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Defining outcome measures of hospitalization for assessment in the Japanese forensic mental health scheme: a Delphi study

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Abstract

Background: A new legislation concerning forensic mental health was established by the Japanese Government in 2005, the “Act on Medical Care and Treatment for the Persons Who Had Caused Serious Cases under the Condition of Insanity,” or the Medical Treatment and Supervision (MTS) Act. Since it was passed, however, there has been broad controversy over Hospitalization for Assessment (HfA), the first stage of the MTS scheme.

Methods: Following a comprehensive literature search to assemble a list of candidates, we conducted a Delphi study to establish standard outcome measures for HfA.

Results: Five Delphi rounds were conducted by 19 panelists including medical practitioners and lawyers. A total of 139 items were accepted as outcome measures for HfA based on panel agreement.

Conclusion: The Delphi study established a list of HfA outcome measures for the MTS act, which will contribute to the optimization of the new forensic mental health system in Japan.

Keywords: Forensic mental health, Delphi study, the Medical Treatment and Supervision Act, Hospitalization for Assessment, Outcome measure

Background

Forensic mental health is a rapidly growing subspecialty in psychiatry which has received recent attention [1]. There is a global trend toward deinstitutionalizing patients with mental disorders, necessitating forensic mental health systems to develop accordingly [2]. As a result, many countries have established legislation for offenders with mental disorders that link together different disciplines [3].

For many years, however, Japan had no specific legislation for patients with mental disorders who had violated criminal laws [4]. Such offenders were subject to Official Involuntary Hospitalization (OIH) under the Mental Health and Welfare Law, a system completely detached from the criminal justice system [5]. The OIH scheme was harshly criticized by lawyers for lack of proper legal procedures protecting patient rights, while psychiatrists

were concerned that many hospitals accepting OIH patients lacked adequate facilities and staffs [6].

To address these problems, the Japanese forensic mental health system was reformed with the enactment of a new legislation in 2005, the “Act on Medical Care and Treatment for the Persons Who Had Caused Serious Cases under the Condition of Insanity,” otherwise known as the Medical Treatment and Supervision (MTS) Act [7]. Under this new scheme, a person who committed serious crimes in a state of insanity or diminished responsibility would be dealt with under a specific judicial administrative framework. The public prosecutor presents an allegation. Then a District Court would make a judgment specifying the treatment of the offender. The judgment panel consists of one judge and one Mental Health Reviewer, a psychiatrist with Judgment Physician license (the national license for forensic mental health specialists). The panel can arrive at three possible verdicts: an order to hospitalize the offender for medical treatment; an order to care for the offender as an outpatient in the community; or an order not to treat the offender in the MTS scheme.

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The offender is then obligated to accept the special psychiatric care provided by the designated medical facilities and to submit to continuous supervision by a Rehabilitation Coordinator working in a probation office. Thus, for the first time, courts and officers of the Ministry of Justice are involved in the treatment of patients with mental disorders, signaling the beginning of a new era for forensic mental health services in Japan [8].

Temporary hospitalization of an offender for psychiatric examination and medical observation (usually for a few months) is called Hospitalization for Assessment (*kantei-nyuin*, HfA). A psychiatrist appointed by the court, named Examiner Psychiatrist, conducts a psychiatric evaluation of the offender and submits a report to the court [9]. A lawyer is appointed as an attendant to defend the offender during the judgment process [10].

In 2008, the Japanese government published a list of 239 mental hospitals accepting offenders for HfA [11], which was increased to 286 institutions in 2013 [12]. However, there have been no specific regulations regarding the conditions of the hospitals accepting HfA cases, and the availability of resources and the environment at these institutions vary markedly [13,14]. Similar argument has occurred about the OIH setting, thus, some hospitals lack adequate resources for appropriate care of offenders with mental disorders [15].

Several studies have been performed in an attempt to optimize the HfA procedure [16-18]. We previously conducted a written questionnaire survey of leading Japanese forensic psychiatrists, to establish an expert consensus about how to deal with HfA cases [9]. We concluded that this consensus should be widely publicized among practitioners to ensure better management of offenders during HfA.

On the other hand, the goals of HfA are not clearly defined. The MTS act describes its aims as both assessment and medical observation of the offender, but there are no standards to evaluate the appropriateness of the medical care in each HfA. For example, there is a debate regarding which should be prioritized, neutral attitude against the offenders for accurate evaluation or development of the therapeutic alliance with them [19], so-called dual-role dilemma. Medical practitioners are struggling to determine how best to deal with offenders because of the lack of outcome indicators for HfA [20].

In light of this uncertainty, we conducted a study to define standardized HfA outcome measures to help practitioners determine the best treatment strategy for offenders. In addition, such outcome measures will be useful for evaluating the appropriateness of management in each HfA case subsequently, thereby contributing to the optimization of the system responsible for implementing the MTS act.

To define the outcome measures of HfA, we conducted a Delphi study, a method frequently used by multidisciplinary panels to establish a rational consensus on some issues not lending itself to precise analytical techniques [21-23]. Although there are many variations of the Delphi study protocol, it always involves a group of experts providing confidential ratings of agreement with a series of statements [24,25]. Their answers are compiled, and returned to each rater for reference in subsequent rounds. Recurrent evaluations are used progressively to select the final list of the items which most agreed upon, which are thus moderate and trustworthy, compared to expert opinions merely gathered in single survey or conference [22].

Materials and methods

Study design

This study consisted of several parts in establishing the outcome measurements. We proceeded the study according to the protocol developed in advance as follows: "Development of the candidate list", "Expert panel formation", "Delphi rounds", and "Choice of items." An overview of the study protocol is shown in Figure 1.

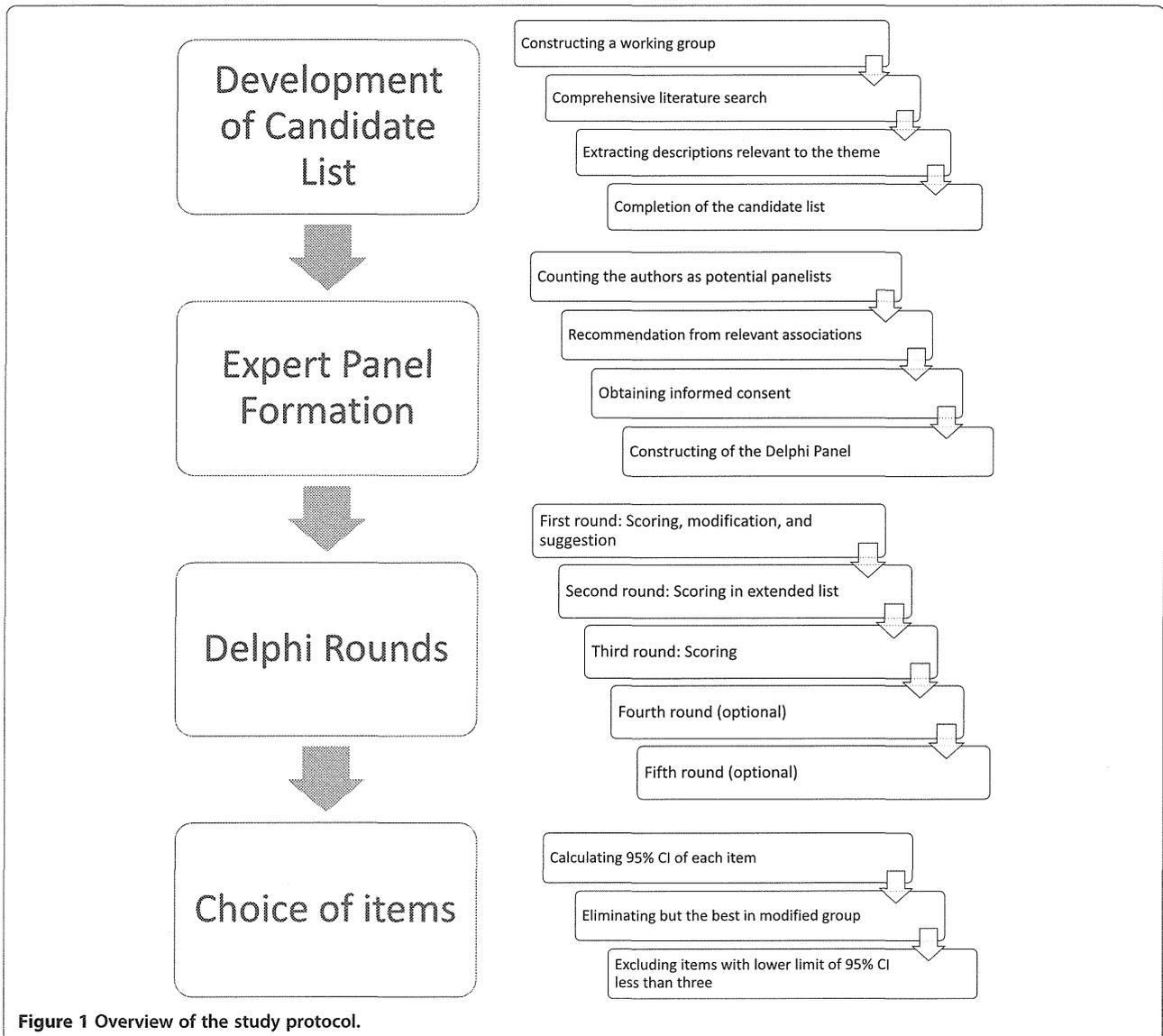
Development of the candidate list

The purpose of this part was to create a list of candidate HfA outcome measures to be evaluated by Delphi panels. For development of the list, we constructed a working group composed of some members belonging to Chiba University Center for Forensic Mental Health.

We searched the scientific literature using *Igaku Chuoh Zasshi* (Japan Medical Abstract Society, one of the biggest databases of Japanese medical journals; <http://search.jamas.or.jp/>) and the LEX database internet (one of the biggest databases of legal precedents in Japan; <https://www.tkclex.ne.jp/>) with the search term "kantei-nyuin." We also searched PubMed using the search terms "MTS act" and "Japan." All items retrieved were fully investigated.

According to this protocol, a total of 68 articles were retrieved from *Igaku Chuoh Zasshi* that included the words "kantei-nyuin," of which 55 included some description regarding HfA outcome measures. Three articles were also retrieved from PubMed that contained the words "MTS act." A total of 17 legal precedents including the word "kantei-nyuin" were found by searching the LEX database internet, of which 12 concerned the contents of HfA.

Additionally, we investigated the first 100 websites listed by Google in response to the search words "kantei-nyuin", of which 10 referred to precedents regarding HfA, 15 were related to a hospital which accepted HfA cases, 6 were news items about HfA, 27 were opinions against the scheme of HfA, 17 were academic articles, 4



were official papers, and 5 were other than the above. Sixteen listed websites were not related to HfA.

We comprehensively investigated all these materials to extract any descriptions suggesting possible HfA outcome measures, such as the sentences related to “What is HfA?,” “Goal of HfA,” and “Outcome of HfA.” Each sentence was then rewritten into a short and concrete statement describing an outcome measure for HfA that could be answered with “yes” or “no” by an evaluator. Redundant content was either excluded or integrated into one item. Each item specified who was to evaluate that particular item (e.g., “You assessed the nature of mental disorders in the offender.” Evaluator: Examiner Psychiatrist).

As a result, 233 candidate HfA outcome measures were compiled into the first questionnaire (Q1) given to

the expert panel. Of these items, 88 were to be evaluated by the doctor in charge, 6 by the Examiner Psychiatrist, 61 by a psychiatric nurse, 28 by the Rehabilitation Coordinator, 23 by the offender, 12 by a family member of the offender, 7 by the attendant lawyer, 5 by a representative of the designated hospital, and 3 by a post hoc survey committee.

Expert panel formation

The panel members consisted of three groups: psychiatrists with a license of judgment physician, medical practitioners other than psychiatrists, and lawyers. We attempted to recruit a total of 15 to 35 panelists based on the standard Delphi method [21].

To make sure that the selecting process of panelists is objective and not arbitrary, we adopted a strict procedure

described below. First, we counted the number of times each potential panelist was listed as an author on a paper identified in the literature search described above. Any candidates belonging to Chiba University Center for Forensic Mental Health were excluded because they were involved in the previous stage. As a result, 28 psychiatrists, 10 medical practitioners other than psychiatrists, and a lawyer, all referred to more than once in the articles gathered, were listed up to be potential panelists. Second, we attempted to contact each person according to the number of publications referring to him/her. In addition, we requested the Japanese Society of Forensic Mental Health (JSFMH, <http://jsfmh.org/>) to recommend mental health practitioners as panelists. We also recruited lawyers who had multiple experiences of participating the MTS act as an attendant lawyer. We explained the content of our study to each potential panelist via telephone and asked for their participation. We sent an acceptance form and protocol paper to each person who committed to taking part in this study.

Finally, 10 psychiatrists with a judgment physician license and three medical practitioners other than psychiatrist (a psychiatric nurse, a pharmacist, and a Rehabilitation Coordinator) accepted the offer. In addition, 3 psychiatrists who were recommended as panelists by the JSFMH accepted the offer, and 3 lawyers with multiple experiences as attendants in the MTS act were also selected. Thus, final Delphi panel was composed of 13 psychiatrists, 3 medical practitioners, and 3 lawyers. All panelists provided written informed consent. The panelists were not informed of the names of the other panelists.

Delphi rounds

The Delphi process was composed of three to five rounds.

For round 1, we sent Q1 to all panelists via email and asked them to score each candidate for outcome measure on a Likert Scale (1: not at all appropriate, 2: hardly appropriate, 3: undecided, 4: considerably appropriate, 5: extremely appropriate). We explained that good outcome measures should meet the criteria as follows; "If the answer to this item is yes, this case is evaluated as appropriately treated in the HfA"; "If the answer to this item is no, this case is evaluated as inappropriately treated in the HfA"; "The evaluator can answer this item with either yes or no"; "This item has clear and definite meanings"; and "This item is variable for each case."

In addition, the panelists were encouraged to propose any other candidate outcome measures based on their own experience. Proposals for preferred evaluators (e.g., Examiner Psychiatrist, psychiatric nurse, attendant lawyer), and any modification of the contents were also welcome. Additionally, any other comments upon each candidate were accepted. Each new or modified candidate

outcome measure was included in the second questionnaire (Q2).

After all the panelists replied, the means and standard deviations (SDs) for all original items were calculated. In addition to new or modified items, all comments provided by panelists, keeping anonymity, were included in Q2.

In the second round, the panelists completed Q2 as described, and the items means and SDs were recalculated. The procedure followed with Q2 was the same as that for Q1, excepting that panelists were not requested to make any additional proposal or modification.

In the third round, results of the second round were sent to all panelists and the items were re-evaluated as in the first and second rounds. We calculated the mean scores of all items; if the mean from round 3 divided by that from round 2 was between 0.95 and 1.05 (i.e., not markedly changed) in all items, a consensus was assumed. Otherwise, up to two additional rounds were conducted.

Choice of items

Finally, we analyzed the results statistically. The 95% Confidence Interval (CI) for each item was calculated. In the modified group, only those items were retained of which the lower limit of 95% CI was the highest. We also excluded all items with a lower limit of 95% CI less than three. The remaining items were defined as HfA outcome measures.

Ethical issues

This survey focused on the opinions of experts and thus did not gather personal information on any actual patients. All participants in this study gave written informed consent to take part in this study, following a full explanation of the protocol. This study was approved by the ethics committee of Chiba University Post Graduate School of Medicine (Aug 29, 2012, No. 365). We registered this survey on the Clinical Trials Registry (CTR) of the University Hospital Medical Information Network (UMIN, Tokyo, Japan), with the unique trial number UMIN000012554.

Term of implementation

We began the survey in December 2013 and completed it in July 2014.

Results

The Delphi rounds

The Delphi rounds were conducted via email. The panelists responded to all of the questionnaires and completed all rounds of the Delphi process.

In the first round, all 233 items developed using the initial literature review were evaluated. The mean item

score was 3.87 ± 0.54 and the mean of the SD was 1.18 ± 0.25 .

In this round, we encouraged the panelists to propose new items to be included as candidate HfA outcome measures on subsequent Delphi rounds. In addition, we accepted any proposals to modify the descriptions of the original items. Each proposal was counted as a new item and added to Q2. The total number of items on Q2 was 413. Of these, 133 were to be evaluated by the doctor in charge, 25 by the Examiner Psychiatrist, 87 by a psychiatric nurse, 39 by the Rehabilitation Coordinator, 34 by the offender, 20 by a family member of the offender, 16 by the attendant lawyer, 9 by a representative of the designated hospital, 7 by a post hoc survey committee, 21 by multidisciplinary team (MDT), 21 by the care coordinator 21, and 1 by a psychiatric social worker.

Q2 was then sent to all panelists. All comments from the first round were also included so that other panelists could be informed about them.

In the second round, the mean item score was 3.62 ± 0.69 , which was significantly lower than that on the first round [unpaired T test: degree of freedom (df) = 644, $T = 4.82$, $P < 0.00001$], and the mean of the SD was 1.06 ± 0.25 . For all subsequent rounds, the panelists were requested to evaluate each item by referring to the previous score.

In the third round, the mean of the 413 items was 3.54 ± 0.80 , and the mean of the SD was 0.87 ± 0.21 . Of the 413 items, only 227 (55.0%) had a mean score between 95% and 105% of that on the second round, so an additional round was conducted according to the same protocol.

In the fourth round, the mean of the 413 items was 3.39 ± 0.86 , which was significantly lower than that in the third round (unpaired T test, $df = 824$, $T = 2.59$, $P < 0.01$), and the mean of the SD was 0.87 ± 0.22 . Only 220 (53.3%) had a mean item score between 95% and 105% of that in the third round, so an additional round was conducted according to the protocol.

In the fifth and final round, the mean of the 413 items was 3.32 ± 0.89 , and the mean of the SD of them was 0.77 ± 0.17 .

The item means and SDs for each round are summarized in Table 1. The overall distribution of ratings for each item in the final round arranged by the lower limit of 95% CI is shown in Figure 2. The average scores of all

the items in each round arranged by the mean score are shown in Figure 3.

Choice of items

After completion of the Delphi rounds, we identified those items judged as highly appropriate HfA outcome measures from the list of candidates.

First, we eliminated all but those items with the highest lower limit of 95% CI among the group with modifications. For example, item No. 55 was originally "You assessed the risk factors in the offender (Evaluator: Doctor in charge)." In the Delphi rounds, three alternate evaluators were proposed by the panelists; MDT, care coordinator, and Examiner Psychiatrist. Then, all four candidates were scored in sequential rounds, resulted that each 95% CI was finally calculated as below: 3.95 - 4.68, 4.32 - 4.94, 4.08 - 4.77, and 4.75 - 5.04, respectively. Therefore, we determined Examiner Psychiatrist as the best evaluator, because its lower limit of 95% CI (4.75) was the highest among the four candidates. Other three candidates were eliminated. According to this process, 130 items were excluded.

Second, we excluded all items with a lower limit of 95% CI less than three, which eliminated 144 items from the list. As a result, 139 items were selected as HfA outcome measures (see Additional file 1: Table S1). Of these, 46 were to be evaluated by the doctor in charge, 17 by the Examiner Psychiatrist, 36 by a psychiatric nurse, 17 by the Rehabilitation Coordinator, 4 by the offender, 3 by a family member of the offender, 3 by an attendant lawyer, 6 by a representative of the designated hospital, 2 by an post hoc survey committee, and 5 by an MDT. There were no items retained whose evaluator was either the care coordinator or a psychiatric social worker, all proposed by panelists (see Table 2).

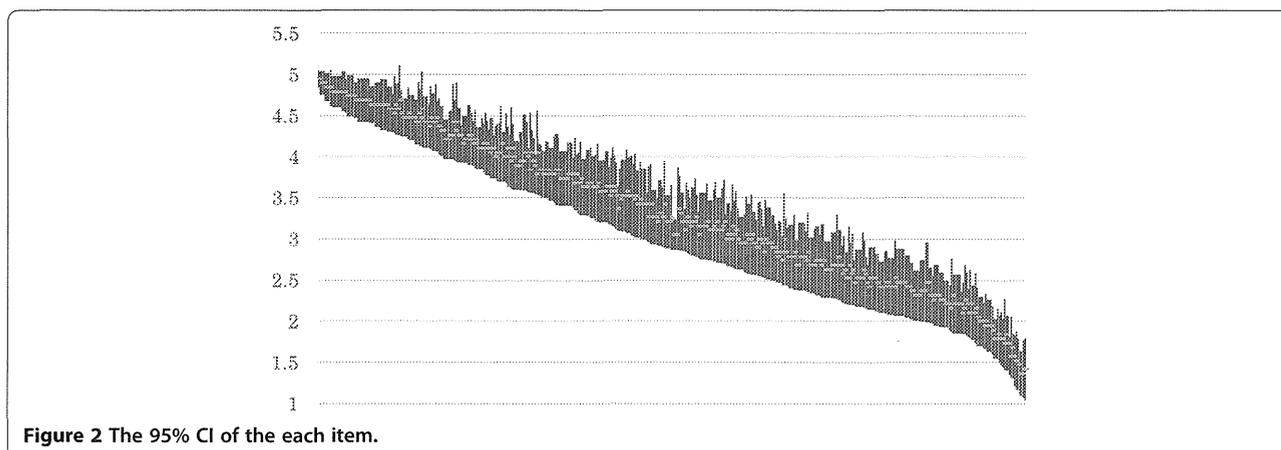
In the list, 114 items had unconditional descriptions (e.g., item No. 42 "You referred to the regulation of the MHW law to ensure adherence to it." Evaluator: doctor in charge), whereas 25 were conditional ones (e.g., item No. 74a "[At a risk to harm self or others] immediate intervention was performed on the offender." Evaluator: doctor in charge).

Discussion

In this study, we attempted to establish an objective and comprehensive method for the evaluation of HfA

Table 1 Mean and standard deviation of the items in each round

	1 st round	2 nd round	3 rd round	4 th round	5 th round
Number of items	233	413	413	413	413
The average score of each item [mean \pm standard deviation (SD)]	3.87 ± 0.54	3.62 ± 0.69	3.54 ± 0.80	3.39 ± 0.86	3.32 ± 0.89
The SD of each item (mean \pm SD)	1.18 ± 0.25	1.06 ± 0.25	0.87 ± 0.21	0.87 ± 0.22	0.77 ± 0.17



outcomes, as no standard guidelines have been proposed by the Japanese government. We identified 139 items as appropriate HfA outcome measures using a Delphi study protocol.

In forensic mental health, outcome measures have proven to be difficult to establish due to the diverse nature of the subject and environmental factors. Recidivism is the most frequently adopted measured parameter in forensic mental health research [26]. However, many factors including recidivism were probably shown likely to be invalid as outcome measures [27]. Furthermore, recidivism may not be available as an outcome measure for HfA because the rates of recidivism of the crimes associated with the MTS act are usually too low to be statistically examined [8]. Therefore, we had to develop an original series of HfA outcome measures.

The Delphi method is widely used by expert panels to arrive at conclusions through Collective Intelligence [28]. It has been applied in many aspects of mental health, such as defining the feature of a particular syndrome [29,30] and to evaluate community mental health care [31,32]. An MDT is often appointed as a Delphi panel [33,34].

Forensic mental health has also been utilizing the Delphi method [35], e.g., to establish guidelines for the treatment of psychosis in a local area [25,36]. Attempts to identify quality indicators or professional roles are also performed using the Delphi method [37-39]. Therefore, we believe the Delphi method is appropriate for defining HfA outcome measures.

Repeated Delphi rounds made the list of candidates far more sophisticated. Mean scores of each item were gradually decreased over consecutive rounds (see Figure 3), but especially between round 1 and 2, suggesting that the panelists made a critical re-evaluation based on the comments made by other panelists in round 2. The individual item SDs were lower in later rounds, indicating evolving agreement on the appropriateness rating by the panelists. In summary, the judgments became more discriminating and uniform over successive Delphi rounds.

This study has some unique characteristics. We provided a lot of items which could be candidates of HfA outcome measures. Comprehensive literature search and exhaustive extract of relevant descriptions ensured that the list included the best evidence available regarding

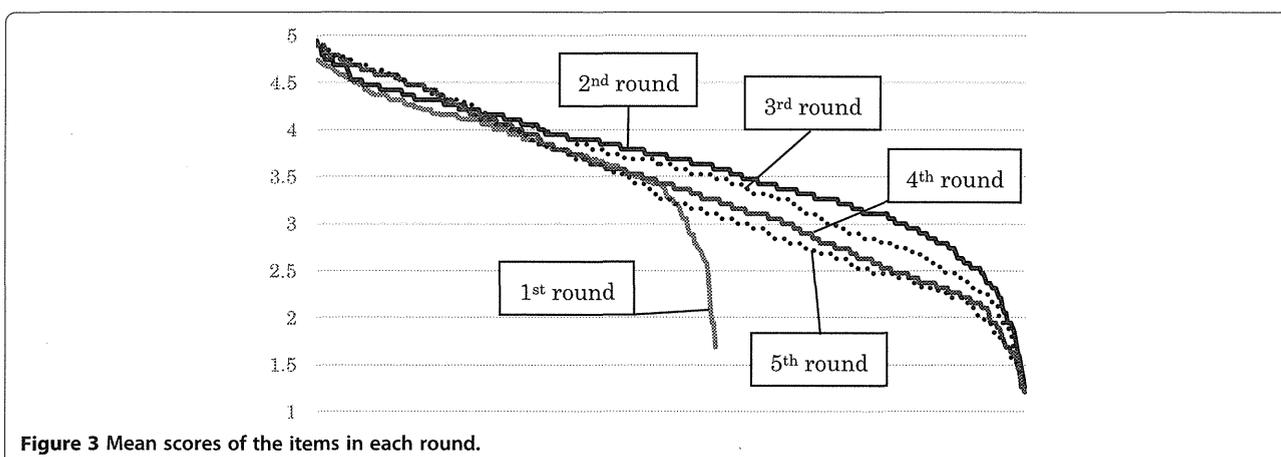


Table 2 The number of items sorted by evaluator

Evaluator	Q1	Q2	Adopted
Doctor in charge	88	133	46
Examiner Psychiatrist	6	25	17
Psychiatric nurse	61	87	36
Rehabilitation Coordinator	28	39	17
Offender	23	34	4
Family member	12	20	3
Attendant lawyer	7	16	3
Representative of the designated hospital	5	9	6
Host hoc survey committee	3	7	2
Multidisciplinary team	0	21	5
Care coordinator	0	21	0
Psychiatric social worker	0	1	0

Q1, questionnaire 1; Q2, questionnaire 2.

HfA optimization. Unlikely to typical Delphi methods, we did not set any criteria to dismiss items during the rounds. The reason is that we could not estimate the average scoring of each item in this study because there is no previous research to be referred in this topic. As a result, the panelists had to look through all of the items every time. Since the 139 items defined as outcome measures have particular 95% CI, we can compare the priorities of each item mathematically. For example, item No. 1001: "The relationship between the MDT and the offender was good." (Evaluator: doctor in charge) has 3.04 - 3.91 of 95% CI, Instead, item No. 45a: "You identified the mental disorders existing at the time of the incident and the final decision." (Evaluator: doctor in charge) has 4.42 - 4.95 of 95% CI. This means that the neutral observation should be prioritized than therapeutic alliance in this context, as an answer to the question described in the background section.

Limitations of this study include the dearth of source material (<100 articles) from which to develop candidate HfA outcome measures for the Delphi evaluation. This may have introduced bias in the final results. The list should be updated in the future in accordance with accumulating evidence on HfA.

In addition, we have not yet utilized the results for real cases under the MTS act. Some items have a room for much sophisticated in the clinical setting. It may be beneficial to compare the results obtained using this list with the opinions of professionals involved in specific cases by conducting face-to-face interviews.

Additional file

Additional file 1: Table S1. The outcome measures of Hospitalization for Assessment.

Abbreviations

CI: Confidence interval; HfA: Hospitalization for assessment; JSFMH: Japanese society of forensic mental health; MDT: Multi disciplinary team; MTS: Medical treatment and supervision; OIH: Official involuntary hospitalization; SD: Standard deviations.

Competing interests

The authors declare that they have no competing interest.

Authors' contribution

Author AS carried out the data collection, analysis and interpretation of the study. Author MI supervised the study. Author YI was the administrator of this study. All authors reviewed and approved the manuscript.

Acknowledgements

The authors are deeply grateful to the 19 Delphi panelists who participated in this research by email.

The authors would like to thank Enago (www.enago.jp) for the English language review.

This study was supported by a grant to Yoshito Igarashi from the Ministry of Health, Labour and Welfare in Japan as part of a research project entitled 'Research on the Optimization and Improvement of the System of Hospitalization for Assessment and Specialized Care in the MTS act'. A portion of the results were collected as research for working papers according to the demands of the Ministry of Health, Labour and Welfare and were sent to the government and close colleagues.

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Received: 28 September 2014 Accepted: 24 January 2015

Published: 28 January 2015

References

- Paul EM. Forensic mental health. *Br J Psychiatry*. 2000;176:307-11.
- Salize HJ, Schanda H, Dressing H. From the hospital into the community and back again—a trend towards re-institutionalisation in mental health care? *Int Rev Psychiatry*. 2008;20:527-34.
- Ogloff JR, Roesch R, Eaves D. International perspective on forensic mental health systems. *Int J Law Psychiatry*. 2000;23:429-31.
- Nakatani Y. Psychiatry and the law in Japan history and current topics. *Int J Law Psychiatry*. 2000;23:589-604.
- Tsuchiya JK, Takei N. Focus on psychiatry in Japan. *Br J Psychiatry*. 2004;164:88-92.
- Yamagami H. The significance of the new Japanese forensic legislation and its prospective issues. *Nihon Seishinka Byoin Kyokai Zasshi*. 2003;22:17-21 (in Japanese).
- Nakatani Y, Kojimoto M, Matsubara S, Takayanagi I. New legislation for offenders with mental disorders in Japan. *Int J Law Psychiatry*. 2010;33:7-12.
- Fujii C, Fukuda Y, Ando K, Kikuchi A, Okada T. Development of forensic mental health services in Japan: working towards the reintegration of offenders with mental disorders. *Int J Ment Health Syst*. 2014;8:21.
- Shiina A, Fujisaki F, Nagata T, Oda Y, Suzuki M, Yoshizawa M, et al. Expert consensus on hospitalization for assessment: a survey in Japan for a new forensic mental health system. *Ann Gen Psychiatry*. 2011;10:11.
- Uchijima J. Iryo-kansatsu-ho no unyo-jittai to taishosha no jinken -Bengoshi no tsukisoi-nin katsudo kara [Current Situation of the MTS act and Human Right of thePatients: From the View of Attendants]. *Jap J Psychiatric Nursing*. 2008;35:43-7 (in Japanese).
- Igarashi Y. Current situations and issues of the Act on Medical Care and Treatment for Persons Who Have Caused Serious Cases under the Condition of Insanity. *Jap J Forensic Mental Health*. 2009;4:40-50 (in Japanese).
- Iryo-kansatsu-ho no iryo-kikan no johkyo. [Information regarding institutions concerned to the MTS act]. <http://www.mhlw.go.jp/bunya/shougaihoken/sinsin/shikou.html> (in Japanese).

13. Hirata T, Shiina A, Igarashi Y, Ueno K, Kawabata T, Kishi Y, et al. Kantei-nyuin ni okeru iryotekikansatsu ni kansuru kenkyu heisei 18 nendo buntankenkyu houkokusho. Tokyo, Japan: Ministry of Health, Labour and Welfare in Japan; 2007. [Annual report from 2006 of the research of medical observation in hospitalization for assessment] (in Japanese).
14. Shiina A, Oda Y, Suzuki M, Yoshizawa Y, Haraguchi T, Fujisaki M, et al. The Act on Medical Care and Treatment for Persons Who Have Caused Serious Cases under the Condition of Insanity' - Issues and Challenges. *Jap Bull Social Psychiatry*. 2009;18:252–8 (in Japanese).
15. Oshita A. Forced medical intervention in psychiatric inpatient treatment. *Seishin Shinkeigaku Zasshi*. 2013;115:745–50 (in Japanese).
16. Murakami M. Development of guideline for forensic psychiatric assessment. *Jap J Clin Psychiatry*. 2009;38:557–61 (in Japanese).
17. Yoshioka R. Existing conditions and challenges of assessment hospital order in treatment and observation act for criminal insane. *Jap J Clin Psychiatry*. 2009;38:551–6 (in Japanese).
18. Kodaka A. Kantei-nyuin to chiiki seishin hoken fukushi katudo. [Hospitalization for assessment and the community mental health approach.]. *Jap Hosp Comm Psychiatry*. 2008;50:132–3 (in Japanese).
19. Moriuchi K, Nakashima H, Kasai S, Miura M, Yoshinaga N, Yamamoto M, et al. Kantei-nyuin no kango toha nanika - kango-kiroku to kikitōri-chosa kara. [What is the nursing in hospitalization for assessment: A study through nursing records and interview.]. *Jap J Forensic Mental Health*. 2011;6:100. in Japanese.
20. Hirata T, Abe H, Kawabata T, Shiina A, Sawa T, Murakami N, et al. Kantei-nyuin-iryō-kikan ni okeru iryō kansatsu ni kansuru kenkyu heisei 22 nendo buntankenkyu houkokusho. Tokyo, Japan: Ministry of Health, Labour and Welfare in Japan; 2011. [Annual report from 2010 of the research of medical observation in facilities accepting the cases of hospitalization for assessment] (in Japanese).
21. Gordon TJ. The Delphi Method. AC/UNU Millennium Project. 1994. [http://www.gerenciamento.ufba.br/Downloads/delphi%20\(1\).pdf](http://www.gerenciamento.ufba.br/Downloads/delphi%20(1).pdf).
22. Linstone HA, Turoff M. The Delphi method: techniques and applications. Boston, US: Addison-Wesley Pub. Co., Advanced Book Program; 1975.
23. Rowe G, Wright G. The Delphi technique as a forecasting tool: issues and analysis. *Int J Forecasting*. 1999;15:353–75.
24. Reavley NJ, Ross A, Killackey EJ, Jorm AF. Development of guidelines to assist organisations to support employees returning to work after an episode of anxiety, depression or a related disorder: a Delphi consensus study with Australian professionals and consumers. *BMC Psychiatry*. 2012;12:135.
25. Jorm AF, Minas H, Langlands RL, Kelly CM. First aid guidelines for psychosis in Asian countries: A Delphi consensus study. *Int J Ment Health Syst*. 2008;2:2.
26. Fitzpatrick R, Chambers J, Burns T, Doll H, Fazel S, Jenkinson C, et al. A systematic review of outcome measures used in forensic mental health research with consensus panel opinion. *Health Technol Assess*. 2010;14:1–94.
27. Chambers JC, Yiend J, Barrett B, Burns T, Doll H, Fazel S, et al. Outcome measures used in forensic mental health research: a structured review. *Crim Behav Ment Health*. 2009;19:9–27.
28. de Villiers MR, de Villiers PJ, Kent AP. The Delphi technique in health sciences education research. *Med Teach*. 2005;27:639–43.
29. Burns T, Fiander M, Audini B. A delphi approach to characterising "relapse" as used in UK clinical practice. *Int J Soc Psychiatry*. 2000;46:220–30.
30. Gurrera RJ, Caroff SN, Cohen A, Carroll BT, DeRoos F, Francis A, et al. An International Consensus Study of Neuroleptic Malignant Syndrome Diagnostic Criteria Using the Delphi Method. *J Clin Psychiatry*. 2011;72:1222–8.
31. Fiander M, Burns T. A Delphi approach to describing service models of community mental health practice. *Psychiatr Serv*. 2000;51:656–8.
32. Crawford MJ, Price K, Rutter D, Moran P, Tyrer P, Bateman A, et al. Dedicated community-based services for adults with personality disorder: Delphi study. *Br J Psychiatry*. 2008;193:342–3.
33. Langlands RL, Jorm AF, Kelly CM, Kitchener BA. First aid recommendations for psychosis: using the Delphi method to gain consensus between mental health consumers, carers, and clinicians. *Schizophr Bull*. 2008;34:435–43.
34. Kingston AH, Jorm AF, Kitchener BA, Hides L, Kelly CM, Morgan AJ, et al. Helping someone with problem drinking: mental health first aid guidelines - a Delphi expert consensus study. *BMC Psychiatry*. 2009;9:79.
35. Mohan R, Slade M, Fahy TA. Clinical characteristics of community forensic mental health services. *Psychiatr Serv*. 2004;55:1294–8.
36. Lee MS, Hoe M, Hwang TY, Lee YM. Service priority and standard performance of community mental health centers in South Korea: a delphi approach. *Psychiatry Investig*. 2009;6:59–65.
37. Davies S, Romano PS, Schmidt EM, Schultz E, Geppert JJ, McDonald KM. Assessment of a Novel Hybrid Delphi and Nominal Groups Technique to Evaluate Quality Indicators. *Health Serv Res*. 2011;46:2005–18.
38. Walker L, Barker P, Pearson P. The required role of the psychiatric-mental health nurse in primary health-care: an augmented Delphi study. *Nurs Inq*. 2000;7:91–102.
39. Sinha IP, Smyth RL, Williamson PR. Using the Delphi technique to determine which outcomes to measure in clinical trials: recommendations for the future based on a systematic review of existing studies. *PLoS Med*. 2011;8:e1000393.

doi:10.1186/1752-4458-9-7

Cite this article as: Shiina et al.: Defining outcome measures of hospitalization for assessment in the Japanese forensic mental health scheme: a Delphi study. *International Journal of Mental Health Systems* 2015 9:7.

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Observational Study

Audit study of the new hospitalization for assessment scheme for forensic mental health in Japan

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Received: December 20, 2014
 Peer-review started: December 21, 2014
 First decision: January 20, 2015
 Revised: February 6, 2015
 Accepted: March 30, 2015
 Article in press: April 2, 2015
 Published online: June 22, 2015

Author contributions: All authors contributed to the creation of the questionnaire; Hirata T collected the data; Shiina A analyzed the data and wrote the manuscript; Iyo M supervised the procedure of this study; Igarashi Y is the administrator of this study; all of the authors critically assessed the manuscript and finally approved this article.

Ethics approval: We did not gather any personally identifiable patient information in this study. No studies described in this paper were interventional. We reported the contents of this survey to the Ethical Council of the Graduate School of Medicine, Chiba University in advance, and the council has confirmed that each survey posed no ethical problems.

Informed consent: This study is a service evaluation study. The ethics council has approved that it is not required to obtain the informed consent of each patient in this study.

Conflict-of-interest: This study was supported by a Grant-in-Aid for Scientific Research from the Ministry of Health, Labour and Welfare of Japan, entitled "Iryo-kansatsu-ho seido no kanteinyuin to senmonteki-iryō no tekiseika to kōjo ni kansuru kenkyū [A research for optimization and improvement of Hospitalization for Assessment and Special Treatments in the MTS Act.]" We declare that we have no other conflict of interests related to this research.

Data sharing: There is no additional data available other than in this article.

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Abstract

AIM: To clarify the components of hospitalization for assessment (HfA) and the management changes from the beginning of the scheme to the present.

METHODS: This study is composed of two surveys. In 2013 survey, we created two paper questionnaires (facility and case questionnaires) for psychiatrists working in psychiatric hospitals accepting HfA patients. Questionnaires were sent to 205 hospitals that were identified as accepting the HfA cases, and responses were requested *via* mail. The facility questionnaire was designed to clarify the following specifications and characteristics of each facility: the facility organizer (public sector or private hospital), and the number of beds, psychiatrists, psychiatric nurses, occupational therapists, psychiatric social workers, psychotherapists, public health nurses, and patients treated through HfA during the survey period. The case questionnaire was then used to collect data of the patients under HfA based on the Medical Treatment and Supervision (MTS) Act who were discharged between July 1, 2012 and June 30, 2013. Gathered information included: legal information of each case, demographic data, past history of the offenders, issued offense and the relationship to the victim, information regarding past psychiatric testimonies, psychiatric diagnoses, contents

of the treatment during HfA, information regarding seclusion and restraint during the HfA, the verdict of the District Court panel, and so forth. Next, we compared those results with relevant data obtained in 2007. The 2007 survey comprised data of HfA patients from July 15, 2005 (the date the MTS Act was enforced) to January 15, 2007.

RESULTS: We obtained 171 cases, approximately a half of whole contemporary cases of HfA, from 134 facilities, of which 46 were national, prefectural, or semi-official hospitals, and 88 were private hospitals, in 2013 survey. The majority of subjects were male, schizophrenic, and experienced previous psychiatric treatment. The most frequent type of the offense was injury, followed by arson. Most of the subjects were medicated, and a few cases took psychotropic injection during the HfA. The frequency of injection was decreased in 2013 ($\chi^2 = 7.54$, $df = 1$, $P = 0.006$) than in 2007. Psychiatric testimony was more likely to be conducted in 2013 ($\chi^2 = 8.56$, $df = 1$, $P = 0.004$). The examiner psychiatrist was more likely to belong to the HfA facility to which the patient was hospitalized ($\chi^2 = 5.32$, $df = 1$, $P = 0.02$). Hospitalization orders were more frequently selected in 2013 ($\chi^2 = 19.76$, $df = 3$, $P < 0.001$), although the characteristics of the subjects had not changed.

CONCLUSION: Although the management of HfA has improved in recent years, structural problems remain.

Key words: Medical treatment and supervision act; Hospitalization for assessment; Forensic mental health; Audit study

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Core tip: In 2005, the Medical Treatment and Supervision Act was enforced in Japan. In this scheme, offenders with mental disorders are hospitalized for assessment (HfA) to determine their treatment. We aimed to clarify the components of HfA and the management changes from the beginning of the scheme to the present. We obtained approximately a half of whole contemporary cases of HfA in the 2013 survey, and then compared the data to those in the 2007 study. The comparison revealed some changes in the HfA cases. This study clarified the improvement of HfA management, and remained some structural problems as well.

Shiina A, Iyo M, Hirata T, Igarashi Y. Audit study of the new hospitalization for assessment scheme for forensic mental health in Japan. *World J Psychiatr* 2015; 5(2): 234-242 Available from: URL: <http://www.wjgnet.com/2220-3206/full/v5/i2/234.htm> DOI: <http://dx.doi.org/10.5498/wjp.v5.i2.234>

INTRODUCTION

Forensic mental health is a topic of great concern

and controversy^[1]. Thanks to the global trend toward deinstitutionalizing patients with mental disorders, the need to develop sophisticated forensic mental health systems has increased^[2]. Consequently, many countries have established their own forensic mental health systems, which link different disciplines according to their cultural backgrounds^[3].

For many years, Japan had no specific legal provision for offenders with mental disorders^[4]. Such offenders were treated under the Mental Health and Welfare Act. Under that legislation, patients with mental disorders who were potentially dangerous, being capable of harming themselves or others, were hospitalized under a prefectural government order. This system of official involuntary hospitalization was completely independent of the criminal justice system^[5], which led some lawyers to argue that the human rights of these patients were not properly guaranteed. Similarly, some psychiatrists suggested the need for special hospitals with sufficient staff to provide appropriate care for offenders with mental disorders^[6].

To address these problems, the Medical Treatment and Supervision (MTS) Act (the Act on Medical Care and Treatment for the Persons Who Had Caused Serious Cases under the Condition of Insanity) was enforced in 2005^[7], and the Japanese forensic mental health system underwent reform. Under this new scheme, individuals committing a serious criminal offense in a state of insanity or diminished responsibility would be dealt with in a judicial, administrative framework. The public prosecutor is responsible for making allegations to the District Court to render judgment. The offender is sent to a hospital, usually soon after the public prosecutor makes an allegation to the court. In the term of hospitalization for 2 to 3 mo, psychiatric examination and treatment are implemented; this assessment period is known as hospitalization for assessment (HfA, *kantei-nyuin*)^[8]. The District Court forms a judgment panel consist of one judge and one mental health reviewer (*seishin-hoken-shinpan-in*), with the latter being selected from a group of psychiatrists who hold a judgment physician license (*seishin-hoken-hantei-i*), which is a national license for forensic mental health specialists. A second psychiatrist with a judgment physician license is then appointed by the panel of the District Court to be an examiner psychiatrist (*kantei-i*), who is required to write a report on the psychiatric evaluation of the patient. At the end of HfA, the panel makes a final decision based on the reports written by the examiner psychiatrist and the rehabilitation coordinator (*shakai-fukki-chousei-kan*) working in a probation office, with reference to the opinion of the mental health advisor (*seishinhoken-sanyo-in*) who is a discretionary member of the panel. The panel can arrive at three possible verdicts: hospitalization orders, community treatment orders, or no treatment/release. In the case of a hospitalization order, the offender is sent to a designated inpatient

facility by the government officials. If either of the first two options is selected, the offender is then obliged to submit to continuous supervision by a rehabilitation coordinator^[9]. When the offender cannot adhere to treatment in the community, the probation office can make an allegation for a recall order, based on the deliberate assessment regarding the risk of recommitting.

In 2008, the Japanese Government published a list of 239 Japanese psychiatric hospitals for the purpose of HfA of mentally disordered offenders^[10]. According to an official report, this has now increased to 286 hospitals^[11]. However, the criteria used to elect these facilities are vague. The MTS Act provides little information on the regulation for even the minimum requirements these facilities must meet, which has led to marked variations in conditions^[12]. To minimize this variation and improve the quality of assessments, we previously conducted a written mail survey of leading Japanese forensic mental health experts. This resulted in the development of expert consensus for many HfA treatment standards. We therefore concluded that these consensus statements should be widely publicized among practitioners to ensure better management during HfA^[9].

Since the MTS Act was enforced some 9 years ago, several papers have been published on subsequent outcomes^[13,14]. In contrast, the status of HfA is rarely reported, either officially or unofficially. Therefore, we have conducted an annual, national audit study to monitor HfA facilities and subjects.

This study aims to clarify the current situation of HfA and to examine the changes in the contents of HfA from the past to now. We first present the data obtained in the 2013 survey, and then compare the results of the obtained data in 2007.

MATERIALS AND METHODS

2013 survey

We created two paper questionnaires (facility and case questionnaires) for psychiatrists working in psychiatric hospitals accepting HfA patients. Questionnaires were sent to 205 hospitals that were identified as accepting the HfA cases by the previous study, and responses were requested *via* mail. The survey was conducted between July 2013 and February 2014.

The facility questionnaire was designed to clarify the following specifications and characteristics of each facility: the facility organizer (public sector or private hospital), and the number of beds, psychiatrists, psychiatric nurses, occupational therapists, psychiatric social workers, psychotherapists, public health nurses, and patients treated through HfA during the survey period. The case questionnaire was then used to collect data of the patients under HfA based on the MTS Act who were discharged between July 1, 2012 and June 30, 2013. The following information was collected: article number for the case, gender, age,

family members, marital history, occupational history, therapeutic history, issued offense, relationship to the victim, relationship to the owner of the property (exclusive in arson cases), whether psychiatric testimonies (committed examination and/or public trial examination) were conducted before the allegation, decision by the prosecutor or the court preceding the allegation, psychiatric diagnosis, dual diagnosis (if applicable), physical complications (if applicable), treatment during HfA (medication, psychotropic drug injections, long-acting injections (LAI), or electroconvulsive therapy), term of seclusion and restraint, whether the examiner psychiatrist belonged to the facility where the patient was hospitalized, and the verdict of the District Court panel.

Comparison analysis

Next, we compared those results with similar data obtained in 2007. The 2007 survey comprised data of HfA patients from July 15, 2005 (the date the MTS Act was enforced) to January 15, 2007. The following common contents were collected: gender, age, issued offense, whether psychiatric testimonies (committed examination and/or public trial examination) were conducted before the allegation, decision by the prosecutor or the court preceding the allegation, psychiatric diagnosis, treatment during HfA, term of seclusion, whether restraint was performed, whether the examiner psychiatrist belonged to the facility where the patient was hospitalized, and the verdict of the District Court panel. The components of each questionnaire are summarized in Table 1.

Statistical analysis

The collected data were analyzed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY). Values of $P < 0.05$ were considered statistically significant in each analysis. We adopted either χ^2 test, Fischer's exact test, or Unpaired t -test, following each character of the data, for statistical evaluation. Data are expressed as mean \pm SD unless otherwise stated. The statistical methods of this study were reviewed by Dr. Kensuke Yoshimura in Department of Mental Health/Psychiatric Nursing, Graduate School of Medicine, The University of Tokyo.

RESULTS

2013 survey

Response rate: We received responses from 134 facilities (response rate: 65.4%) covering 171 patient records. According to an official report, 388 cases were decided by court panels based on the MTS Act in 2012^[15]. Estimating that all of these cases required HfA, the capture rate was approximately 44.1%.

Facility questionnaire responses: Of the facilities, 46 were national, prefectural, or semi-official hospitals, and 88 were private hospitals. The mean number

Table 1 Items on the questionnaires in the 2013 survey

Facility questionnaire	Case questionnaire
Facility organizer	Article number
Number of beds	Gender ¹
Psychiatric beds	Age ¹
Other types of beds	Family members
Number of staffs	Marital history
Psychiatrists	Occupational history
Psychiatric nurses	Therapeutic history
Occupational therapists	Issued offense ¹
Psychiatric social workers	The victim
Psychotherapists	The owner of the damaged property (if applicable)
Public health nurses	Psychiatric testimonies ¹
Number of the accepted HfA cases ¹	Preceding Decision by the prosecutor or the court ¹
	Psychiatric diagnosis ¹
	Dual diagnosis (if applicable)
	Physical complications (if applicable)
	Treatment during HfA
	Medication
	Psychotropic drug injections ¹
	Long-acting injections ¹
	Electro-convulsive therapy ¹
	Seclusion and restraint ¹
	Belonging of the examiner psychiatrist ¹
	Verdict of the District Court panel ¹

¹Collected also in the 2007 survey.

of psychiatric beds was 284 ± 136, and 27 facilities were equipped with beds for non-psychiatric patients. The average staffing levels were as follows: 10.4 ± 5.9 psychiatrists (7.4 ± 3.9 designated physicians, 1.9 ± 2.0 judgment physicians), 113.1 ± 51.3 psychiatric nurses, 8.0 ± 5.1 occupational therapists, 8.3 ± 5.5 psychiatric social workers (0.6 ± 1.0 were mental health advisor candidates), and 3.8 ± 3.2 psychotherapists. Only 13 facilities employed public health nurses. Sixty-nine facilities (51.5%) accepted at least one HfA patient during the survey period (Table 2). The facilities that accepted HfA cases had higher proportions of judgment physicians (1.30 vs 0.48, *df* = 122, *t* = 3.4; *P* = 0.0009) and mental health advisor candidates (0.37 vs 0.17, *df* = 116, *t* = 2.3; *P* = 0.02) per 100 psychiatric beds compared with facilities that did not accept HfA cases (unpaired *t*-test).

Case questionnaire: Of the 171 cases, 168 were subject to HfA by Article 34 of the MTS Act (initial assessment), and 3 were subject to Article 60 (assessment for recall). In total, 123 were men and 48 were women, and the mean age was 46.6 ± 16.4 years; 125 patients lived with their family and 40 lived alone at the time of the offense (unknown = 6). Furthermore, 93 had never been married, 38 were currently married, 21 were divorced, and 5 were widowed (unknown = 14 cases). We also found that 97 had at least one prior job and 25 had no work experience (unknown = 49 cases). Regarding their therapeutic history, 35 patients had no experience of

Table 2 Characteristics of facilities in the 2013 survey

Item	Options	<i>n</i>
Organization	National, prefectural, or semi-official	46
	Private sector	88
Number of beds ¹	Psychiatric beds	284 ± 136
Other types of beds	Equipped	27
	Unequipped	107
Number of staffs ¹	Psychiatrist	10.4 ± 5.9
	Designated Physician	7.4 ± 3.9
	Judgment Physician	1.9 ± 2.0
	Psychiatric nurse	113.1 ± 51.3
	Occupational therapist	8.0 ± 5.1
	Psychiatric social worker	8.3 ± 5.5
	Candidate of Mental Health Advisor	0.6 ± 1.0
	Psychotherapist	3.8 ± 3.2
Experience of accepting HfA case	Yes	69
	No	64
	Unknown	1

¹Data expressed as mean ± SD. HfA: Hospitalization for assessment.

past psychiatric treatment until the issued offense, whereas 62 were being withdrawn from treatment, 63 were under ongoing outpatient care, and 7 were hospitalized (unknown = 4 cases); 100 patients had been hospitalization before the issued offense.

The issued offenses were: homicide (*n* = 24), attempted homicide (*n* = 34), arson (including attempted arson; *n* = 41), robbery (including attempted robbery and robbery with injury; *n* = 7), injury leading to death (*n* = 5), rape (including attempted rape; *n* = 1), injury (*n* = 64), sexual coercion (*n* = 2), "other" (*n* = 18). This distribution was no different from that in the official report¹⁶⁾. The victims were family members (*n* = 71), friends (*n* = 13), strangers (*n* = 31), and "others" (*n* = 25). In the arson cases, the damaged property was owned by self (*n* = 37), family (*n* = 3), friend (*n* = 1), stranger (*n* = 1), and "other" (*n* = 8).

In 59 cases (34.5%), at least one psychiatric testimony (committed examination and/or public trial examination) occurred before the allegation. The decisions prior to the HfA submission were as follows: no prosecution by reason of insanity (prosecutor; *n* = 105), suspended prosecution by reason of diminished responsibility (prosecutor; *n* = 33), not guilty by reason of insanity (court; *n* = 3), suspended imprisonment with diminished responsibility (*n* = 16), and "other" (*n* = 14).

The main psychiatric diagnoses, categorized according to the International Classification of Disease, 10th edition, were F0 (Organic, including symptomatic, mental disorders) 18, F1 (Mental and behavioral disorders due to psychoactive substance use) 13, F2 (Schizophrenia, schizotypal and delusional disorders) 111, F3 [Mood (affective) disorders] 14, F4 (Neurotic, stress-related and somatoform disorders) 2, F5 (Behavioral syndromes associated with physiological disturbances and physical factors) 0, F6 (Disorders of adult personality and behavior) 2, F7 (Mental

retardation) 9, F8 (Disorders of psychological development) 2, and F9 (Behavioral and emotional disorders with onset usually occurring in childhood and adolescence) 0. Dual diagnoses were present in 32 cases (18.7%), and recorded as F0 1, F1 7, F2 1, F3 1, F4 2, F6 3, F7 14, and F8 3. During the HfA period, 9 patients required consultations with physicians from other hospitals, and 3 patients were transported to another hospital for the treatment of physical complications.

In terms of treatment strategies, 161 patients were prescribed medication and 10 received no medication. Five patients received a psychotropic injection, and one received LAI. No patient received electro-convulsive therapy. However, 116 patients were secluded for a mean of 32.2 ± 27.1 d (not secluded = 32; unknown = 23 cases), and 10 patients required physical restraint for periods from 3 to 67 d (no restraint = 148; unknown = 13).

In 142 cases, the examiner psychiatrist originated from the HfA facility, whereas a psychiatrist from another hospital took the role of the examiner psychiatrist in 20 cases (unknown = 9). The verdicts determined by the panel were hospitalization order ($n = 120$), community treatment order ($n = 12$), no treatment/release ($n = 57$), and allegation rejected or withdrawn ($n = 6$; unknown = 6).

Comparison to the results in the 2007 survey

Response rate: In the 2007 survey, we gathered data for 284 cases covering one-and-a-half years, from July 15, 2005 (the date of enforcement) to January 15, 2007. Based on the assumption that 388 cases of HfA occur annually, the capture rate was estimated to be 48.8%. No statistically significant differences existed in the capture rate between the two surveys ($\chi^2 = 2.09$, $df = 1$, $P = 0.15$).

Demographic data: Of the 284 cases, 196 were men and 76 were women (unknown = 12), which did not significantly differ from the 2013 survey ($\chi^2 = 0.00087$, $df = 1$, $P = 0.98$). The mean age of the patients was 43.2 ± 13.9 , which was slightly lower than that of the 2013 survey (unpaired t -test without the assumption of equality of the variance, $t = -2.22$, $df = 280.507$, $P = 0.027$).

The issued offenses were homicide ($n = 41$), attempted homicide ($n = 33$), arson (including attempted arson; $n = 74$), robbery (including attempted robbery and robbery with injury; $n = 14$), injury leading to death ($n = 6$), rape (including attempted rape; $n = 5$), injury ($n = 91$), sexual coercion ($n = 7$), and unknown ($n = 13$). In 61 cases (21.5%), at least one psychiatric testimony was performed before the allegation, and this testimony was more likely to be conducted in 2013 ($\chi^2 = 8.56$, $df = 1$, $P = 0.004$). The decisions prior to the HfA submission were as follows: no prosecution by reason of insanity (prosecutor; $n = 220$), suspended prosecution

by reason of diminished responsibility (prosecutor; $n = 10$), not guilty by reason of insanity (court; $n = 2$), suspended imprisonment with diminished responsibility ($n = 23$), and "other" ($n = 29$).

For the 2007 data, the dominant psychiatric diagnoses were as follows: F0 17, F1 15, F2 204, F3 29, F4 4, F5 1, F6 3, F7 10, F8 1, and F9 0. 33 patients received psychotropic injections, 6 patients started LAI, and 2 patients received electro-convulsive therapy. Injections were less common during HfA in 2013 ($\chi^2 = 7.54$, $df = 1$, $P = 0.006$). Some 194 patients were secluded for a mean of 37.1 ± 26.5 d and 57 were not secluded (unknown = 33), while 15 patients required physical restraint during HfA.

In 221 cases, the examiner psychiatrist was from the HfA facility to which the patient was hospitalized, whereas a psychiatrist from another hospital took up that role in 59 cases (unknown = 4 cases). The examiner psychiatrist was more likely to belong to the HfA facility to which the patient was hospitalized ($\chi^2 = 5.32$, $df = 1$, $P = 0.02$). The panel verdicts were hospitalization order ($n = 137$), community treatment order ($n = 57$), no treatment/release ($n = 44$), allegation rejected or withdrawn ($n = 7$; unknown = 39). Hospitalization orders were more likely to be provided in the 2013 data than that in the 2007 data ($\chi^2 = 19.76$, $df = 3$, $P < 0.001$). The results of the comparison are summarized in Table 3.

DISCUSSION

In this study, we attempted to clarify the current focus of HfA as well as the changes in its operation. We gathered data for almost half of all cases subject to HfA in 2012-2013 and compared it with the data in 2005-2007. This revealed several important considerations for the proper management of patients under HfA.

Approximately one-third of the facilities accepting HfA cases were administered by an official state organization. Considering that more than 90% of psychiatric hospital care is administered by the private sector in Japan, and that the majority of private hospitals accept official involuntary hospitalization cases^[16], private hospitals appear reluctant to participate in HfA. Moreover, there tended to be higher staffing levels in facilities accepting the HfA cases; that is, only hospitals with adequate staff could cope with the offenders with mental disorders.

In our study, men were 2.5 times more likely to be subject to HfA than women. Men are known to commit crimes 5-10 times more often than women, particularly homicide^[17,18], yet a higher proportion of women (19/76 = 25%) committed homicide in our study (21/196 = 10.7%) ($\chi^2 = 6.23$, $df = 1$, $P = 0.01$). This may have been due to the considerable amount of involuntary cases by mothers, which is common in Japan^[19,20].

The mean age of offenders in the 2013 survey was significantly higher than that in the 2007 survey.

Table 3 Comparison between the datasets obtained in 2007 and 2013

Year		2007	2013	Pvalue
<i>n</i>		284	171	
Gender	Male	196	123	0.98 ¹
	Female	76	48	
Mean age		43.2 ± 13.9	46.6 ± 16.4	0.027 ²
Psychiatric testimony	No	223	112	0.004 ¹
	Yes	61	59	
Psychiatric diagnosis (ICD-10)	F0	17	18	NA
	F1	15	13	
	F2	204	111	
	F3	29	14	
	F4	4	1	
	F5	1	0	
	F6	3	2	
	F7	10	9	
	F8	1	2	
	F9	0	0	
Injection	No	251	166	0.006 ¹
	Yes	33	5	
Depot	No	278	170	0.26 ³
	Yes	6	1	
Electroconvulsive therapy	No	282	171	0.53 ³
	Yes	2	0	
Seclusion	No	57	32	0.8 ¹
	Yes	194	116	
Restraint	mean term (d)	37.1 ± 26.5	32.2 ± 27.1	0.12 ²
	No	269	148	0.83 ¹
Examiner Psychiatrist belongs to the hospital where the patient was hospitalized	Yes	15	10	0.002 ¹
	No	59	20	
Verdict	Hospitalization	137	120	< 0.001 ¹
	Community treatment	57	12	
	No-treatment	44	57	
	Rejected or withdrawn	7	6	

¹χ² test; ²Unpaired *t*-test (data shown by mean ± SD); ³Fischer's exact test. NA: Not available.

Considering that the mean age in Japan increased from 43.7 in 2007 to 45.5 in 2013^[21], this difference may be consistent with societal trends. Furthermore, most offenders had no history of marriage, which is also consistent with a questionnaire survey of mental health care users in which just 13.0% (132/1016) of the participants lived with a spouse^[22]. In contrast, 80% of the responders had an occupational history. In another survey of psychiatric outpatients, we reported that 40% of patients had no current occupation^[23], while a survey of mental healthcare users revealed that one-fourth earned enough money for daily living^[24]. Even after accepting the limitations of combining these findings, it appears that forensic patients have superior occupational performance to standard psychiatric outpatients. The relationship between executive function and offending in patients with mental disorders remains controversial^[25], and further analyses with sophisticated datasets will be required to investigate the association between occupational history and serious offending.

Almost half of all offenders in these surveys were under ongoing psychiatric treatment, and relatively few were therapy naïve. This is much different from

that reported in other countries^[26]. It may therefore be essential to enrich the care for patients already attached to medical practitioners, rather than to introduce a new treatment pathway for patients without a therapeutic history. This approach could reduce serious crimes by patients with mental disorders in Japan.

The percentage of HfA cases implementing the use of psychiatric testimony increased between the survey periods, suggesting that prosecutors have come to consider the criminal responsibility of offenders deliberately. This tendency is consistent with the establishment of the Lay Judge Act (2009). According to this new legislation, in the case of serious crimes where the defendant can be subjected to the MTS Act, a lay judge system is used; since its enforcement, psychiatric testimony has been more common in Japan^[27,28]. Prosecutors appear to require psychiatric testimony in any cases of questionable criminal responsibility, subject to the lay judge system, leading to a higher proportion of psychiatric testimony in HfA cases. This is advantageous in terms of clarifying diagnoses, but can delay medical treatment that tends to be withheld during psychiatric testimony, which may

cause the offender's mental state to deteriorate.

Most offenders subjected to the HfA in these surveys had schizophrenia or some other psychotic disorders. This is expected considering only those considered to be irresponsible or to have diminished responsibility were subject to HfA. In contrast, dual diagnoses were identified in approximately one-fifth of the cases, which is less than that previously reported in other countries^[26,29]. It was reported that 23.3% of inpatients treated under the MTS Act in designated hospitals had dual diagnosis, including intellectual disability, developmental disorders, and substance misuse^[30]. This discrepancy suggests that dual diagnoses were overlooked in some cases at the HfA stage. Deeper investigation is necessary to make a precise diagnosis during HfA to determine the best treatment strategy for the subjects.

The majority of the offenders were prescribed medication, which is rational considering the fact that most of them were diagnosed with schizophrenia. Facilities accepting HfA cases seem to be disciplined in prescribing medications for the offenders in the same way as they would for other patients with mental disorders, as recommended by expert consensus^[9]. However, fewer offenders received injectable psychotropic drugs during HfA in the 2013 data than that in the 2007 data. This could suggest that recent offenders were adequately treated with oral medication and did not need injections. A solid knowledge base and sophisticated HfA procedures probably help in minimizing the reliance on invasive treatment. On the other hand, accumulating evidence suggest the efficacy of LAI of antipsychotics upon patients with psychosis^[31,32]. It is highly estimated that offenders with psychotic disorders are adaptable to LAI in terms of maintaining compliance and stabilizing their mental state. However, the term of HfA is limited to 2 or 3 mo. Introduction of LAI at the initial stage of HfA has some difficulties, such as the risk of misdiagnosis and acquiring informed consent. Forced LAI induction is not recommended by experts in the HfA^[9]. An appropriate strategy of using LAI in the HfA should be established.

Most offenders were secluded during the HfA process, although the precise term of seclusion varied. Therefore, the likelihood of seclusion was much higher than that in acute psychiatric units in the US^[33]. In Japan, the standard management of patients with schizophrenia, and therefore risk for harm to others, tends to involve physical seclusion^[34]. Our surveys revealed that the proportions of secluded offenders have not changed since the MTS Act was enforced. One of the reasons for frequent seclusion in Japan seems to be a small number of nursing staff, as experts recommended rich human resource in the HfA setting^[9]. The fact that the seclusion rate per bed in a year is only 0.1-0.2 in designated inpatient facilities^[35] is consistent with the estimation above. Although restraint was less frequent than seclusion, it continues to be used at similar rates in 2013.

Reductions are necessary in both these areas, when possible.

While this is a controversial topic, it is recommended that the examiner psychiatrist should be selected from among the psychiatrists at the hospital where the offender is hospitalized because this brings practical advantages^[36]. In almost 90% of respondents in the 2013 survey, the examiner psychiatrist met this criterion, which had increased from the 2007 data. This result suggests improved processes for selecting the examiner psychiatrist.

In terms of the panel decisions, hospitalization orders were more common in the 2013 data than in the 2007 data, and community treatment orders were less frequently adopted. We assume that the panel has become more defensive over recent years. In July 2007, the Supreme Court made a verdict that it is inappropriate to withhold treatment orders for offenders who need psychiatric care as part of the MTS Act simply because adequate care can be provided through the Mental Health and Welfare Act^[37]. After this verdict, offenders requiring any inpatient care were to be hospitalized in designated inpatient hospitals under the MTS Act, regardless of the severity of their mental disorders. Another possible explanation is more practical; some years after the MTS Act was brought into law, several hospitals opened new wards to accept the cases of MTS act. It is possible that bed shortages initially suppressed the decision to hospitalize patients early after the introduction of the MTS Act.

In conclusion, the characteristics of offenders with mental disorders did not change between the two survey periods. In contrast, treatment and administration of subjects under the HfA has improved to some extent. Nevertheless, several challenges must still be overcome to ensure proper treatment in the HfA setting.

The main limitation of this study is its inherent selection bias. All respondents of our survey voluntarily returned the questionnaires we sent. Therefore, it is possible that only those facilities in which the staff was willing to participate in the HfA responded to our survey. Even after confirming that the proportion of cases was consistent with that in official reports, care should be taken when generalizing our results to the broader HfA landscape.

COMMENTS

Background

There had been broad controversy regarding the treatment of offenders with mental disorders. Some major associations around mental health practitioners were opposing to establishment of forensic mental health scheme, insisting such a policy would strengthen the discrimination against the patients with mental disorders. Even now some people including mental health experts are involved in the movement aiming the repeal of the Medical Treatment and Supervision (MTS) act. There was also a broad argument which were responsible for the administration of the hospitalization for assessment (HfA) scheme. Neither the Ministry of Justice, Ministry of Health, Labour and Welfare, or the Supreme Court are willing to handle the HfA management. The authors are strongly concerned about the risk that some patients are inappropriately treated in the HfA because their situation has not been clarified by the

authorities. It is the motive of conducting this study.

Research frontiers

There are several topics around the MTS act. Besides the HfA scheme, decision making for the patients with developmental disorder, substance misuse, and/or personality disorder are often discussed. Although inpatient treatment strategy has been established, outpatient care is still inadequate in terms of social resource. How to deal with the patients who hardly respond to the treatment is another issue, as the same in foreign countries.

Innovations and breakthroughs

This article is the first paper reported in English about the current situation and challenges of the HfA scheme in Japan, as far as we know. This scheme was started only eight years ago. Therefore, the authors considered the importance of recording the concurrent situation, perhaps valuable for further reference in the future.

Applications

Medical practitioners and lawyers engaging in the MTS act management should know the fact described in this article. This study itself is quite domestic, but the authors are planning to conduct some international comparison studies about this region, to improve the forensic mental health systems in each country.

Terminology

The authors have described some essential words to understand the MTS act in the main article.

Peer-review

One of the reviewers assessed this article as a paper aimed to investigate the components of HfA and the management changes from 2005 (when a new forensic mental health legislation has been introduced) to the present using mailing questionnaire surveys between 2005 and 2013. The authors are thankful for good understanding of our work to the reviewers.

REFERENCES

- Mullen PE. Forensic mental health. *Br J Psychiatry* 2000; **176**: 307-311 [PMID: 10827876 DOI: 10.1192/bjp.176.4.307]
- Salize HJ, Schanda H, Dressing H. From the hospital into the community and back again - a trend towards re-institutionalisation in mental health care? *Int Rev Psychiatry* 2008; **20**: 527-534 [PMID: 19085409 DOI: 10.1080/09540260802565372]
- Ogloff JR, Roesch R, Eaves D. International perspective on forensic mental health systems. *Int J Law Psychiatry* 2000; **23**: 429-431 [PMID: 11143942 DOI: 10.1016/S0160-2527(00)00062-5]
- Nakatani Y. Psychiatry and the law in Japan. History and current topics. *Int J Law Psychiatry* 2000; **23**: 589-604 [PMID: 11143956 DOI: 10.1016/S0160-2527(00)00061-3]
- Tsuchiya KJ, Takei N. Focus on psychiatry in Japan. *Br J Psychiatry* 2004; **184**: 88-92 [PMID: 14719534 DOI: 10.1192/bjp.184.1.88]
- Yamagami H. [The significance of the MTS act, based on the forensic psychiatric point of view. *Nihon Seishinka Byoin Kyokai Zasshi* 2005; **24**: 9-13]
- Nakatani Y, Kojimoto M, Matsubara S, Takayanagi I. New legislation for offenders with mental disorders in Japan. *Int J Law Psychiatry* 2010; **33**: 7-12 [PMID: 19906429 DOI: 10.1016/j.ijlp.2009.10.005]
- Murakami M. Development of guideline for forensic psychiatric assessment. *Jap J Clin Psychiatry* 2009; **38**: 557-561
- Shiina A, Fujisaki M, Nagata T, Oda Y, Suzuki M, Yoshizawa M, Iyo M, Igarashi Y. Expert consensus on hospitalization for assessment: a survey in Japan for a new forensic mental health system. *Ann Gen Psychiatry* 2011; **10**: 11 [PMID: 21473787 DOI: 10.1186/1744-859X-10-11]
- Igarashi Y. Current situations and issues of the Act on Medical Care and Treatment for Persons Who Have Caused Serious Cases under the Condition of Insanity. *Jap J Forensic Mental Health* 2009; **4**: 40-50
- Ministry of Health, Labour and Welfare of Japan. Iryo-kansatsusho no iryo-kikan no joho. [Information regarding institutions concerned to the MTS act. Available from: URL: <http://www.mhlw.go.jp/bunya/shougaihoven/sinsin/shikou.html>]
- Shiina A, Oda Y, Suzuki M, Yoshizawa Y, Haraguchi T, Fujisaki M, Igarashi Y, Iyo M. 'The Act on Medical Care and Treatment for Persons Who Have Caused Serious Cases under the Condition of Insanity' - Issues and Challenges. *Jap Bull Social Psychiatry* 2009; **18**: 252-258
- Nakatani Y. Challenges in interfacing between forensic and general mental health: a Japanese perspective. *Int J Law Psychiatry* 2012; **35**: 406-411 [PMID: 23040709 DOI: 10.1016/j.ijlp.2012.09.021]
- Fujii C, Fukuda Y, Ando K, Kikuchi A, Okada T. Development of forensic mental health services in Japan: working towards the reintegration of offenders with mental disorders. *Int J Ment Health Syst* 2014; **8**: 21 [PMID: 24932212 DOI: 10.1186/1752-4458-8-21]
- Courts in Japan. Shiho Tokei. [Statistics of legal cases] 2012. Available from: URL: http://www.courts.go.jp/app/sihotokei_jp/search
- National Institute of Mental Health. Seishin Hoken Fukushi Shiryo. [Current situation of mental health and welfare] 2012. Available from: URL: <http://www.ncnp.go.jp/nimh/keikaku/vision/630data.html>
- Bennett S, Farrington DP, Huesmann LR. Explaining gender differences in crime and violence: The importance of social cognitive skills. *Agg Viol Behav* 2005; **10**: 263-288 [DOI: 10.1016/j.avb.2004.07.001]
- "Homicide Trends in the United States, 1980-2008" United States Department of Justice 2010. Available from: URL: <http://www.bjs.gov/content/pub/pdf/htus8008.pdf>
- Yamauchi M, Usami S, Ikeda R, Echizen N, Yoshioka N. Medico-legal studies on infanticide: statistics and a case of repeated neonaticide. *Forensic Sci Int* 2000; **113**: 205-208 [PMID: 10978626 DOI: 10.1016/S0379-0738(00)00206-1]
- Taguchi H. [Maternal filicide in Japan: analyses of 96 cases and future directions for prevention]. *Seishin Shinkeigaku Zasshi* 2007; **109**: 110-127 [PMID: 17396572]
- [Mean and median age, and age structure index] data by National Institute of Population and Social Security Research. Available from: URL: http://www.ipss.go.jp/pp-newest/j/newest02/3/t_4.html
- Association of National Network of the patients with mental disorders. The 2nd Questionnaire Survey of Mental Health Care Users Report. NPO Wendy, 2006
- Shiina A, Igarashi Y, Iyo M. A survey of concern about forensic psychiatry in users of mental health care. *Jap J Forensic Psychiatry* 2014; **9**: 2-13
- Association of National Network of the patients with mental disorders. The 4th Questionnaire Survey of Mental Health Care Users Report. NPO Wendy, 2009
- Fullam RS, Dolan MC. Executive function and in-patient violence in forensic patients with schizophrenia. *Br J Psychiatry* 2008; **193**: 247-253 [PMID: 18757987 DOI: 10.1192/bjp.bp.107.040345]
- Oram S, Flynn SM, Shaw J, Appleby L, Howard LM. Mental illness and domestic homicide: a population-based descriptive study. *Psychiatr Serv* 2013; **64**: 1006-1011 [PMID: 23820784 DOI: 10.1176/appi.ps.201200484]
- Okada T. Annual Report of Research on status of psychiatric expert testimony in Lay Judge System in Japan. 2013. Available from: URL: http://kaken.nii.ac.jp/pdf/2012/seika/C-19_1/82611/22591309seika.pdf
- Seishin hoken iryo fukushi no saishin doko. [Recent situation of mental health and welfare] in Nursing Star Nov. 1 2011, published by Japanese Psychiatric Nurses Association. Available from: URL: http://www.med.u-toyama.ac.jp/seishinkango/info/2011_11_nursing-star.pdf
- Young A. Dual diagnosis and forensic care. Are the needs of service users being met? *J Psychiatr Ment Health Nurs* 2006; **13**: 117-124 [PMID: 16441402 DOI: 10.1111/j.1365-2850.2006.00919.x]
- Kishi Y. Annual Report from 2009 in the Research of Promoting Rehabilitation in the Inpatient Care. Tokyo: Ministry of Health, Labour and Welfare in Japan, 2010
- Girardi P, Serafini G, Pompili M, Innamorati M, Tatarelli R, Baldessarini RJ. Prospective, open study of long-acting injected risperidone versus oral antipsychotics in 88 chronically psychotic patients. *Pharmacopsychiatry* 2010; **43**: 66-72 [PMID: 20099224 DOI: 10.1055/s-0029-1239541]
- Kimura H, Kanahara N, Komatsu N, Ishige M, Muneoka K,

- Yoshimura M, Yamanaka H, Suzuki T, Komatsu H, Sasaki T, Hashimoto T, Hasegawa T, Shiina A, Ishikawa M, Sekine Y, Shi-raishi T, Watanabe H, Shimizu E, Hashimoto K, Iyo M. A prospective comparative study of risperidone long-acting injectable for treatment-resistant schizophrenia with dopamine supersensitivity psychosis. *Schizophr Res* 2014; **155**: 52-58 [PMID: 24667073 DOI: 10.1016/j.schres.2014.02.022]
- 33 **Simpson SA**, Joesch JM, West II, Pasic J. Risk for physical restraint or seclusion in the psychiatric emergency service (PES). *Gen Hosp Psychiatry* 2014; **36**: 113-118 [PMID: 24268565 DOI: 10.1016/j.genhosppsych.2013.09.009]
- 34 **Noda T**, Sugiyama N, Sato M, Ito H, Sailas E, Putkonen H, Kontio R, Joffe G. Influence of patient characteristics on duration of seclusion/restraint in acute psychiatric settings in Japan. *Psychiatry Clin Neurosci* 2013; **67**: 405-411 [PMID: 23941159 DOI: 10.1111/pcn.12078]
- 35 **Hirabayashi N**. Annual Report from 2013 in the Research of Basic Survey and Improvement of Medical Treatment in Designated Hospitals. Tokyo: Ministry of Health, Labour and Welfare in Japan, 2014
- 36 **Igarashi Y**. Iryo kansatsu ho kantei nyuin ni okeru taishosha no shinryo ni kansuru shishin. [A guideline of medical treatment for the subject to Hospitalization for Assessment in the Medical Treatment and Supervision Act] Sep 15 2011. Available from: URL: <http://www.m.chiba-u.ac.jp/class/shakai/jp/housystem/doc/kanteinyuin2.pdf>
- 37 **Hirata T**. Annual Report from 2007 in the Research regarding Medical Observation in the Hospitalization for Assessment. Tokyo: Ministry of Health, Labour and Welfare in Japan, 2008

P- Reviewer: Celikel FC, Serafini G **S- Editor:** Qi Y **L- Editor:** A
E- Editor: Yan JL





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Abstract

Reactive aggression is a response to salient threats that may have evolved as a strategy for survival. The likelihood of its outburst is mediated by several factors including the activity of serotonin and other neurotransmitters that regulate reactive aggression through the corticolimbic circuit. Specifically, this circuit is modulated by monoamine oxidase A (MAOA) such that low levels of activity incline an animal to impulsive behavior. Evidence also indicates that aggressive behavior is determined through interactions between genes and the environment. Further studies are expected for appropriate treatment.

Keywords: Reactive Aggression; Serotonin; Monoamine Oxidase A (MAOA); Gene-Environment Interaction.

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Received: January 10, 2015

Accepted: March 26, 2015

Published: March 27, 2015

Citation: Shiina A (2015) Neurobiological Basis of Reactive Aggression: A Review. *Int J Forensic Sci Pathol.* 3(3), 94-98.

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Introduction

Aggression is defined as any form of behavior that is intended to injure someone physically or psychologically [1]. While aggression was seen as a homogeneous category of behavior until the 1960s, evidence has since suggested that it can be divided into two subtypes: proactive and reactive [2, 3].

Proactive (instrumental, predatory, cold-blooded, or premeditated) aggression is a controlled attack designed to achieve a goal, such as acquiring money or social dominance over others. Individuals engaged in proactive aggression are consciously aware of the benefits gained from using violence [4]. In contrast, reactive (impulsive, affective, hostile, or hot-blooded) aggression is a physical act committed with little consideration of its consequences or harm to others, and is often accompanied by feelings of remorse or thought confusion [5]. Assessment is performed through measurements that have been developed to quantify the magnitude of each form of aggression [6, 7].

Support for categorizing aggression this way is not universal. Some believe that such a dichotomy overlooks multifaceted mo-

tivations that drive human violence, and others point out that most children who frequently use one form of aggression also frequently use the other [8]. However, distinguishing between reactive and proactive aggression has several advantages. In child inpatients, future antisocial behavior is more strongly related to proactive aggression than to reactive aggression [9]. Additionally, increases in proactive, but not reactive, aggressive behavior in young teenagers partially predicts later delinquency within a few years [10]. Furthermore, when proactive aggression is observed in adolescent boys, it also predicts psychopathic characteristics in adulthood. In contrast, reactive aggression in adolescent boys is specifically associated with negative emotions such as anxiety [11]. A meta-analysis has shown that internalizing problems [12], suicidal ideation, and suicidal behavior [13] are more strongly related to reactive aggression than to proactive aggression. These findings support the idea that aggressive behaviors exist in two fundamentally different forms, and as a corollary, that effective interventions for reactive aggression should be different from those for proactive aggression.

Reactive Aggression As A Dysfunction

The neural circuitry governing outbursts of reactive aggression has been investigated using mammalian species [14]. Based on the results, reactive aggression is now understood to be a part of a system that responds to acute threats. Low levels of threat trigger freezing, whereas high levels lead to escape-related behavior. However, a high-level threat without any possibility of flight will elicit reactive aggression [15, 16]. Thus, reactive aggression can be an alternative adaptive response to a threatening stimulus [17].

While reactive aggression can be natural and beneficial in some situations, it can be a dysfunction when frequently exhibited in inappropriate situations. Several studies have tried to explain this phenomenon as an inability to inhibit violent impulses when frustrated. This hypothesis is consistent with findings that subjects displaying reactive aggression also show executive dysfunctions

such as exaggerated perception of hostility from others [18], impaired somatic marker systems [19], and social response reversal [20]. Furthermore, patients who displayed antisocial behavior showed impaired performance on measures of executive functioning [21, 22]. Similar dysfunctions are also observed in psychopathic patients who also are at high risk for both reactive and proactive aggression [23]. In short, reactive aggression likely results from both excessive responses to stimuli and deficits in correctly interpreting stimuli and making decisions based on them.

Neuronal Circuit For Reactive Aggression

Animal studies have indicated that responses to imminent threats are mediated by a system that runs from the amygdala (AMG) downward, largely via the stria terminalis to the medial hypothalamus (MH), and from there to the dorsal half of the periaqueductal gray (PAG) [14, 23, 24]. This AMG-MH-PAG hierarchical pathway is also found in humans. One theory is that the AMG acts as a mediator that can increase or decrease the responsiveness of the sub-cortical systems that respond to threats. Thus, lesions to the AMG can modulate the risk of reactive aggression [25]. However, studying this pathway directly is still challenging, partially because of technical difficulties in visualizing neural activity in sub-cortical regions of the human brain [25].

Ever since the well-known case in which Phineas Gage showed a remarkable personality change after severe frontal lobe injury, it has been hypothesized that dysfunction in the frontal lobe might contribute to aggressive behavior [26, 27]. Indeed, several lines of evidence indicate that frontal cortex is involved in the modulation of the AMG-MH-PAG pathway [14, 28, 29]. Animal studies show that the AMG and medial prefrontal cortex are connected by a negative regulatory circuit [30, 31]. Disrupting this circuit causes deficits in emotion regulation, which results in impulsive behaviors [23]. Moreover, neuroimaging studies using positron emission tomography indicate frontal lobe dysfunction in patients displaying reactive aggression. Lower glucose metabolic values were observed in medial temporal and prefrontal cortices of violent patients than of control subjects [32]. Affective murderers also showed decreased activity in bilateral prefrontal cortices, but increased activity in right subcortical areas [4]. It is noteworthy that the same findings were not observed in people who exhibited predominantly proactive aggression. Dysfunctions in the ventromedial prefrontal cortex [29] and the orbital frontal cortex (OFC) [20] were shown to be associated with a higher risk for reactive aggression but not proactive aggression [16]. In contrast, the dorsolateral prefrontal cortex does not seem to have a prominent role in reactive aggression [25], although room for argument still exists [33].

The OFC modulates reactive aggression via the AMG-MH-PAG pathway through at least two separate processes. First, it computes expected rewards that accompany actions. If a reward is absent or less than expected, some OFC neurons increase their activity and excite sub-cortical systems, which may lead to reactive aggression [34]. Second, the OFC is involved in social response reversal [20]. Patients with OFC deficits have difficulty suspending ongoing behavior even though they recognize that other people are expressing anger or unfriendly emotions [20, 35].

Furthermore, the AMG and OFC are tightly connected by several pathways that are functionally linked with each other [30, 36]. Pa-

tients with intermittent explosive disorder exhibited exaggerated AMG reactivity and diminished OFC activity, but did not show AMG-OFC coupling, suggesting that their disconnection from each other caused difficulty in modulating aggression in social settings [37].

Biochemicals In Reactive Aggression

The risk of reactive aggression is higher in clinical conditions such as posttraumatic stress disorder [38, 39], anxiety disorder [40], childhood bipolar disorder [41], and impulse-control disorder. Some have hypothesized that serotonin is involved in modulating reactive aggression because abnormal neurotransmitter levels is a common root of these disorders [42].

Serotonin is a monoamine neurotransmitter derived from tryptophan that has an important role in the central nervous system. Lowered concentrations of 5-hydroxyindoleacetic (5-HT) acid, the main metabolite of serotonin, were observed in impulsively violent offenders, but not in those who were proactively violent [43]. In healthy volunteers, the effects of tryptophan depletion included an increase in aggression, which suggests that aggression is one consequence of impeding synthesis of serotonin in the brain [44]. In contrast, administering the selective serotonin reuptake inhibitor paroxetine resulted in a reduction of hostility in a double-blind trial [45]. These results are consistent with clinical observations that agitated patients had an estimated shortage of serotonin [38, 39, 40]. However, the correlation between serotonin and violence is not quite simple. Several subtypes of serotonin receptors exist in multiple regions of the brain, often with differing functions. For example, activation of 5-HT_{1A} and 5-HT_{1B} receptors in mesocorticolimbic areas triggers a reduction in aggressive behaviors, whereas activating them in the medial prefrontal cortex or septal area can cause aggression [46].

Some hormones are also involved in the regulation of aggressive behavior. Testosterone level has repeatedly been shown to be associated with reactive aggression in both men and women [47-49]. Conversely, low levels of cortisol have been observed in subjects with violently aggressive, antisocial tendencies [50, 51]. These findings suggest that reactive aggression is affected by an imbalance between testosterone and cortisol at the subcortical level [17]. In addition, the so-called social neuropeptides vasopressin and oxytocin are also likely to play a role in mediating impulsiveness [52].

The Maa Gene And Reactive Aggression

Genetic factors have also been implicated in susceptibility to aggressive behavior [53]. Brunner's landmark work described a large group of related Dutch in which many people (all males) were affected by a syndrome consisting of borderline mental retardation and impulsive aggression. The work proved that a specific genetic variant was involved in the aggressive behavior, and the syndrome is now called Brunner syndrome [54]. The common factor linking all people with the syndrome was a total lack of MAOA activity. In each of five males, a point mutation was identified in the eighth exon of the MAOA structural gene. These findings had a great impact on sequential genetic research.

MAO catalyzes the oxidative deamination of biogenic amines. The two isoforms (MAOA and MAOB) are localized to the outer