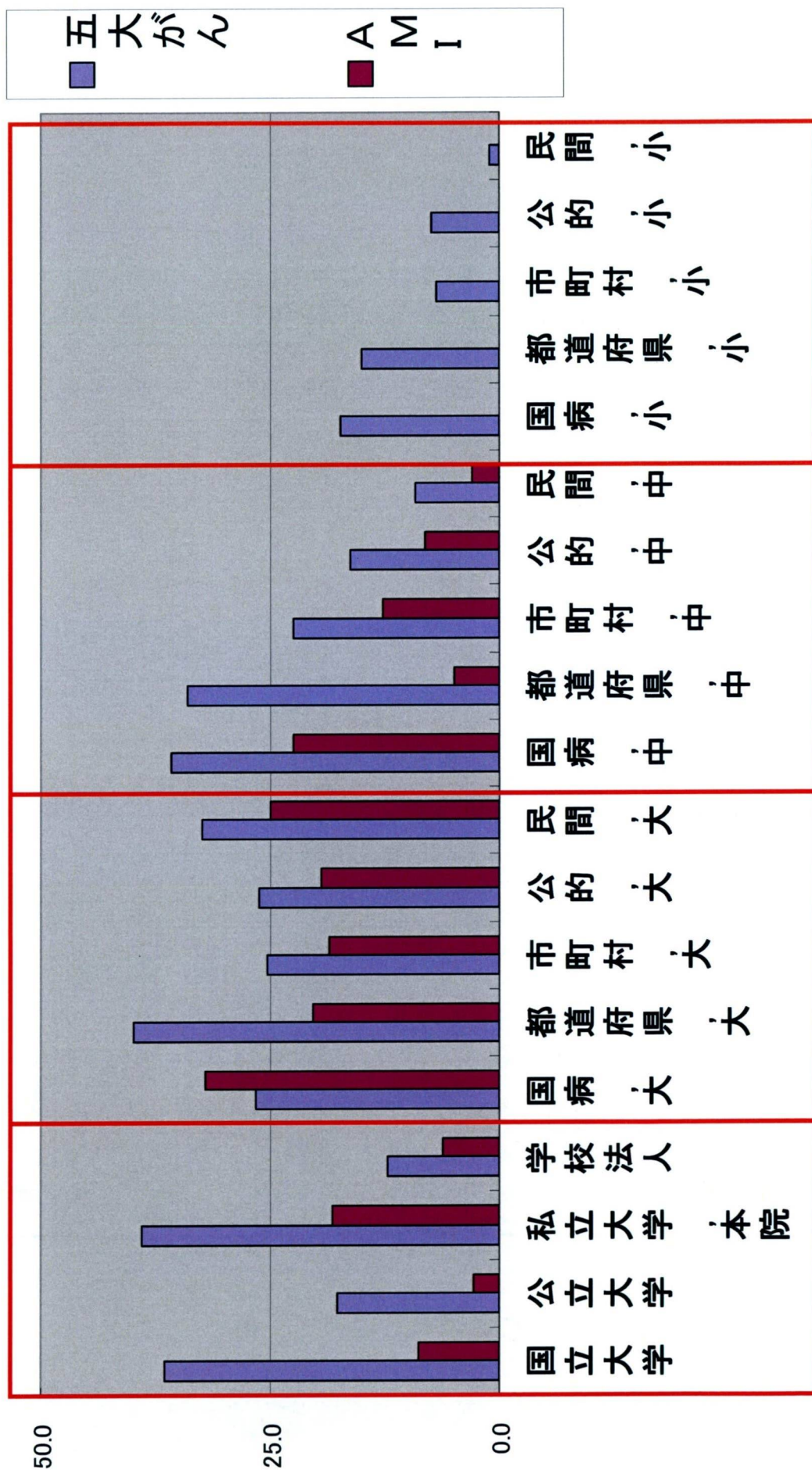
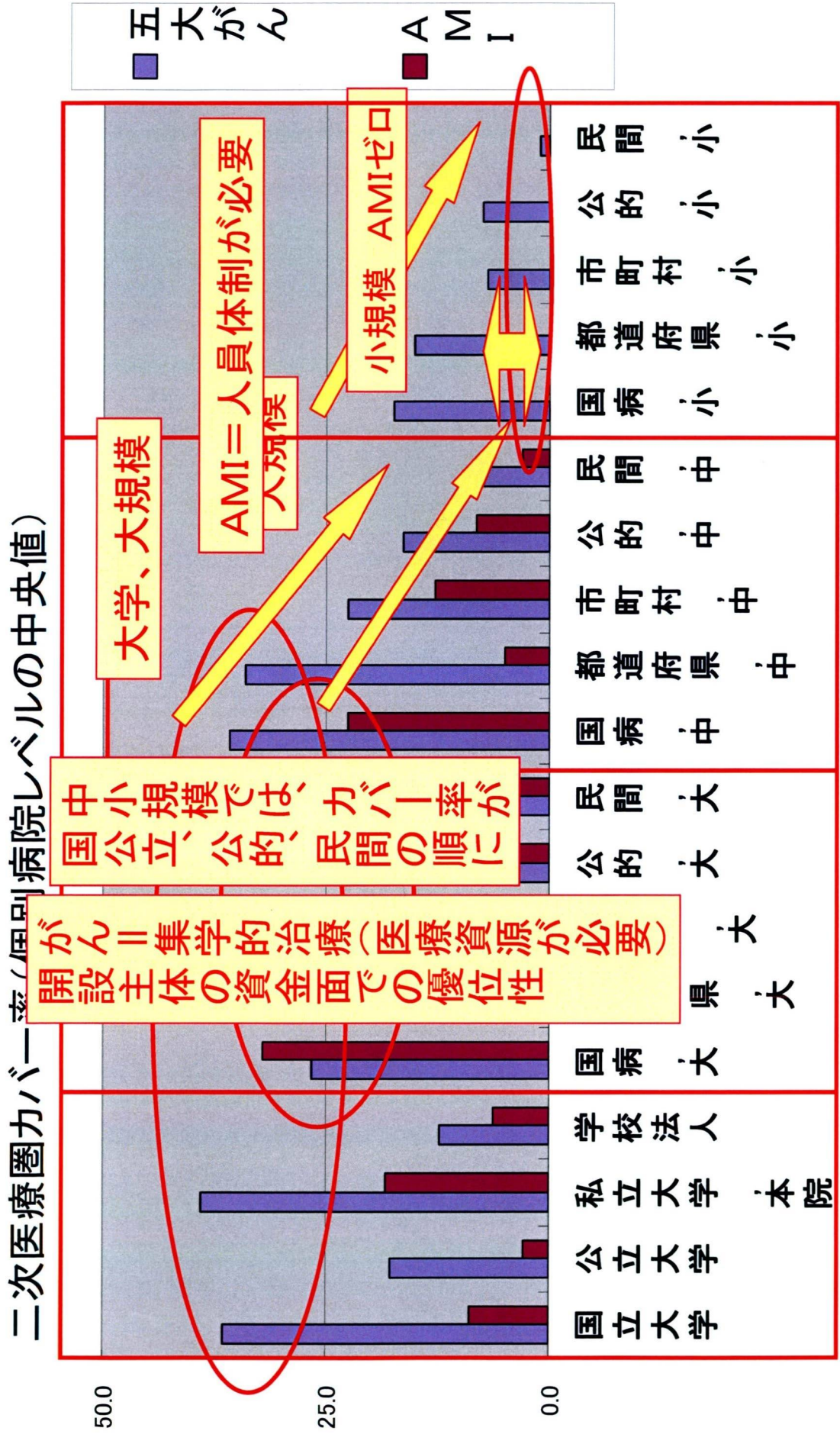


開設者別・規模別の診療分担状況

二次医療圏カバー率(個別病院レベルの中央値)



開設者別・規模別の診療分担状況



Impact of system-level activities and reporting design on the number of incident reports for patient safety

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ABSTRACT

Background Incident reporting is a promising tool to enhance patient safety, but few empirical studies have been conducted to identify factors that increase the number of incident reports.

Objective To evaluate how the number of incident reports are related to system-level activities and reporting design.

Methods A questionnaire survey was administered to all 1039 teaching hospitals in Japan. Items on the survey included number of reported incidents; reporting design of incidents; and status for system-level activities, including assignment of safety managers, conferences, ward rounds by peers, and staff education. Staff education encompasses many aspects of patient safety and is not limited to incident reporting. Poisson regression models were used to determine whether these activities and design of reporting method increase incident reports filed by physicians and nurses.

Results Educational activities were significantly associated with reporting by physicians (53% increase, $p < 0.001$) but had no significant effect on nurse-generated reports. More reports were submitted by physicians and nurses in hospitals where time involved with filing a report was short ($p < 0.05$). The impact of online reporting was limited to a 26% increase in physicians' reports ($p < 0.05$).

Conclusion In accordance with the suggestions by previous studies that examined staff perceptions and attitudes, this study empirically demonstrated that to decrease burden to reporting and to implement staff educations may improve incident reporting.

Despite emphasis by the Institute of Medicine on the importance of building a safer healthcare system,¹ study of effectiveness of safety programmes on patient safety has not yet accelerated. Because of lack of evaluation tools and difficulty in measuring rare outcomes over short periods for small samples of patients with progressive diseases,²⁻⁴ trials based on adverse events as the outcome can be extraordinarily difficult.⁵ Instead, using systematic quality improvement, which has demonstrated success in non-medical industries, is a promising approach.^{5,6}

As quality and safety enhancement involves the ability to learn from errors, which have emphasised consequences in high-risk industries,⁷⁻⁹ incident reporting is a leading initiative proposed to improve patient safety.¹⁰⁻¹² Having a systematic collection of reports enables organisational learning by identification of sources of failure and thereby allows implementation of corrective actions. Under-reporting, however, is inherently involved in incident reporting systems. Because under-reporting of

incidents has been estimated to range from 50% to 96%,¹³⁻¹⁹ the frequency of reports likely does not represent true incidence of errors. Therefore, in using numbers of incident reports as the indicator of capacity of organisational learning, we must adjust barriers to reporting.

In the present study, we identified factors that increase the number of incident reports based on aspects of system-level activities for patient safety and design of incident reporting method.

METHODS

Data and sampling

We conducted our cross-sectional survey between December 2006 and May 2007, using all 1039 teaching hospitals in Japan. Ownership structures of teaching hospitals vary widely in Japan, and our survey included university, national, municipal, public and corporate models of ownership. Number of acute care beds varied from 42 to 1505 per hospital.

This study was approved by the institutional review board at the Graduate School of Medicine of Kyoto University.

Development of questionnaire

The questionnaire was designed to collect information about numbers of incident reports filed by physicians and nurses, system-level activities for patient safety and design of incident reporting method. Questionnaire content was developed based on a review of past literature on patient safety²⁰⁻²⁴ and clinical experience of a multidisciplinary panel of healthcare professionals and patient safety experts. The questionnaire included factors addressed in previous studies, most of which examined staff perceptions of barriers to reporting incidents: a busy and fatigued workforce,^{8,9,25-41} fear of reporting,^{8,9,28-38,42} and lack of knowledge about reporting.^{8,9,23,25-27,30-32,35-43}

Because each question in the questionnaire was designed to investigate the method of current incident reporting, and the system-level activity status of each hospital is stringently recorded, the reliability of the responses may be thought of as high. In addition, the questionnaire was validated through interviews with several managers of patient safety and discussions with panels of experts. Because our validation process involved literature reviews and expert consensus, we believe that the survey questions have at least face validity and are reliable markers of patient safety systems.

Dependent variables: numbers of incident reports

We measured numbers of incidents by type of professionals (physicians and nurses) reporting incidents during the 6 months from April to September

2006. As the hospital accreditation authority in Japan has a voluntary incident reporting system using a three-level classification scheme based on severity of injury, most hospitals refer to any of the following criteria as an incident: (1) an event occurred, but was caught before reaching the patient; (2) an event occurred and reached the patient, but patient was unharmed; and (3) an event occurred and the patient was affected, but the treatment attributable to the event was minimal. Incidents that involve a degree of harm to patients that requires more than the minimal amount of treatment are categorised as *accident* and therefore were not included in our definition of incidents.

142 Independent variables: predictors of numbers of incident reports

143 Hospital characteristics

144 We controlled for certain hospital characteristics that were suspected to be confounding factors in counting the number of incident reports submitted. These characteristics included ownership and the number of inpatient-days.

148 In addition, the length of time that the incident reporting was in place at each hospital was included because of the hypothesis that the longer an incident reporting system has been in place, the higher the chance that the individual staff members understand the importance and methods to report incidents. We used this factor as a binary variable: below and above the median of elapsed years from implementation.

156 Design of incident reporting method

157 To control some suggested barriers to reporting incidents, patient safety managers were asked to evaluate the following four qualitative measures of design of incident reporting method: (1) whether the incidents were reported electronically or via paper; (2) average length of time staff spent to fill out an incident report; (3) whether a policy of non-punitive reporting was guaranteed by written documentation and/or orally; (4) numbers of recommendations per bed that the hospital implemented to improve systems, processes or products resulting from incidents reported between April and September 2006.

167 The first question refers to the potential barrier of a cumbersome method of reporting, which may negatively affect staff perception of reporting.^{25–30} The emphasis on the barrier of perceived staff busyness and fatigue is inherent in the second question. If the potential reporter is too busy and too tired to report incidents, decreasing extra work involved in reporting is important.^{8 9 30–41} We required respondents to answer which of the following lengths of time was closest to the average for reporting: ≤ 15 min, ≤ 30 min, ≤ 45 min, ≤ 60 min or > 60 min. Responses then were collapsed into two categories: ≤ 30 and > 30 min.

177 Confidentiality or immunity from punishment may be essential for potential reporters to overcome the barrier of fear.^{8 9 28–38 42} Therefore, we gave two options for the third aspect of reporting design—a policy of non-punitive reporting ensured by written documentation and/or oral description, or no policy. The fourth aspect—recommendations derived from reported incidents—was based on past findings that giving feedback on results of incident reporting is useful to enhance reporting.^{25–33 41}

186 Amount of system-level activities for patient safety

187 Because lack of knowledge about the reporting method is one of the most important barriers to reporting incidents,^{23 25–27 30–32 35–43} we evaluated the amount of staff education for physicians and nurses. Staff education encompasses many aspects of patient safety and is not limited to incident reporting. In addition, we assessed activities to advance the “plan-do-check-act” cycle and,

thereby, to improve patient safety systems, including assignment of safety managers, conferences and ward rounds. The person-time spent on these practices was calculated for a specified 6-month window (table 1). To calculate the person-time for each patient safety activity, we surveyed number of staff, amount of time required per activity session and frequency of activity sessions conducted between April and September 2006. Then, we converted the time spent by personnel on patient safety programmes into 2007 US dollars, using the employee’s hourly wage^{44–46} and the Purchasing Power Parities.⁴⁷ Finally, by use of the number of beds and the distribution of amount of each system-level activities among respondent hospitals, we collapsed the cost per 100 beds into two categories: over and under the median.

Statistical analysis

We excluded hospitals lacking data regarding incident reports, reporting design or institutional characteristics. In the remaining hospitals, the top 1% of hospitals in terms of numbers of incident reports was further excluded from analysis because we found that these hospitals showed inordinately high incident report numbers and would therefore act as outliers that substantially affect the estimates of regression analysis. Because numbers of incident reports conform to a Poisson distribution, Poisson regression with overdispersion was used to perform multivariable analysis. Standard errors were made heteroskedastically consistent via the Huber–White covariance matrix. Stata V.9.2 was used for all analyses.

RESULTS

A total of 418 hospitals participated in the study (response rate, 40.2%). Hospitals that did not meet inclusion criteria were dropped from the statistical analysis, resulting in a final sample of 232 hospitals. No significant relationships were noted between response rates and hospital demographic information, including geographic location (χ^2 test, $p=0.24$) and bed size (χ^2 test, $p=0.94$).

The mean (SE) of incident reports per 10 000 inpatient-days by physicians and nurses was 2.62 (0.18) and 91.3 (4.42), respectively. Table 2 compares reporting design of incidents. Although 63.8% of hospitals surveyed required an average of ≤ 30 min to report incidents, approximately 80 hospitals (36.2%) took an average of > 30 min to fill out a report. Significantly more hospitals used paper-based reporting than online reporting (65.5% vs 34.5%; $p<0.001$).

The median (interquartile range) dollars spent on system-level activities per 100 beds during a 6-month period for assigning patient safety managers, conferences, ward rounds by peers,

Table 1 Contents of system-level activities for patient safety

Activity domain	Activity component
Assignment of safety managers	Assignment of dedicated full-time and part-time staff to patient safety division
Conferences	Supreme decision-making board/committee
	Regular meetings in patient safety division
Ward rounds by peers	Regular assessment of ward environment conducted by patient safety division
	Additional internal audit conducted by a separate department, such as nursing
Staff education	Physicians’ participation in educational seminars to promote patient safety.
	Nurses’ participation in educational seminars to promote patient safety

Table 2 Design of incident reporting method in eligible hospitals (n=232)

Reporting design	No. of hospitals (%)*	No. of hospitals (%)†
Time involved in documenting an incident		
≤5 min	6 (2.6)	148 (63.8)
≤15 min	69 (29.7)	
≤30 min	73 (31.5)	
≤45 min	41 (17.7)	84 (36.2)
≤60 min	13 (5.6)	
>60 min	30 (12.9)	
Reporting media and format of report		
Online based: only structured questions	1 (0.4)	80 (34.5)
Online based: open-ended and structured questions	76 (32.8)	
Online based: only open-ended questions	3 (1.3)	
Paper based: only structured questions	8 (3.5)	152 (65.5)
Paper based: open-ended and structured questions	129 (55.6)	
Paper based: only open-ended questions	15 (6.5)	
Immunity policy		
Both documentation and oral explanation	167 (72.0)	218 (94.0)
Only oral explanation	51 (22.0)	
No policy	14 (6.0)	14 (6.0)
Rate of recommendations derived from the incidents		
≤First quartile (0.90 cases per 100 beds)	59 (25.4)	119 (51.3)
≤Second quartile (2.00 cases per 100 beds)	60 (25.9)	
≤Third quartile (3.61 cases per 100 beds)	55 (23.7)	113 (48.7)
>Third quartile (3.61 cases per 100 beds)	58 (25.0)	

*Crude data on responses in accordance with the questionnaire.

†Converted data for use in multi-variable regression.

education for physicians and education for nurses was \$9410 (\$5729–\$13 575), \$1326 (\$873–\$1899), \$204 (\$79–\$482), \$992 (\$50–\$3440), and \$488 (\$63–\$1128), respectively (table 3).

Results of regression analyses presented in table 4 demonstrate that incident reports filed by physicians could be increased by online reporting (26%, $p<0.05$) and shorter time required to file a report (27%, $p<0.05$). Moreover, hospitals that implemented more education for physicians significantly increased reporting by 53% ($p<0.001$). In hospitals with dedicated full-time staff for the purpose of patient safety, the number of incident reports by physicians significantly increased by 35% ($p<0.05$). However, immunity policy and rate of recommendations derived from reported incidents did not significantly influence the number of physician-generated incident reports.

However, results of predictor factors in numbers of nurse-reported incidents, compared to physician-reported incidents, showed different relationships. Nurse-reported incidents were encouraged only by decreased time for reporting (22% increase, $p<0.05$). Education for nurses was not a significant factor in reporting.

There was no significant relationship between the elapsed years of incident reporting system and the number of incidents reported by physicians and nurses.

DISCUSSION

To our knowledge, this is the first empirical study that explores determinants associated with incident reporting and identifies the impact of system-level activities on numbers of incident reports that could increase capacity of organisational learning.

Table 3 Status of system-level activities for patient safety (n=232)

Activity component	Activity status, median (IQR)	Cost*, US\$†, median (IQR)
Assignment of safety managers to patient safety division		\$9410 (\$5729–\$13 575)
Assignment of full-time staff		
Physician (no. of staff per 100 beds)	0.0 (0.0–0.0)	
Nurse (no. of staff per 100 beds)	0.2 (0.1–0.3)	
Allied staff (no. of staff per 100 beds)	0.0 (0.0–0.2)	
Assignment of part-time staff		
Physician (person-hours per week per 100 beds)	0.3 (0.0–0.7)	
Nurse (person-hours per week per 100 beds)	0.0 (0.0–1.5)	
Allied staff (person-hours per week per 100 beds)	0.2 (0.0–1.5)	
Conferences		\$1326 (\$873–\$1899)
Supreme decision-making board/committee		
No. of staff (per session per 100 beds)	2.6 (1.9–3.8)	
Time required (minutes per session)	60 (60–75)	
Frequency (during a 6-month period)	6.0 (6.0–6.0)	
Regular meeting in safety division		
No. of staff (per session per 100 beds)	4.1 (2.6–6.3)	
Time required (minutes per session)	60 (60–80)	
Frequency (during a 6-month period)	6.0 (5.0–6.0)	
Ward rounds		\$204 (\$79–\$482)
By patient safety division		
No. of staff (per session per 100 beds)	0.6 (0.1–1.1)	
Time required (min per session)	60 (13–90)	
Frequency (during a 6-month period)	3.0 (1.0–6.0)	
By other department		
No. of staff (per session per 100 beds)	0.6 (0.0–1.6)	
Time required (min per session)	30 (0–60)	
Frequency (during a 6-month period)	1.0 (0.0–4.8)	
Educational seminars		
Physicians' participation (person-hours during a 6-month period)	12.1 (5.6–25.7)	\$992 (\$50–\$3440)
Nurses' participation (person-hours during a 6-month period)	93.3 (51.4–171.0)	\$488 (\$63–\$1128)

IQR, interquartile range.

*Cost per 100 beds during a 6-month period in a hospital.

†2007 US\$ (JPN¥=US\$0.85).

Our results provide new evidence supporting most of the previous studies that examined staff perceptions regarding incident reporting.

Our rationale for the present study was an extension of other works hypothesising that system-level activities enable reporting of incidents by establishing a solid safety culture among employees. In the first outcome studies in patient safety, researchers focused on factors that contribute to improvement of safety culture. Ginsburg *et al*²¹ and Thomas *et al*²² found that an improved safety culture was associated with implementation of staff education and executive ward rounds, respectively. Next, Naveh *et al*⁴⁸ empirically demonstrated that enhanced safety culture was associated with increased reporting of incidents. Later, a randomised controlled study by Figueiras *et al*²³ showed that physician-generated reporting of adverse drug reactions was increased by implementing staff education. Recent studies revealed that implementation of a multifaceted intervention package comprising staff education and changes in reporting designs could improve incident reporting.^{25 26 30} Because previous studies did not assess the effectiveness of each patient safety programme on incident reporting, we investigated these issues in the current study.

Table 4 Results of Poisson regression for predictors of the number of incident reports in a hospital (n=232)

Variable	Physician-generated reports		Nurse-generated reports	
	IRR (95% CI)	p Value	IRR (95% CI)	p Value
Hospital size				
No. of inpatient-days per 10 000	1.11 (1.08 to 1.14)	<0.001	1.10 (1.07 to 1.13)	<0.001
Ownership				
University hospital	1.93 (1.47 to 2.55)	<0.001	1.00 (0.76 to 1.30)	0.972
National hospital	1.20 (0.87 to 1.66)	0.268	1.31 (1.03 to 1.67)	0.028
Municipal hospital	0.78 (0.58 to 1.05)	0.103	1.04 (0.84 to 1.29)	0.713
Public hospital	0.92 (0.70 to 1.19)	0.509	1.02 (0.84 to 1.24)	0.817
Healthcare corporation and others	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
Elapsed years of incident reporting system				
-6 years (\leq median)	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
+7 years ($>$ median)	1.19 (0.97 to 1.47)	0.100	1.11 (0.95 to 1.30)	0.177
Design of incident reporting method				
Reporting media				
Paper-based reporting	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
Online reporting	1.26 (1.05 to 1.52)	0.012	0.95 (0.82 to 1.11)	0.516
Time involved with filing a report				
>30 min	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
\leq 30 min	1.27 (1.05 to 1.53)	0.014	1.22 (1.05 to 1.42)	0.011
Immunity policy in hospital				
No policy	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
Non-punitive policy	1.35 (0.88 to 2.06)	0.172	0.99 (0.72 to 1.35)	0.938
Rate of recommendations to staff				
Low (\leq median)	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
High ($>$ median)	1.01 (0.82 to 1.24)	0.939	1.01 (0.86 to 1.19)	0.872
System-level activities for patient safety				
Assignment of safety managers				
Low (\leq median)	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
High ($>$ median)	1.35 (1.10 to 1.66)	0.004	1.04 (0.89 to 1.21)	0.650
Conferences				
Low (\leq median)	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
High ($>$ median)	1.09 (0.89 to 1.33)	0.414	1.02 (0.87 to 1.20)	0.821
Ward rounds by peers				
Low (\leq median)	1.00 (1.00 to 1.00)		1.00 (1.00 to 1.00)	
High ($>$ median)	1.04 (0.87 to 1.25)	0.661	1.02 (0.89 to 1.18)	0.748
Physicians' attendance at educational seminars				
Low (\leq median)	1.00 (1.00 to 1.00)		—	
High ($>$ median)	1.53 (1.24 to 1.89)	<0.001	—	
Nurses' attendance at educational seminars				
Low (\leq median)	—		1.00 (1.00 to 1.00)	
High ($>$ median)	—		1.08 (0.93 to 1.25)	0.334

IRR, incidence-rate ratio.

In contrast to the physician-generated reports, there was no significant association between education for nurses and the number of nurse-initiated reports. A possible reason for this difference is a decreased marginal effect of education for nurses. Considering that the average number of nurse-generated reports was more than 30 times higher than that of physicians and that educational time for nurses was more than seven times greater than that for physicians, nurses' knowledge about incident reporting appears to be sufficient. According to previous studies,^{31 36 37 41} staff perspectives regarding reporting show that lack of knowledge was not a major deterrent for reporting by nurses, although it may be a major barrier to reporting by physicians. In addition, other studies demonstrated that implementing physician education resulted in significant improvement in reporting by physicians.^{25 38} Therefore, our results were partially consistent with previous qualitative findings. Furthermore, we shed light on the impact of assignment of safety manager on the number of incident reports filed by physicians for the first time. Although our survey focused on system-level

activities for patient safety that were conducted organisationally, other daily detailed activities not specifically included in the survey were instead covered under the duties of full-time dedicated staff. For example, each dedicated staff member performs the activities involved in analysing reported incidents and giving feedback on results of incident reporting, and promotes awareness of patient safety throughout hospital via such routine activities. These activities might affect physicians' attitude to incident reporting.

In addition to a lack of knowledge as discussed above, our result that busyness and fatigue are barriers of incident reporting was consistent with past literature that examined the reasons of under-reporting of incidents.³¹⁻⁴¹ By decreasing the time to fill out incident reports, the number of incidents by physicians and nurses could be significantly increased by 27% and 22%, respectively. Meanwhile, the influence of reporting method (online vs paper-based) was different depending on type of professions, and this was again in concordance with previous findings. For example, the finding that physician-generated online reports

513 significantly increased by 26% ($p < 0.05$) is in accordance with
 514 previous studies that examined numbers of incidents reported via
 515 online systems.^{28 29} Regarding reporting by nurses, in contrast,
 516 our results are also similar to previous studies.^{29 30} Perceptions of
 517 usefulness versus the cumbersome nature of online reporting
 518 might depend on accessibility and a user-friendly interface.
 519 Because reducing the time required to fill out a report would
 520 obviously make reporting less burdensome, this reporting design
 521 could generate more reports by physicians and nurses.

522 Although fear of reporting has been previously found to be
 523 another barrier,^{31–38 42} our studies did not observe this result.
 524 Willingness to report incidents could depend on the legislative
 525 system, such as presence of laws protecting patient safety
 526 whistle-blowers from retaliation. Japanese healthcare providers
 527 are susceptible to criminal prosecution for professional negli-
 528 gence.⁴⁹ Therefore, the impact of an immunity policy in hospitals
 529 might decrease the barrier of fear in reporting incidents.

530 Previous studies that evaluated staff perception suggested that
 531 giving feedback to staff was useful to enhance reporting.^{27 31–33}
 532 A possible reason why our study did not confirm a significant
 533 relationship between these factors is that because our study was
 534 an observational study and therefore unable to standardise the
 535 definition of recommendation derived from reported incidents,
 536 there would be discrepancy of content of feedback among
 537 participant hospitals. Further study is needed to examine the true
 538 impact of feedback on incident reporting.

539 Previous studies have paid little attention to the impact of
 540 elapsed years since implementation of a reporting system,
 541 whereas it is likely that the longer an incident reporting system
 542 has been in existence in a particular hospital might correlate
 543 with a better maturation of the reporting system and therefore
 544 present an increased number of incidents. Although our model
 545 was unable to demonstrate this relationship, this result should
 546 be viewed with caution. Because the variable in our model used
 547 the elapsed years of the first adoption of incident reporting
 548 system, it did not reflect that of the current reporting system.

549 Our study has several limitations. First, questions on the
 550 amount of system-level activities were answered by patient
 551 safety managers. Therefore, even if activities to improve patient
 552 safety systems were conducted within other departments, all
 553 activities implemented in a hospital might not be reflected in our
 554 survey and thus might diminish the measurable effect of the
 555 activities. Second, many hospitals did not respond to our ques-
 556 tionnaire, thus raising the existence of selection bias. Those that
 557 participated in our survey may systematically establish patient
 558 safety systems as compared to hospitals that did not respond
 559 our questionnaire because it is likely that hospitals that recorded
 560 daily activity status may tackle the issue of patient safety in an
 561 organised way. Therefore, our results might reflect the status of
 562 teaching hospitals with relatively high motivation to enhance
 563 patient safety. Last, our findings could be favourable within
 564 a stage in which the incident reporting system has not been fully
 565 matured. When the understanding of the incident reporting
 566 system increases among professions, and each staff member will
 567 report all incidences that he or she encounter, the next stage will
 568 be that the number of true incidents will gradually diminish.
 569 Although the influence of secular trends on our results is unclear,
 570 our findings may offer an effective way to attain such a desirable
 571 subsequent stage.

572 In conclusion, our results demonstrate empirically that the
 573 number of incident reports reflect the degree of staff education
 574 and have implications for initiatives to design better reporting
 575 methods. Further research is needed to develop successful
 576 educational content and to modify incident reporting formats. A

challenge is to balance competing goals of ease of the reporting
 process and the need for more detailed information enabling
 prevention of recurrence of similar incidents.

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Competing interests None.

Ethics approval This study was conducted with the approval of the institutional review board at the Graduate School of Medicine of Kyoto University. [2]

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画像診断(CT,MRI)に関する実態調査 研究報告

能城 毅・関本美穂・今中雄一

調査共催 日本医学放射線学会 (理事長 大友 邦)

【背景と目的】

近年、画像診断機器及び処理装置の目覚ましい発達、また、病変の早期発見要望また治療の高度化による画像診断への要求高度化等により、膨大な件数の画像診断が施行されていると考えられる。また、日本には CT,MRI といった画像診断装置が世界の中でも突出して導入されているのは既知の事実である。画像診断の高度化はそれ自体歓迎されるべきものではあるが、その解釈には専門性を要するのをもまた事実である。医療の現場では、CT,MRI の撮像適応や撮像方法の決定、また撮像された画像を読影・文書化後担当医に伝達し医療に役立てる役割を担っているのが放射線科診断医であり、この過程が円滑に行われているとすれば画像診断の質を保証することもできていると判断できる。しかし、現在の画像診断機器稼働状況に比較し放射線診断医数は圧倒的に少数であり、画像診断の質が保証されているとは言い難い。また、昨今の都市部への医師集中は放射線科診断医でも例外ではなく、地域による業務量差も問題となる（通信手段の発達により遠隔画像診断という方法も既に導入されつつある）。

画像診断の質を保証するためには、診断機器・放射線科診断医の適正配置や診断医教育・養成など様々な要因について考慮しなければならないが、そのためには診断機器稼働状況及び診断医業務量等の現状を把握し、問題点を明らかにする必要があると考えられる。以上より、今回、日本における画像診断のあるべき姿を考察するため、CT,MRI 検査数及び放射線診断医関与の現状把握目的に、病院による記入式の調査票に基づく調査を行った。

【方法】

全国の医療機関を対象として、アンケート調査を実施した。調査は、京都大学医学研究科・医療経済学分野と日本医学放射線学会の共催により実施された。同学会は、日本で唯一の放射線専門医の認定団体である。アンケート調査の内容および実施方法は同学会理事会で審議され、承認された。

放射線科診断業務の大部分は病院で行なわれるため、診療所は調査の対象から除外した。放射線診断の常勤医が存在する可能性の高い一般病床 200 床以上規模の病院はすべて調査対象とし、一般病床 20-199 床規模の病院は層別化サンプリングにより選択した。各都道府県ホームページ等で公表されている届出医療機関の一覧表から一般病床 200 床以上の病院を同定した。20-199 床規模病院

は、以下の方法にてサンプリングを行った。すなわち、新医療 2008/2009(エムイー振興協会)の全国 CT,MRI 設置病院リストと届出医療機関の一覧表から、都道府県別に 100-199 床規模病院数の 1/10、20-99 床規模病院数の 1/20 をランダムサンプリングした。

調査票の質問項目は、1) 施設の概要 (一般病床数や患者数、設立主体など)、2) 放射線科医数 (常勤医師・非常勤医師・常勤技師・非常勤技師)、画像診断機器 (CT・MRI の台数)、3) 読影数などである。アンケート対象施設の中には回答するも件数等統計を実施していない施設もあり、解析の際、解析方針に合わせて使用可能なデータを利用した。

【結果と考察の概要】

1,998 施設にアンケートを送付し、855 施設より回答を得た。総回答割合は 43%であった。全回答 855 施設中、583 施設に画像診断常勤医が存在し、その割合は 68%であった。読影割合には病院種別に加え地域差が認められる。当調査により常勤医や遠隔診断の関与割合、常勤画像診断医年間平均パフォーマンス、常勤画像診断医と一人あたり CT/MRI 台数の分布が求められる。これらに基づき、台数や業務負担の不均衡を表すことができる。また、平均的なパフォーマンスや分布を参照した基準値の設定により、検査量から放射線科診断業務量や画像診断医の人員を求めて不足幅を明示することができるようになる。

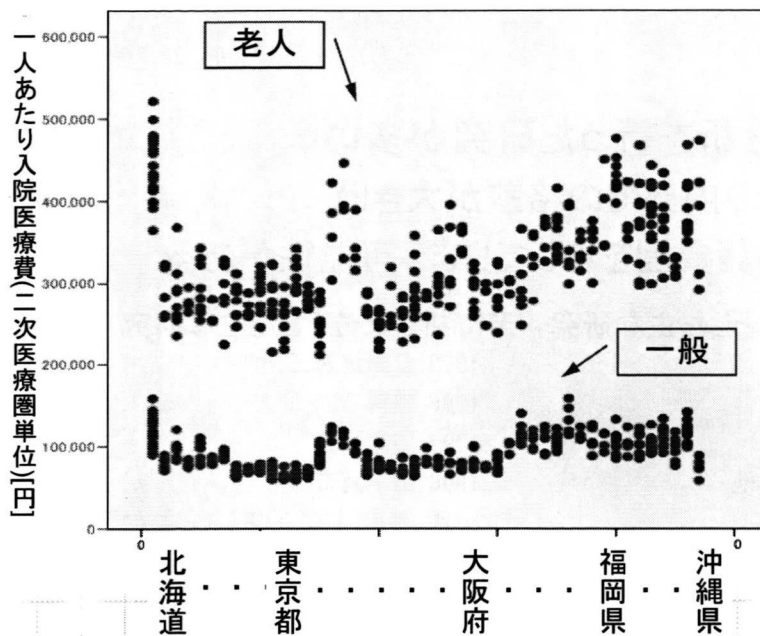
二次医療圏単位で見た 老人医療費の規定因子

社会健康医学系専攻 医療経済学分野
後藤 悦

2

- 背景・目的
- 方法
- 結果
- 考察
- まとめ

老人医療費の地域差(2002年、国保データ)



- 老人医療費に地域差があることはかねてから指摘されている。[1][2]
- 医療費の地域差を、地域の疾病構造の差はほとんど説明しない。[3]

[1]前田信雄, 1983 [2]藤原佳典, 他, 1998
 [3]府川哲夫 地域差研究会編, 地域差の研究, 第5章 2001

背景

医療費の地域差の要因

● 先行研究(1)

- 老人医療費の地域差は、主に病床数に拠る^{[4][5][6]}
- 病床数は医療費適正化計画の削減目標に^[7]
- 他の要因については十分に議論されていない
- 病床数以外に地域差を説明する要因は？
- 医療サービス供給側要因(診療所数^[8]、…)
- 医療サービス需要側要因(疾患構造^[3]、大病院志向^[9]、…)
- 社会経済的要因(人口^[8]、世帯人数^{[8][11]}、経済力^{[10][11]}、…)

[4]今井博久, 他 1998 [5]新村和哉, 他 1999 [6]堀真奈美, 他 2006
 [7]医療費適正化に関する施策についての基本的な方針 平成20年 厚生労働省
 [8]安西将也, 他 1989 [9]青木研 地域差研究会編, 地域差の研究, 第10章 2001
 [10]森満, 他 1988 [11]印南一路 1997

背景

医療費の地域差の要因

● 先行研究(2)

- 都道府県単位で分析を行った研究が多い
 - 都道府県は、その内部での格差が大きい
 - 地域に起因する諸要因を均してしまう可能性がある

都道府県を単位とした主な研究

1983 前田信雄
 1987 安西将也、他
 1988 森満、他
 1989 安西将也、他
 1989 二木立
 1996 伏見恵文
 1999 福田吉治、他
 1999 新村和哉、他
 2003 知野哲朗
 2006 堀真奈美

市町村を単位とした主な研究

1990 多田羅浩三、他
 1996 畝博
 1997 印南一路
 1998 山下真宏

二次医療圏を単位とした主な研究

1992 西村やよい、他
 1998 今井博久、他

レセプトを単位とした主な研究

1995 府川哲夫
 1999 府川哲夫

目的

医療費の地域差の要因

● 本研究では

- (病床数以外で)医療費の地域差には、何が関連するか？
 1. 医療サービス供給側、需要側、社会経済的因子
 2. 二次医療圏単位での分析
 3. 二次医療圏を可住地面積人口密度の高低で3グループに分ける
 - 医療費と因子の関連は、地域の特性によって変わると考えられる [12][13][14]

- 背景・目的
- 方法
- 結果
- 考察
- まとめ

方法 データ

- 医療費
 - 資料:平成14年度国民医療費
 - 市区町村、国民保険被保険者のうち65歳以上
 - 以降、65歳以上を「老人」とする
 - 入院医療費
- 分析単位
 - 二次医療圏

方法

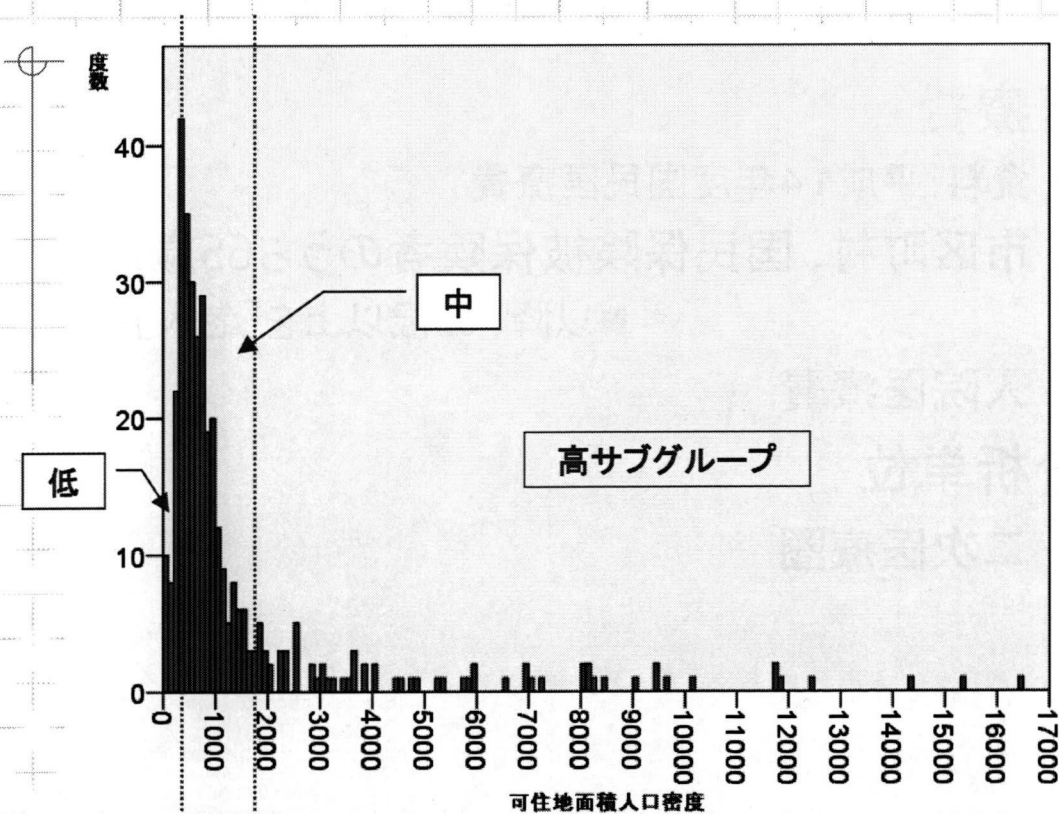
可住地面積人口密度[人/Km²] ①

- 総人口÷可住地面積
- 高低による3サブグループ

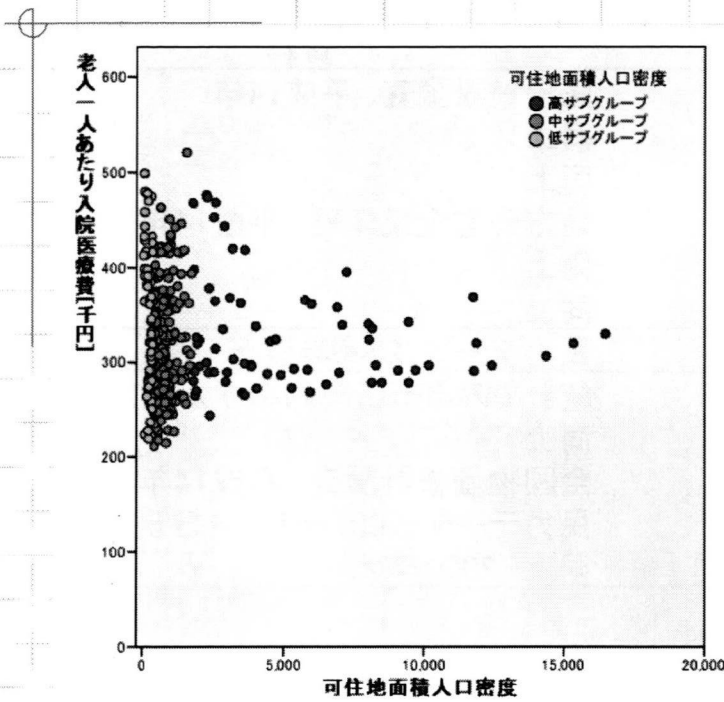
サブグループ	範囲	二次医療圏数
低	下位20%	72
中	中位60%	219
高	上位20%	72

■ 以降、人口密度とする

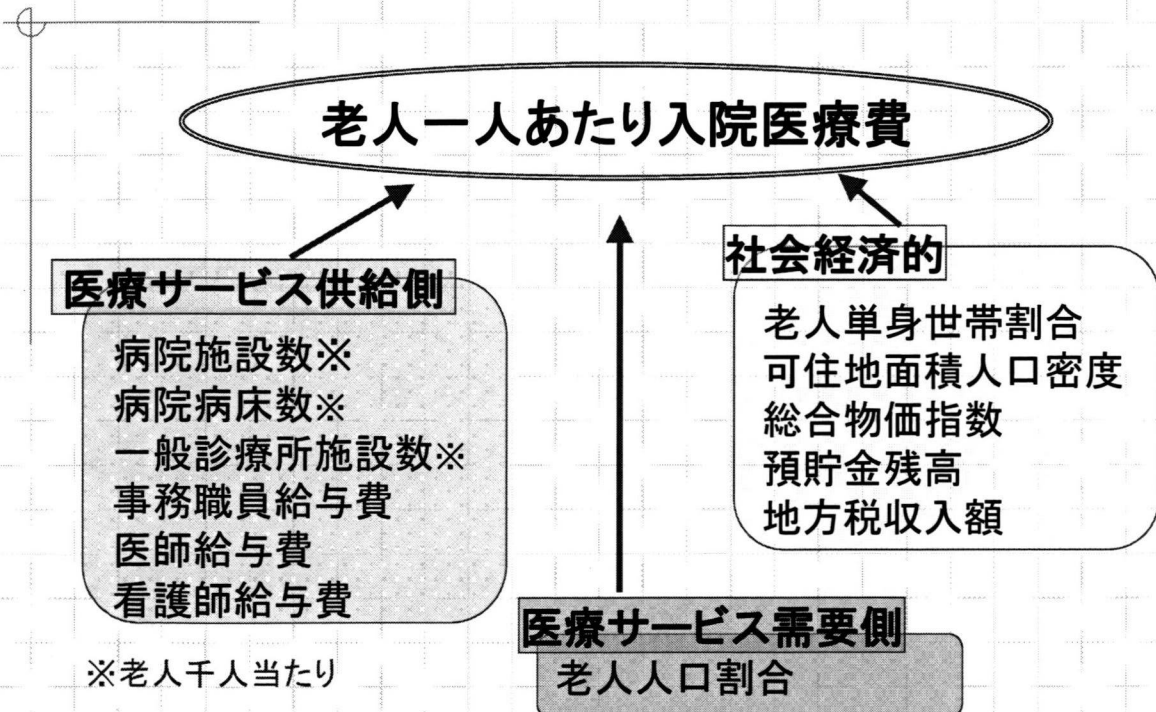
可住地面積人口密度 度数分布



可住地面積人口密度と老人入院医療費



方法 被説明変数と説明変数



方法

説明変数資料

	説明変数	資料
	病院施設数※	医療施設調査、平成14年
医療	病院病床数※	同上
サー	一般診療所施設数※	同上
ビス	事務職員給与費	地方公営企業年鑑、平成14年
供給	医師給与費	同上
	看護師給与費	同上
需要	老人人口割合	民力データ 2000年度データ
	老人単身世帯割合	統計でみる市区町村のすがた2002
社会	可住地面積人口密度	同上
経済	総合物価指数	全国物価統計調査、平成14年(第5巻)
的	預貯金残高	民力データ 2001年3月31日現在
	地方税収入額[百万円]	同上 2000年度

※老人千人当たり

方法 分析方法

● 分析方法

- 重回帰分析
- 有意水準は両側5%とする
- 統計ソフトウェアはSPSS 15.0J for Windowsを使用
- 両辺対数変換し、対数線型モデルを使用
- 説明変数選択は、ステップワイズ法
 - 全国、サブグループにおいて選択される説明変数が異なる
 - ▶ 全国、各サブグループの老人入院医療費にどの因子が関連するのかを検討することは可能

- 背景・目的
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- 結果
- 考察
- まとめ

分析結果

被説明変数と説明変数の記述統計

	MEAN	SD	MIN	MAX	パーセンタイル		
					25	50	75
入院医療費[千円]	322.5	62.6	211.5	520.9	273.7	308.6	365.4
病院施設数※	0.4	0.2	0.1	1.2	0.3	0.4	0.5
病院病床数※	68.7	23.3	8.1	144	52.6	65.5	81.7
一般診療所施設数※	3.6	1.3	1.5	15.9	2.7	3.4	4.2
事務職員給与費[千円、月給]	583.4	68.9	332.9	749	535.2	575.8	630.2
医師給与費[千円、月給]	1295	183.4	930.6	2106.4	1195	1249	1381
看護師給与費[千円、月給]	507.4	46.2	384.6	671.8	475.8	505.7	538.3
老人人口割合[%]	21	4.9	11.3	33.7	17.1	21	24.4
老人単身世帯数割合[%]	9.4	2.9	3.7	18	7.2	8.8	11.1
可住地面積人口密度[人/]	1.6	2.5	0.1	16.5	0.4	0.7	1.4
総合物価指数	98.1	4	89.6	111.4	95.6	97.6	99.8
預貯金残高[百万円]	1327	4319	3.7	71340	197.1	401.9	1218
地方税収入額[百万円]	49.8	70.5	1.7	686.5	9.3	24.5	61.4

※老人千人当たり

重回帰分析の結果① 変数選択にステップワイズ法を使用 全国

● 老人医療費を被説明変数とする重回帰分析の結果

1. 全国 N=363

\bar{R}^2	説明変数	B	SE	β
	(定数)	11.636	1.009	
0.593	病院施設数**	0.184	0.025	0.393
	病院病床数**	0.159	0.028	0.311
	一般診療所施設数*	0.078	0.033	0.133
	看護師給与費*	0.147	0.073	0.071
	老人人口割合**	-0.194	0.063	-0.245
	老人単身世帯数割合**	0.269	0.041	0.435
	可住地面積人口密度**	-0.037	0.011	-0.203

- ** p<0.01,*p<0.05

重回帰分析の結果② 変数選択にステップワイズ法を使用 低サブグループ

● 老人医療費を被説明変数とする重回帰分析の結果

2. 可住地人口密度 低サブグループ N=72

\bar{R}^2	説明変数	B	SE	β
	(定数)	14.842	0.574	
0.740	病院施設数**	0.184	0.047	0.395
	病院病床数*	0.105	0.048	0.205
	老人人口割合*	-0.331	0.136	-0.248
	老人単身世帯数割合**	0.378	0.075	0.478
	可住地面積人口密度**	-0.087	0.031	-0.195

- ** p<0.01,*p<0.05

重回帰分析の結果③ 変数選択にステップワイズ法を使用 中サブグループ

- 老人医療費を被説明変数とする重回帰分析の結果
3. 可住地人口密度 中サブグループ N=219

\bar{R}^2	説明変数	B	SE	β
	(定数)	12.04	0.163	
0.653	病院施設数**	0.146	0.031	0.309
	病院病床数**	0.273	0.036	0.484
	老人単身世帯数割合**	0.162	0.029	0.259

- ** p<0.01,*p<0.05

重回帰分析の結果④ 変数選択にステップワイズ法を使用 高サブグループ

- 老人医療費を被説明変数とする重回帰分析の結果
4. 可住地人口密度 高サブグループ N=72

\bar{R}^2	説明変数	B	SE	β
	(定数)	10.575	2.390	
0.597	病院施設数**	0.232	0.038	0.503
	一般診療所施設数*	0.179	0.066	0.250
	看護師給与費*	0.600	0.151	0.297
	老人人口割合**	0.165	0.081	0.149
	総合物価指数**	-1.365	0.357	-0.355

- ** p<0.01,*p<0.05