and Nutrition Examination Survey. *Ann Epidemiol* 2005, **15**:167–174.
13. Wu YW, Su YJ, Chen CK: Clinical characteristics, precipitating stressors, and correlates of lethality among suicide attempters. *Chang Gung Med J* 2009, **32**:543–552.
14. Tóth, Adám S, Birkás E, Székely A, Stauder A, Purebl G: Gender Differences in Deliberate Self-Poisoning in Hungary. *Crisis* 2014, **3**:1–9.
15. Kawashima Y, Ito T, Narishige R, Saito T, Okubo Y: The characteristics of serious suicide attempters in Japanese adolescents - comparison study between adolescents and adults. *BMC Psychiatry* 2012, **12**:191.
16. Posner K, Oquendo MA, Gould M, Stanley B, Davies M: Columbia Classification Algorithm of Suicide Assessment (C-CASA): Classification of suicidal events in the FDA's pediatric suicide risk analysis of antidepressants. *Am J Psychiatry* 2007, **164**:1035–1043.
17. Silverman MM, Berman AL, Sanddal ND, O'Carroll PW, Joiner TE: Rebuilding the Tower of Babel: A Revised Nomenclature for the Study of Suicide and Suicidal Behaviors. Part 1: Background, Rationale and Methodology. *Suicide Life Threat Behav* 2007, **37**:248–263.
18. Silverman MM, Berman AL, Sanddal ND, O'Carroll PW, Joiner TE: Rebuilding the Tower of Babel: A Revised Nomenclature for the Study of Suicide and Suicidal Behaviors Part 2: Suicide-Related Ideations, Communications, and Behaviors. *Suicide Life Threat Behav* 2007, **37**:264–277.
19. American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)*. Washington DC: American Psychiatric Association 2000.
20. Asukai N: Mental Disorder as a Risk Factor of Suicide; A Clinical Study of Failed Suicides. *Seishin Shinkeigaku Zasshi* 1994, **96**:415–443 (in Japanese).
21. Bertolote JM, Fleischmann A: Suicide and psychiatric diagnosis: a worldwide perspective. *World Psychiatry* 2002, **1**:181–185.
22. Pornpili M, Girardi P, Tatarelli G, Ruberto A, Tatarelli R: Suicide and attempted suicide in eating disorders, obesity and weight-image concern. *Eat Behav* 2006, **7**:384–394.
23. Isometsä E, Heikkinen M, Henriksson M, Aro H, Marttunen M, Kuoppasalmi K, Lönnqvist J: Suicide in non-major depressions. *J Affect Disord* 1996, **36**:117–127.
24. Annual Report on the Labour Force Survey 2012. <http://www.stat.go.jp/english/data/roudou/report/2012/index.htm>.
25. Beautrais A: Subsequent mortality in medically serious suicide attempts: a 5 year follow-up. *Aust N Z J Psychiatry* 2003, **37**:595–599.
26. Nordström P, Samuelson M, Asberg M: Survival analysis of suicide risk after attempted suicide. *Acta Psychiatr Scand* 1995, **91**:336–340.
27. Owens D, Horrocks J, House A: Fatal and non fatal repetition of self-harm. Systematic review. *Br J Psychiatry* 2002, **181**:193–199.

doi:10.1186/1471-244X-14-144

Cite this article as: Narishige et al.: Gender differences in suicide attempters: a retrospective study of precipitating factors for suicide attempts at a critical emergency unit in Japan. *BMC Psychiatry* 2014 **14**:144.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit





Original communication

Suicide of physicians in the special wards of Tokyo Metropolitan area



Wakako Hikiji, MD, PhD, Medical Examiner*, Tatsushige Fukunaga, MD, PhD, Director

Tokyo Medical Examiner's Office, Tokyo Metropolitan Government, 4-21-18 Otsuka, Bunkyo-ku, Tokyo 112-0012, Japan

ARTICLE INFO

Article history:

Received 27 July 2013
Received in revised form
1 December 2013
Accepted 7 December 2013
Available online 18 December 2013

Keywords:

Suicide
Physician

ABSTRACT

Numerous studies on physician suicide in various countries have been reported but no data from Japan on the issue can be found to date. In this study, physician suicides in the special wards of Tokyo Metropolitan area in 1996–2010 were investigated retrospectively. A total of 87 cases were enrolled. The results suggested that physician suicide has been linked to pre-existing psychiatric illnesses and occupational problems, and that psychiatrists have a relatively higher suicide risk compared to those majoring in other specialities of medicine. A distinctive feature was that 19 cases had used either drugs or devices which were accessible due to their profession some time during the process of committing suicide. Another notable feature was that 4 out of 5 anaesthesiologists enrolled in the study had chosen poisoning for their suicide method, with the drugs frequently used in their speciality. The findings advocate strongly for efficient suicide prevention measures for physicians including an early detection and treatment of psychiatric illnesses, as well as an urgent need for a more effective pharmacy management in applicable institutions together with the implementation of self discipline on each physician. This is the first broad academic study on physician suicide in Japan.

© 2013 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

1. Introduction

Suicides numbered 32,863 in Japan in 1998 and have exceeded 30,000 in every subsequent year, which accounts for the highest rate in the world.¹ Various analyses, researches and measures have been taken by professionals in various fields to stop such a long lasting trend of a complex public health problem. However, an absence of central institution to manage the detailed data on suicide has been making it difficult to grasp the actual condition through a large scale epidemiological study nationwide.

On the other hand, the shortage of physicians in Japan has become a serious social problem in recent years.^{2,3} It is a great loss for the whole society to lose a physician by suicide, even though the number of cases is expected to be relatively small. It should be an issue to be dealt with not only by the professionals of forensic science or epidemiology, but by those from a variety of academic fields. No broad academic study on physician suicide from Japan can be found to date, due to the lack of academic epidemiological data.

The main objective of the present study was to examine the characteristics of physician suicide cases in the special wards of Tokyo Metropolitan area in 1996–2010, as the first broad academic study on the issue in Japan.

2. Methods

Data on suicides of physicians and non-physicians handled in the Tokyo Medical Examiner's Office during 1996–2010 were extracted for descriptive analysis retrospectively. The Tokyo Medical Examiner's Office is an institution in which all unnatural deaths, including suicide, occurring in the special wards of Tokyo Metropolitan area are reported and the inquests are performed. This therefore provides that all suicide cases occurring in the area are processed by this institution. Death certificates and supplementary documents were examined which included age, gender, professional speciality, past and present illness/es, device/s used, proposed motive and other relevant information of each case. The ethical committee of the Tokyo Medical Examiner's Office approved the protocol of this study.

3. Results

The total number of suicides handled in the Tokyo Medical Examiner's Office during the study period was 28248 and 87 were physicians (0.31%). Of these 87 cases, the age varied from 25 to 82 (mean = 47.97, median = 47.00) and the male to female ratio was 68:19 (the percentage of female physicians = 21.84%). The suicide methods consisted of 49 hanging, 14 poisoning, 12 jumping, 3 diving, 3 hypoxia, 3 cutting, 1 hydrogen sulfide intoxication, 1 carbon monoxide intoxication and 1 drowning. The percentage of

* Corresponding author. Tel.: +81 3 3944 1481; fax: +81 3 3944 7585.
E-mail addresses: hikiji@kyudai.jp (W. Hikiji), fukutatu@b-star.jp (T. Fukunaga).

methods chosen by physicians and non-physicians are shown in Fig. 1. Regardless to the suicide method, 19 physicians (21.84%) were found to have used either drugs or devices which were accessible due to their profession at some time during the process of committing suicide. Forty five cases (51.72%) had been diagnosed with a psychiatric illness, and the main motives of suicide of each case were psychiatric illnesses, occupational problems and non-psychiatric illnesses. The area of speciality of physicians consisted of 21 internists, 16 psychiatrists, 6 paediatricians, 5 anaesthesiologists, 4 dermatologists, 3 otolaryngologists, 2 radiologists, 2 surgeons, 2 obstetricians/gynaecologists, 1 orthopaedist, 1 plastic surgeon, 1 ophthalmologist, 1 pathologist, 1 researcher, 1 freelance, 1 industrial physician and 4 unknown, while 6 were junior residents (Table 1). Out of 5 anaesthesiologists, only 1 had chosen hanging as a suicide method but the remaining 4 had chosen poisoning with anaesthetics, using the devices most likely to have been taken out from their workplace (Table 2).

4. Discussion

Several studies have been carried out on the issue of suicide of physicians in various countries,^{4–10} presenting notable findings in the distribution of suicidal methods and specialities in medicine. The present study revealed numerous noteworthy findings on the issue, some of which were unique in characteristics.

The mean and median age of physician suicides enrolled in the present study, 47.97 and 47.00 respectively, had no statistical difference compared to those of non-physician suicides in the equivalent period (mean = 49.69, median = 51.00, $p > 0.05$). The

Table 1

The speciality of physicians on the national registry and those in the present study.

	Percentage in physicians over 15 years	Number of physician suicide	%
Internists	37.15–40.65%	21	24.14
Dermatologists	2.95–3.06%	4	4.60
Paediatricians	5.58–5.98%	6	6.90
Psychiatrists	4.64–5.06%	16	18.39
Surgeons	9.54–12.03%	2	2.30
Orthopaedists	7.09–7.44%	1	1.15
Plastic surgeons	0.57–0.78%	1	1.15
Ophthalmologists	4.56–4.99%	1	1.15
Otolaryngologists	3.22–3.84%	3	3.45
Obstetricians/gynaecologists	4.40–5.39%	2	2.30
Radiologists	1.82–2.00%	2	2.30
Anaesthesiologists	2.19–2.75%	5	5.75
Unknown	0.47–0.77%	13	16.09
Others	7.32–13.96%	10	11.49

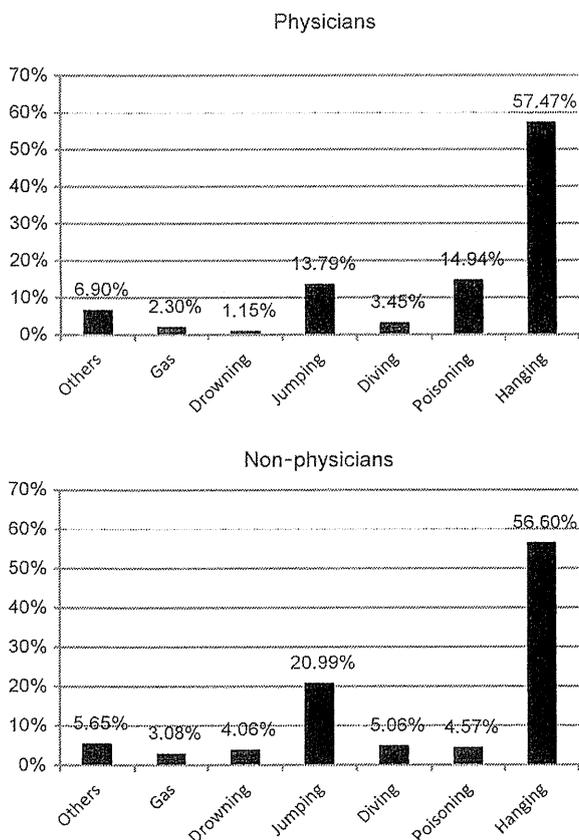


Fig. 1. The suicide method of physicians and non-physicians in 1996–2010 in the Tokyo Metropolitan area.

percentage of female physicians enrolled in the study (21.84%) was slightly higher compared to the percentage of females accounting for whole physicians; which increased from 13.39% in 1996 and 18.94% in 2010.^{11,12}

It was found that 45 out of 87 cases had been diagnosed and received some kind of treatment for a psychiatric illness. Furthermore, a closer examination of supplementary documents revealed that the most common motives of suicide were pre-existing psychiatric illnesses, mostly depression, followed by occupational problems and non-psychiatric illnesses. There has been some evidence that depression, drug abuse, and alcoholism are often associated with suicides of physicians according to the studies conducted in other countries,^{8,9} which is in accordance with the results of present study. The most common motive among non-physician suicides during the equivalent period was also psychiatric illnesses [data not shown], which indicates that an early detection and an appropriate treatment of psychiatric illnesses would be a key factor in the prevention of suicides, regardless of the occupational background.

It has been pointed out that psychiatrists and anaesthesiologists have a relatively higher risk of suicide compared to physicians majoring in other specialities.^{10,13,14} According to the biennial reports released by the Ministry of Health, Labour and Welfare of Japan in 1996–2010, psychiatrists accounted for 4.64–5.06% of the whole registered physicians respectively.^{11,15–21} On the other hand, there were 16 psychiatrists (18.39%) enrolled in the present study, which accounted for a distinctly higher percentage compared to the proportion of physicians in the national registry over the equivalent period; the assumption that the speciality distribution is the same in the Tokyo Metropolitan area. It is unknown whether there are occupational stresses particular to the psychiatric fields of medicine, or if the choice of speciality is influenced by factors that might differentially influence risk. However, there is a study reporting high levels of stress and dissatisfaction for psychiatrists.²²

The present study revealed that the most common suicide method was hanging for physicians. Although the percentage of suicidal poisoning for physicians was relatively high compared to that of non-physicians, it only accounted for about a quarter of that of hanging (Fig. 1). On the other hand, poisoning was found to be the most common suicide method among physicians in some previous studies.^{4,7} Some authors suggested that this phenomenon is due to physicians being rich in knowledge on lethal drugs and doses, as well as accessibility to them. While these factors may have had effects to the results, another factor

Table 2
The method of suicide by the speciality of physicians.

Speciality/ method of suicide	Internists	Dermatologists	Paediatricians	Psychiatrists	Surgeons	Orthopaedists	Plastic surgeons	Ophthalmologists	Otolaryngologists	Obstetricians/ gynaecologists	Radiologists	Anaesthesiologists	Unknown	Others	Total
Hanging	14	2	4	12	1	1	1	1	2	2	1	1	6	4	49
Poisoning	3	1		3							4		1	2	14
Diving	1													1	3
Jumping	1		2					1					3	3	12
Drowning	1														1
Gas	1														2
Others	1			1	1	1	1	1	1	2	1	2	2	2	6
Total	21	4	6	16	2	1	1	3	2	2	5	5	13	10	87

for consideration was established through the cases noted in the present study.

Physicians generally have more knowledge of effective suicide methods than those with less medical knowledge. It is notable that either drugs or devices only accessible to medical professionals had been used during the process of committing suicide in 19 out of 87 cases (21.84%). Furthermore, it is concerning to note that 4 out of 5 anaesthesiologists had chosen poisoning for their method of suicide, using anaesthetics; droperidol, vecuronium bromide, midazolam, barbiturate and propofol. This is a distinct contrast to internists, with only 4 out of 21 using accessible medical drugs or devices during the suicidal process. Anyhow, these results indicate that an easy access to and a substantial knowledge of potentially dangerous drugs may lead to an inappropriate usage. For example, it is well known to medical professionals that propofol has sedative and relaxing properties, and brings euphoric feelings.²³ Quite a number of lethal cases have been reported on those dying from the misuse of propofol on themselves.^{24–27} Medical institutions are responsible in managing potentially dangerous drugs and devices appropriately, but it also strongly depends on the moral of each professional involved. Every member of staff, not only those with management responsibilities, should be aware that there is a possibility that they might be used for unintended purposes other than suicide, such as addiction and homicide. There are case reports in which anaesthetics were suspected of having been accessories in homicides.^{28,29}

It is clear that measures need to be taken to address the current problem of drug and device misuse by physicians. With the availability and ease of obtaining them along with the difficulty of detection, the use of prescribed drugs for wrong purposes, including suicide, will probably continue in the future. However, the best solution may not be to place restrictions on their circulation as the majority would be used for their intended purpose. Instead, a more strict pharmacy accounting of potentially dangerous drugs and devices in applicable institutions, together with the implementation of self-discipline on physicians should be encouraged to prevent their illicit diversion.

There are a number of limitations to this study. Due to the extremely small number of cases covered despite 15 years of study period, it is impossible to draw a reliable conclusion on the trends on physician suicide by age and period. A new distinctive characteristic may be revealed by continuous research on the issue and the accumulation of further cases of this nature. Furthermore, the study is based only on the physician suicides occurred in the Tokyo Metropolitan area. A different trend, such as the distribution in the speciality of medicine, may be observed in the other areas of the nation, particularly in the rural area.

5. Conclusion

Although the number of physician suicide accounted for less than 1% of whole suicides in the Tokyo Metropolitan area, numerous distinctive features were observed by background analyses. The results of the present study should encourage physicians and all physician associated co-workers to pay attention to the need for early intervention for psychiatric illness among themselves, and also to review of pharmacological management in their workplace and their morals as professionals handling potentially dangerous drugs and devices.

Conflict of interest

The authors have no conflict of interest.