

Choking Incidents Among Psychiatric Inpatients: A Retrospective Study in Chutung Veterans General Hospital

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Background: Choking incidents have long been recognized as a cause of death in people with mental illness. This study attempted to determine the rate of choking incidents and deaths among psychiatric inpatients and identify the risk factors associated with choking incidents. Some preventive measures are also suggested.

Methods: All choking incidents recorded over 3 years in 3 psychiatric wards of Chutung Veterans General Hospital (total of 210 beds) were retrospectively analyzed for demographic variables, psychiatric and medical diagnoses, and drug therapy at the time of the incidents.

Results: During the 3-year period, 16 incidents were recorded, involving 11 patients at a rate of 1 incident every 451.4 months of hospitalization per person. Men were 3 times more likely to experience choking incidents than women, and the mean age of choking patients was higher than that of all patients (59.7 vs. 44.4 years). Among the 16 incidents, 3 fatal cases were noted, giving an annual choking death rate of 5.05 per 1,000 persons hospitalized. A high re-choking rate of up to 40.0% was noted, and patients with organic mental disorder had 3.4 times the choking incidence of all patients. The mean antipsychotic dosage of the choking cases was similar to that of all inpatients, but the mean hypnotic dosage of the fatal choking cases was significantly higher. Up to 62.5% of the choking accidents occurred at breakfast, and *mantou* (a type of steamed bun) was the most common food (9/16) that resulted in the accidents. Of the 11 patients, 9 were rated as "poor" or "very poor" with regard to self-care before the accidents.

Conclusion: Compared with studies in Western psychiatric inpatients, we have a lower choking incident rate but higher death rate due to choking. We found that older age, male sex, higher dosage of hypnotics, previous choking attacks, organic mental disorder, poor self-care, breakfast time and *mantou* were possible risk factors associated with choking, in which older age, poor self-care, and higher dosage of hypnotics for fatal cases were statistically significant. [*J Chin Med Assoc* 2010;73(8):419-424]

Key Words: airway obstruction, antipsychotic agents, hypnotics and sedatives, mental disorders

Introduction

Choking incidents have long been recognized as a cause of death in people with mental illness. A 3.3% proportionate mortality of choking in institutionalized chronic schizophrenic patients was reported early in 1966.¹ Another study, in 1968, reported a proportionate choking mortality rate of 4.2% in a mental hospital and an absolute mortality rate of 1.7 deaths per 1,000 hospital population per year,² similar with the result of a study

in 1980 that reported the presence of asphyxia as a concomitant cause of sudden death among psychiatric inpatients with an absolute mortality of about 1–2 deaths per 1,000 hospital population.³ All of them had a far higher rate than the annual rate of 0.66 choking fatalities per 100,000 general population in the United States.⁴

After the trend of deinstitutionalization and the introduction of newer antipsychotics, a rate of 1 choking incident every 56.32 months of hospitalization per



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person among Italian psychiatric inpatients was reported in 1997.⁵ In 2003, Corcoran and Walsh reported that 10% of sudden deaths among Irish psychiatric inpatients were due to choking, with annual fatalities of 21 per 100,000 patients.⁶ Another study in Australia revealed that individuals who died by choking were over 20 times more likely to have been treated for schizophrenia, and the rate of choking deaths in this group was about 6 per 100,000 patients annually.⁷ Although the fatality rates varied in these studies, they remind the clinician that choking incidents among people with mental disorders are high and should be paid more attention.

Several risk factors for choking have been suggested to play a role in people with mental illness, such as poor eating habits, impaired dentition, comorbid neurological diseases, dysphagia, aging, use of antipsychotics and extrapyramidal syndromes.^{2,5,6,8} In addition to psychiatric patients, groups with higher choking risk include young children,⁹ the elderly,¹⁰ especially those with dementia, learning disabilities,¹¹ and intellectual disabilities,^{12,13} and neurological patients.¹⁴ Some of them share the similar problem of imperfect mental status. From the findings of these studies, various simple, effective measures have been proposed to prevent choking in psychiatric inpatients.

To our knowledge, there has been no report of choking incidents in Asian psychiatric inpatients. Therefore, the first objective of this study was to investigate the rate of choking incidents and choking deaths among psychiatric inpatients in a hospital. The second objective was, through a survey of the patients' psychotropic medications, and physical and mental statuses, to explore the risk factors associated with choking incidents.

Methods

A retrospective survey of ward reports and clinical files was made of all choking incidents that occurred between July 1, 2006 and June 30, 2009 in 2 chronic psychiatric wards (150 beds) and 1 acute psychiatric ward (60 beds) of Chutung Veterans General Hospital. We defined "choking incident" as "an acute episode in which the patient experienced the food bolus lodging in their respiratory tract with an inability to speak or to cough effectively by themselves, and the bolus had to be expelled by others to terminate the event".

During the 3-year study period, 11 inpatients who had choked were identified, with 8 in the chronic wards and 3 in the acute ward. Three inpatients had 2 choking incidents and 1 had 3 incidents, giving a total of 16 incidents. For each case, the following data were

collected: demographic characteristics, psychiatric diagnosis, medical condition, psychotropic medications at the time of the incidents and the features of the incidents. Antipsychotic dosages were converted into equivalent milligrams of chlorpromazine.¹⁵⁻¹⁷ Hypnotic or sedative dosages were also converted into equivalent milligrams of diazepam.¹⁸

Subsequent statistical analyses were based on incidents or patients. For incident-based analyses, all 16 incidents were included, whereas patient-based analyses of those who had choked more than once concentrated on the first incident. Cross-sectional data of all psychiatric inpatients of the 3 wards on August 31, 2009 were collected to represent the pool of all the psychiatric inpatients for comparison. Categorical data were analyzed using Fisher's exact test. Nonparametric test (Mann-Whitney test) was used to evaluate between-group differences for continuous variables. In all of the tests, the criterion for significance was set at $p < 0.05$.

Results

During the 3-year study period, 16 choking incidents occurred to 11 patients (9 men with 14 incidents and 2 women with 2 incidents; Table 1) among a total of 216,672 person-admission days (149,551 and 61,121 person-admission days for males and females, respectively), giving an overall rate of 1 incident every 451.4 months per person hospitalized. Male patients had about 3 times the number of choking incidents as females (every 356.1 and every 1,118.7 months per person hospitalized for males and females, respectively), but the difference was not statistically significant ($p = 0.157$). For the 16 choking incidents, 13 incidents of 8 patients occurred in the chronic wards (mean length of admission, 1,957 days; range, 143–2,740 days), and 3 incidents of 3 patients occurred in the acute ward (on the 7th, 16th and 29th days of admission, respectively).

Among the 16 incidents, 3 fatal cases were noted, giving an annual death rate due to choking of 5.05 per 1,000 persons hospitalized. Two patients died directly soon after the choking attacks. Due to autopsy not being performed, primary causes responsible for their deaths other than choking, such as heart attack, could not be ruled out. Another patient fell into a coma and had aspiration pneumonia after the choking, which resulted in his death 8 months later.

Four patients had a second choking accident, and 1 had a third during the survey period. The average number of days between 2 choking accidents was 92 days (range, 22–199 days). The rate of a second

Table 1. Characteristics of the inpatients and choking incidents

Case	Age (yr)/Sex	Diagnosis	Meal time	Food	Antipsychotic (mg/d)	Hypnotic (mg at bed time)
1	67/F	Schizophrenia	Breakfast	Mantou	Risperidone (2)	Zolpidem (10)
2	71/M	Dementia	Breakfast	Mantou	Aripiprazole (10)	Zolpidem (10)
3	56/M	Schizophrenia	Lunch	Rice	Flupentixol (3)	Zopiclone (7.5)
4	55/F	Schizophrenia	Dinner	Rice	Clozapine (600)	Zopiclone (15)
5	28/M	Alcoholic psychosis	Breakfast	Mantou	Quetiapine (150)*	
6 [†]	46/M	Schizophrenia	Dinner	Meat	Clopenthixol (80)	Flunitrazepam (4)
7 [†]	65/M	Schizophrenia	Dinner	Rice	Flupentixol (9)	Zolpidem (10)
			Breakfast	Mantou	Clozapine (100)	Dalmadorm (30)
						Zolpidem (10)
						Dalmadorm (30)
						Kinzolam (4)
8	67/M	Bipolar disorder	Breakfast	Mantou	Risperidone (2)	Flunitrazepam (4)
			Breakfast	Pastry	Sulpiride (800)	Flunitrazepam (4)
9 [†]	80/M	Schizophrenia	Dinner	Meat balls	Quetiapine (150)*	Midazolam (15)
						Kinzolam (4)
						Mesyrel (50)
			Breakfast	Mantou	Flupentixol (2)	Midazolam (15)
						Estazolam (4)
10	82/M	Organic mental disorder	Breakfast	Mantou	Quetiapine (100)	Zopiclone (7.5)
			Breakfast	Mantou	Quetiapine (100)	Zopiclone (7.5)
			Night snack	Noodles	Quetiapine (100)	Zopiclone (7.5)
11	40/M	Organic mental disorder	Breakfast	Mantou	Flupentixol (3)	Estazolam (2)

*Flupentixol depot was also given; [†]fatal.

choking incident among those who survived the first choking was 40.0% (4/10).

The mean age of the 11 patients was 59.7 years (range, 28–82 years), which was higher than the mean age of all the patients (44.4 years; range, 18–91 years; $p=0.003$). The diagnoses of the 11 patients were: schizophrenia, 6; bipolar disorder, 1; dementia, 1; alcohol-induced psychotic disorder, 1; and organic mental disorders, 2 (1 due to traumatic head injury and 1 due to asphyxia).

Regarding the mental condition before the choking incidents, 8 patients had disorientation and 5 had irrelevant speech. From the chart records on self-care evaluation, 2 were graded as “fair” (assisted just by verbal instructions), 6 as “poor” (needs assistance for feeding or showering), and 3 as “very poor” (defecation and urination in wrong place). Patients graded as poor or very poor had significantly higher choking risk than those graded fair (for all patients, 127 were fair, 48 were poor and 9 were very poor; $p=0.009$ between groups graded poor and fair, and $p=0.004$ between groups graded very poor and fair). Of the 3 fatal cases, 2 were graded as very poor and the other as poor.

From the chart records on physical condition, 6 were recorded as having unsteady gait, and 5 had falling accidents in the 3-month period before the choking incidents. With regard to comorbidities of chronic

physical illnesses, 1 had seizure, 1 had hypothyroidism and 3 had hypertension. Nine patients had electrocardiogram records before or at choking accidents, and mild QT prolongation was observed in 1 patient (male sex; QTc = 446 ms, >440 ms). The above data are summarized in Table 2.

All 11 patients were treated with 1 type of oral antipsychotic (flupentixol, 3; clopenthixol, 1; clozapine, 1; risperidone, 2; quetiapine, 3; and aripiprazole, 1), and 2 of them had received an additional 20 mg flupentixol depot injection within 1 month before the choking incident. Their mean daily dose of chlorpromazine equivalent was 281.8 mg (range, 100–1,200 mg), which was lower, but not statistically significantly so, than the mean dosage of all inpatients (386.6 mg; $p=0.079$). In addition to their antipsychotic medication, 2 patients were treated with valproic acid (1,000 and 500 mg/day), and another 3 were treated with antidepressants. Ten patients were treated with at least 1 hypnotic (benzodiazepine, zolpidem or zopiclone), with the dose ranging from 5 to 50 mg diazepam/day. The mean daily dosage of hypnotics among these choking patients (16.8 mg diazepam) was higher than that of all patients (14.0 mg diazepam; $p=0.924$). Moreover, fatal cases were noted to have a higher mean hypnotic dosage of 41.7 mg diazepam at bed time than that of all patients ($p=0.008$). For those choking incidents that occurred

Table 2. Statistical data of the patients who choked and those who died

	Patients who choked (11)	Patients who died (3)
Age (yr)		
< 40	1	0
40–49	2	1
50–59	2	0
60–69	3	1
70–79	1	0
> 79	2	1
Sex		
Male	9	3
Female	2	0
Number of choking incidents		
1	7	1
2	3	2
3	1	0
Mental condition before the choking incidents		
Disorientated	8	3
Irrelevant speech	5	3
Self-care evaluation		
Fair (assisted just by verbal instructions)	2	0
Poor (needs assistance for feeding or showering)	6	1
Very poor (defecation and urination in wrong place)	3	2
Physical condition		
Unsteady gait	6	1
Falling accident in 3-mo period before choking	5	1
Comorbidity with chronic physical illness		
Seizure	1	0
Hypothyroidism	1	0
Hypertension	3	0
QT prolongation	1*	0†

*Two of the patients who choked had no electrocardiogram record; †1 of the patients who died had no electrocardiogram record.

at breakfast, the mean hypnotic dosage was 19.5 mg diazepam/day.

For the 16 choking incidents, 10 incidents occurred at breakfast, 1 at lunch, 4 at dinner, and 1 at night snack. The main contents of the food boluses recorded included *mantou* (a type of steamed bun, 9), rice (3), pastry (1), meat (1), meat balls (1) and noodles (1). For the 3 fatal cases, 2 occurred at breakfast with *mantou*, and 1 at dinner with meat. Three patients were

supplied with soft diets because of their ease of choking, but they obtained solid food from other patients, which resulted in their choking incidents.

Discussion

This study revealed an overall rate of 1 choking incident every 451.4 months per person hospitalized in the psychiatric wards of 1 general hospital in Taiwan. A rate of 1 choking incident every 56.32 months of hospitalization per person was reported in Italian psychiatric inpatients.⁵ Regarding the death rate due to choking, our study found a rate of 5.05 per 1,000 persons hospitalized, which is 2.9 times the rate of choking death in a mental hospital in the US,² and about 766 times the rate in the US general population.⁴ The high choking death rate in our study suggests the importance of efforts to prevent choking and providing training to rescue choking patients at high risk.

Aging has been suggested to be a risk factor for choking,⁵ which is in line with our finding that the mean age of the choking patients was higher than that of all patients (59.7 vs. 44.4 years). In addition to age, our study also revealed that men were 3 times more likely to have choking incidents than women. To our knowledge, this risk factor has not been reported by previous studies.

For those who survive a previous choking incident, a high re-choking rate up to 40.0% was noted, and the mean duration between the 2 choking incidents was short (3 months). Although some preventative interventions were adopted for inpatients in the wards, such as changing their meals to soft diets, patients still managed to obtain solid food from other inmates.

A high proportion of the choking incidents (62.5%) in this study occurred at breakfast. There are 2 possible explanations for this finding. First, we found that *mantou* caused 9 of 16 choking incidents. *Mantou* is a popular staple of breakfast for ethnic Chinese. With its soft texture, it is easy for a mouthful to cause choking. For patients with a high risk of choking, such types of food should be avoided. Second, we found that patients who choked had higher hypnotic dosages and, for those who choked at breakfast, the mean hypnotic dosage was even higher. With the high hypnotic dosage, and during breakfast time, the residual hypnotic effect may disturb patients' consciousness as well as esophageal reflex and result in choking.

Of the patients who choked, 54.5% had schizophrenia, 9.1% had bipolar disorder, 9.1% had dementia, 9.1% had alcohol-induced psychotic disorder, and 18.2% had organic mental disorder. Compared with

all inpatients, who had the percentages of 71.2%, 10.9%, 7.1%, 2.2%, and 5.4%, respectively, higher choking incidence was noted in patients with organic mental disorders (3.4 times the incidence of all inpatients). Our finding is in line with previous reports that organicity is a risk factor for choking.^{5,19}

Self-care function, which is related to psychiatric status, was recognized as an indicator of choking, as 27.3% of patients who choked were graded as “very poor” and 54.5% as “poor”. For the 3 fatal cases, 2 were graded as very poor and the other as poor. For patients with very poor or poor self-care function, close prevention for choking is needed.

The role of antipsychotics in choking is controversial.²⁰ In this study, all 11 patients who choked had received 1 type of oral antipsychotic and 2 had received an additional injection of flupentixol depot. Patients with choking incidents had a similar dosage of antipsychotic compared with all psychiatric patients. Our finding is not in line with previous reports that antipsychotics, especially thioridazine, were found to increase choking in psychiatric inpatients.^{5,19} A possible explanation is that when a patient was found to have dysphagia or ease of choking, the possibility of psychotropic-induced adverse effects was considered, which resulted in trimming the antipsychotic medications.

Antipsychotic drugs may cause serious cardiovascular side effects, including myocarditis, cardiomyopathy and rhythm abnormalities. Among the rhythm abnormalities, prolonged QT interval, which can even lead to torsades de pointes and sudden cardiac death, is the most common.²¹ Although no severe cardiac abnormality was reported for the patients who choked in this study, the possible association between cardiac attack and choking should be noted.

The majority (90.9%) of the patients who choked had been given at least 1 hypnotic at bed time, with a mean dosage of 16.8 mg diazepam, which was 1.2 times the mean dosage for all patients (14.0 mg diazepam). For the choking incidents that occurred at breakfast, the mean hypnotic dosage (19.5 mg diazepam) was 1.4 times the mean dosage for all patients. For the 3 fatal cases, the mean hypnotic dosage (41.7 mg diazepam) was 3.0 times the mean dosage for all patients. For patients at risk for choking, hypnotics should be used with caution, and close observation for the state of consciousness at breakfast is necessary.

Compared with previous studies, there was a lower choking incidence in this study but a higher fatality rate. Some possible reasons are inferred. First, choking incidents caused by liquid foods or episodes where patients expelled the bolus by themselves (through coughing or other means) were excluded in this study

to enhance the validity of case identification. Such strict criteria (either type or severity) would reduce the number of choking incidents included. Second, eating customs influence the choking event. In this study, the most common food that resulted in choking was *mantou*, which is a traditional Chinese food that is rarely seen in Western countries. Thus, identification of foods with a high choking risk in patients’ diet was necessary. Third, different habits of prescription might be a reason for the different results. In this study, a high proportion of patients was given hypnotics at bed time, and the most dangerous time for choking was at breakfast. There are no related data in previous studies to compare with. The relationship between choking and the use of hypnotics or other psychotropics should be further investigated.

This study documented an increased risk of choking incidents/deaths in psychiatric inpatients in general. Our finding confirms the urgent need for strategies to prevent such episodes among patients with possible risk factors such as old age, male sex, hypnotic use, previous choking attacks, organic mental disorder, and poor self-care. Evaluation of the swallowing function is suggested, especially for those with previous choking attacks due to the high re-choking rate. Surveillance of physical problems is essential to rule out other causes of choking, such as seizures, heart problems, gastrointestinal problems, or infectious diseases. Medications with intensely sedative or extrapyramidal effects should be administered cautiously. Foods with high choking risk should be avoided, and changing to a soft diet is suggested for those with multiple risk factors. Intensive monitoring during meal time and keeping such patients from food between meal times are also suggested.

This study was limited by its retrospective design, and some important factors related to choking (such as heart problems, complete toxicological information or neurological examinations) may have been missed. Further prospective studies with more sophisticated design to identify the risk factors associated with choking could help to establish strategies to reduce choking incidents in psychiatric inpatients.

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