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CLINICAL REPORT

Is an urban legend true in the teaching hospital that "you will get hurt if you go to hospital at the beginning of the fiscal year"?

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Abstract An urban legend that "you will get hurt if you go to hospital at the beginning of the fiscal year" is in circulation, because people in general suppose that inexperienced newcomers start to work at clinical practice during that time period. We tried to determine whether this urban legend was true or not by using data from our operation management system. We retrospectively conducted a study to investigate whether the number of cannulation failures, which was used as an index of patient disadvantages at clinical practice, could be affected by the volume of residents in clinical participation. The number of insertion trials per case was not prominent in the first month of the fiscal year. However, the number of insertion trials per case increased in proportion to the average number of residents per day. It seems that there was no evidence to support the urban legend that "you will get hurt if you go to hospital at the beginning of the fiscal year." However, our results suggest that rather than an urban legend, we are now confronting the fact that patients may suffer from medical disadvantages in the teaching hospitals.

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Introduction

An urban legend is a form of modern folklore consisting of stories that may or may not have been believed by their tellers to be true. As with all folklore and mythology, the designation suggests nothing about the story's veracity, but merely that it is in circulation, exhibits variation over time, and carries some significance that motivates the community in preserving and propagating it. One example of an urban legend is that "you will get hurt if you go to hospital at the beginning of the fiscal year". We can understand that people in general suppose that inexperienced newcomers start to work at clinical practice during that time period. In fact, it is not true, because newcomers do not always start to work at clinical practice at the beginning of the fiscal year. However, this urban legend suggests that the quality of clinical practice can depend on the volume of inexperienced newcomers at clinical practice.

Previous research on resident participation in clinical practice has consistently found no reduction in patient satisfaction when trainees at all levels are involved in care [1–3]. In addition, it has been reported that patient satisfaction did not differ in regard to "the technical skills of the doctor" [4]. However, these reports only addressed specific situations and are not enough to generalize the results to all aspects of the resident participation in clinical practice. Thus, some patients might suffer from medical disadvantages as far as such an urban legend is in circulation. To the best of our knowledge, there is no study to focus on patient disadvantages due to resident involvement in clinical practice.

About half of patients report moderate to severe pain with intravenous cannulation and anxiety before the procedure [5]. Therefore, it may be justified to use the number of cannulation failures as an index of patient disadvantages at clinical practice. In our institute, the first-year residents training in anesthesiology mainly participate in anesthesia management for minor surgical procedures, which do not require intensive monitoring or drug administration. Thus, the extra amount of catheters used compared to the estimated amount is thought to be the number of cannulation failures. In this study, we retrospectively investigated whether the extra amount of catheters used could be affected by the number of residents, and whether patient satisfaction could depend on the number of residents.

Methods

Approval for review of patient's clinical charts and access to hospital stock management data was obtained from the Nara Medical University Institutional Review Board (No. 738 approved on 10-29-2012). Data were collected during the period between April 2012 and March 2013. Eligible cases were adult patients who underwent otorhinolaryngological or plastic surgery procedures which started first thing in the morning, because these cases were usually managed by one peripheral venous line with the participation of a first-year resident. In our hospital rule, peripheral venous catheterization for the first case in the morning was performed in the operating room by the attending resident or supervising anesthesiologist. Local anesthetics or a eutectic mixture of local cream anesthetics were not used before cannulation. Therefore, the number of catheters used in the case was thought to be equivalent to the number of insertion trials. The first choice for catheterization was usually a $\geq$ 22-gauge needle (Angiocath^{TM}, Becton, Dickinson and Company, NJ). The other sizes of the catheter could be used for purposes other than catheterization. Thus, we focused on the consumption of $\geq$ 22-gauge needle. We determined the number of catheters used in the case using data from an operation management system (Opera MasterTM Hogy Medical Co., Ltd. Tokyo), which automates operation management and improves analysis of historical records and data whilst increasing the operational efficiency of operating rooms. The system allows accurate control of stock and materials, including purchasing, usage and stock numbers giving precise costs for each procedure. In our teaching program, residents are assigned to the cases in a one-to-one relation with surgical patients. An anesthesia staff member usually supervises one to two residents in otorhinolaryngological or plastic surgery cases. During the study period, the teaching program was secured. We routinely conduct a questionnaire regarding perioperative patient care, which is filled out by patients themselves using a simplified patient satisfaction scale (satisfactory, dissatisfactory) until the seventh postoperative day at the postoperative anesthesia consultation clinic. Data regarding the patient satisfaction scale used in this study were extracted from the patient's clinical chart. In addition, inflow and outflow of the anesthesia resident population during the study period were investigated. Using the cumulative total number of residents in each month, the average number of residents per day was calculated for each month.

Statistical analysis

Descriptive statistics were used to summarize the number of surgical cases, the average number of residents per day, the consumption of catheters, and the ratio of satisfactory and dissatisfactory regarding patient satisfaction in each month. To determine the correlation of the average number of residents per day with the consumption of catheters per month and the satisfaction rate, the Pearson's product–moment correlation coefficient was calculated. Statistical significance was defined as $p < 0.05$.

Results

During the study period, 3,918 patients underwent general anesthesia. There were 354 otorhinolaryngological or plastic surgery cases in total. Of those, 230 cases were subject to the investigation. Descriptive statistics are presented in Table 1. In Japanese Society, the beginning of the fiscal year is April; however, the number of catheters used in April was not prominent at all. However, there was a significant positive correlation between the average number of residents per day and the consumption of catheters per month with a Pearson's product–moment correlation coefficient, $r = 0.627$, $p = 0.029$ (Fig. 1). On the other hand, there was a negative tendency; however, a significant correlation was not observed between the average number of residents per day and the satisfaction rate with a Pearson's product–moment correlation coefficient, $r = 0.544$, $p = 0.0676$ (Fig. 2).

Discussion

The number of insertion trials per case was not prominent in April, which is usually the beginning of the fiscal year in Japan. However, the number of insertion trials per case increased in proportion to the average number of residents per day. Therefore, our study showed that there was no evidence to support the urban legend that "you will get hurt

Table 1 Number of surgical cases and related variables in each month

	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Otorhinolaryngology (number of cases)	14	12	16	17	19	15	16	17	16	16	15	14
Plastic surgery (number of cases)	3	3	5	4	4	2	2	3	4	4	4	5
Number of total cases	17	15	21	21	23	17	18	20	20	20	19	19
Number of catheter used	19	20	37	37	37	31	34	36	50	32	36	36
Number of catheter used/case	1.12	1.33	1.76	1.76	1.61	1.82	1.89	1.80	2.50	1.60	1.89	1.89
Satisfaction rate (%)	81.25	55	55	47.62	66.67	66.67	56.25	77.78	55	42.11	60	63.64
Average number of resident/day (person)	0.63	1.52	2.73	3.87	4.13	3.07	2.58	3	6.23	6.58	6.03	3.39

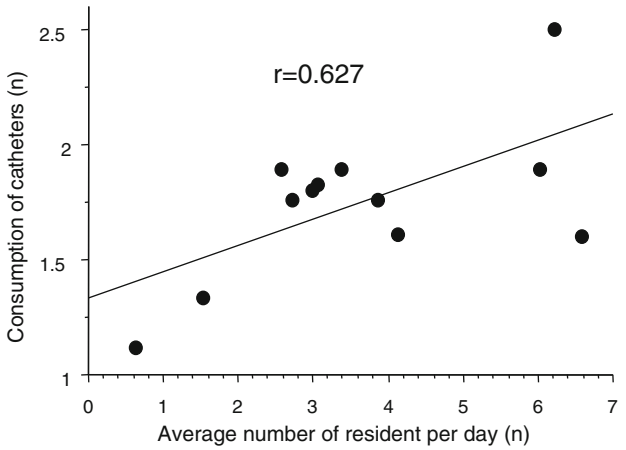

Fig. 1 Correlation of the average number of residents per day with the consumption of catheters per month. There was a significant positive correlation with a Pearson's product–moment correlation coefficient, $r = 0.627$, $p = 0.029$

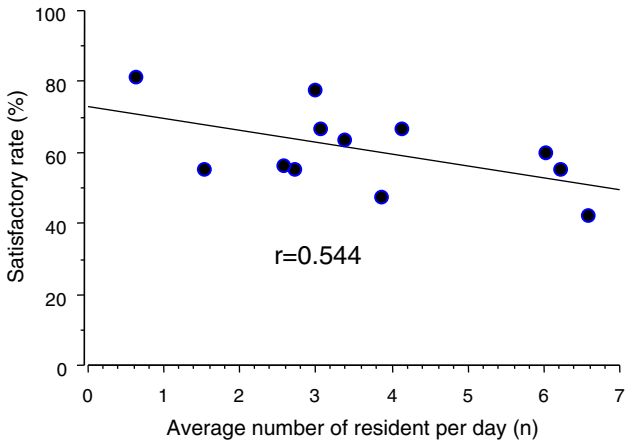

Fig. 2 Correlation of the average number of residents per day with the patient satisfaction rate. There was a negative tendency; however, a significant correlation was not observed with a Pearson's product–moment correlation coefficient, $r = 0.544$, $p = 0.0676$

if you go to hospital at the beginning of the fiscal year," whereas, it suggested that "you might get hurt if you go to the hospitals where many residents work at clinical practice." However, it is necessary to acknowledge the limitation that we did not directly compare the cases of resident involvement with the cases of no resident involvement in terms of the number of catheters used, because the operating management system did not provide such data.

We used the number of cannulation failures as an index of patient disadvantages at clinical practice. As mentioned before, intravenous cannulation usually causes significant pain and anxiety in patients [5]. It is the second most commonly performed invasive procedure after venipuncture [6]. Thus, it is natural for patients to think that the insertion failure of catheters is a symbol of discomfort in the hospital. Patients who are dissatisfied are known to experience more adverse events due to medical errors, and patient complaints and malpractice claims have also been associated with low patient satisfaction [7, 8]. Patient experience has been considered as a fundamental priority in healthcare quality [9]. In addition, it has been suggested that physicians' interactions with patients significantly impact overall perceived patient experience and satisfaction [10]. Therefore, it is reasonable to suppose that patient experience of cannulation failure should significantly impact the overall perceived patient experience of anesthesia management, during which patients are almost unconscious. Collectively, it is agreeable that as the number of residents increased, the number of cannulation failures increased, which is thought to be related to a tendency of decline of patient satisfaction.

Regarding intravenous catheterization, preparation to an acceptable level is definitively important prior to contact with patients. As a result, the number of cannulation failures increased in proportion to the number of residents, suggesting that most attending residents might have lacked practice. However, acquisition of scientific knowledge, basic, clinical skills and moral values is essential for medical trainees in order to develop medical professionalism [11]. Therefore, it may be unreasonable to expect experienced performance from residents to develop without establishing medical professionalism. It is necessary to establish new techniques in training and education to solve

the technical differences between experienced physicians and residents. However, we need to know that it is fact, not an urban legend, that patients can suffer from medical disadvantages in the teaching hospitals, although patient satisfaction may not differ regardless of "the technical skills of the doctor" [4].

There are several limitations of the study that merit discussion. We did not actually count the number of cannulation failures, because our operation management system does not cover such data. In addition, we do not routinely record the number of failures for each procedure. Therefore, we cannot know the actual number of failures. However, it is not unreasonable to think that the number of ≥22-gauge catheters used per case is estimated as the number of insertion trials, because the ≥22-catheter is rarely used for other purposes than peripheral intravenous catheterization for otorhinolaryngological or plastic surgery procedures in our institute. In addition, it is possible to use the same catheter for multiple attempts. Generally speaking, however, the number of insertion trials would be greater in the cases in which more catheters were used than in the cases in which fewer catheters were used, even if we consider that the residents use the same catheter for multiple attempts. Someone might wonder what results we could have obtained from other surgical cases using the operation management system. Initially, we tried to pursue this; however, we gave up the idea because other surgical cases involved many more confounding factors complicating the analysis for our purpose. We believe that our methods used in this study are the best solution, because retrospectively available data for our purpose is limited. Otherwise, studies to confirm our results would need to be conducted prospectively. Lastly, we need to add a comment about the questionnaire conducted at the postoperative anesthesia consultation clinic. We do not think that this questionnaire could correctly elicit the rate of patient's satisfaction related to intravenous cannulation before anesthesia. However, satisfaction of the patient may depend on any event that was done before anesthesia induction, especially in minor surgeries. It is not unreasonable to suppose that intravenous cannulation was the main event before anesthesia in this study.

Conclusions

It seems that there was no evidence to support the urban legend that "you will get hurt if you go to hospital at the beginning of the fiscal year." However, our results suggest that the true nature of this urban legend may not be completely denied. Thus, we are now confronting not an urban legend, but the fact that patients may suffer from medical disadvantages in the teaching hospitals.

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