Comparative Study Regarding Autonomy of Final-Year Surgical Residents: A Case Study of Perception among Surgical Residents, Surgical Staff, Administrators, and Patients at Siriraj University Hospital

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ABSTRACT

Objective: To identify barriers towards resident autonomy as perceived through four groups; surgical residents, surgical staff, administrators, and patients.

Materials and Methods: Anonymous surveys were distributed to these four groups. Data were thematically analyzed.

Results: 401 responses were collected including 231 patients. The response rate of residents, surgical staff, and administrators was 62.2% (119), 44.8% (26), and 43.1% (25) respectively. Patients had more favorable views of resident participation than administrators and surgical staff. Administrators and surgical staff indicated that residents have a positive effect on overall quality of care provided and so do the patients, however, administrators and surgical staff believed that too much autonomy for a resident deceased patient safety. When resident autonomy increased, increased cost of patient care was considered. Residents and patients have the same opinion that patients should receive a discount on medical expenses, which is opposite to administrators' and surgical staff's opinion. The presence of surgical staff in the operation room had a major impact on resident autonomy and a big influence on patient acceptance of operative complications. Even in complicated operations, most patients felt comfortable having a resident perform on with surgical staff controlling the operation. Surgical staff provided too much direction in either patient care or operation and did not take residents' input as seriously as expected and seldom explained the reasons before changing treatment regimens.

Conclusion: Surgical residents, surgical staff, and patients had discordant perceptions of resident autonomy in many aspects. Self-determination theory should be applied. Scaffolding strategy, mentoring program would be the solutions.

Keywords: Autonomy; independence; resident; surgery (Siriraj Med J 2022; 74: 634-649)

INTRODUCTION

Currently, the problem of a lack of surgical skills, including pre- and post-operative care is being studied. This could possibly be the result of the fact that surgical residents have little opportunity to care for patients requiring surgery from the time they are a medical student.[1] More importantly, during the period in which surgical residents practice in provincial hospitals after completing their MD, they do not have the opportunity to practice surgical skills.[2] Another factor to consider is

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Received 9 May 2022 Revised 8 September 2022 Accepted 9 September 2022
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http://dx.doi.org/10.33192/Smj.2022.75

that the Department of Surgery, the Faculty of Medicine at Siriraj Hospital offers various training opportunities in various sub-disciplines following the completion of the Diplomate of the Thai Board of Surgery. These sub-disciplines take another one to two years to complete. This means surgical residents who have not completed the Diplomate of the Thai Board of Surgery before, lose the opportunity to develop surgical skills and techniques required in pre and post-operative care. Such problems do not occur only in Thailand, but also in the United States as well.[3]

The ability of surgical residents to have autonomy from surgical staff plays a very important role in the skills needed to train capable surgeons. Once surgical residents have autonomy, they are more willing to take on responsibility and work hard to become capable surgeons. Any competent and skilled surgical resident to care for surgical patients will be accepted by surgical staff and then this surgical resident would be given the autonomy to make treatment decisions and operate on patients. However, surgical residents who do not take care of patients or do not have the required surgical skills as expected of a staff member, will not be given autonomy, which can lead to an inability to develop skills in caring for patients and surgical techniques. Without the trust of surgical staff, a resident will not be allowed to operate by himself or herself. Hence, the skills of a surgical resident to care for a patient cannot be developed. *Sterkenburg et al*[4] reported that when surgical residents are given greater autonomy than they expected to make treatment decisions, they are more confident in learning, maintaining, and practicing which leads to increased competency. A review by *Kempenich JW*[5] stated that 47% of surgical residents and 38% of surgical staff commented that surgical residents did not have sufficient independence to make treatment decisions.

Factors affecting the lack of autonomy and/or lack of surgical residents' independence in decision making were reviewed.

1. Perspectives of surgical staff who teach and train[6]

1.1 Surgical treatment. If a surgical resident is capable and has good surgical skills, he/she is given the autonomy to operate on a patient. However, this depends not only his/her surgical skill, but also on the difficulty of the procedure.[5,7] On the other hand, surgical residents who don't have the skills to perform a difficult operation should not be given the autonomy to perform operations on their own.

1.2 Pre and post-operative care. Any surgical resident who doesn't have the skill to handle pre and post-operative care of patients, is not given autonomy by surgical staff, making it impossible to develop the skills needed to care for patients. The more trust surgical staff have in a resident, the greater the likelihood of surgical residents developing adequate skills.[6,8]

2. Administrator's perspective

Administrators were more likely to prevent the degree of autonomy surgical residents expected.[5] It may be related to the following factors:

2.1. Finance and reimbursement. The administrator has to limit payments of surgical treatments. There are many sources of reimbursement, such as the Thailand National Health Services, Social Security Fund, or other measures. If surgical residents have too much autonomy, it will increase cost of treatment, either due to prolonged operative time and costs incurred because of an increase in complications caused by surgical residents. On the contrary, the administrator has the duty to strike a balance between autonomy of surgical residents as well as costs incurred by them. Financial issues are another factor in the regulation of autonomy afforded to surgical residents.[9,10]

2.2. Legal prosecution. If a surgical resident was granted too much autonomy without adequate supervision, a decision-making error or mistake in surgical technique can lead to a civil or criminal case. Therefore, legal prosecution is another factor to consider when regulating the autonomy of surgical residents.[11]

2.3. Regulation of resident training standards. Regulatory systems aim to manipulate the ability of surgical residents during training such as those established by the Royal College of Surgeons of Thailand, Advanced Hospital Accreditation or other standards like the World Federation for Medical Education (WFME). These factors relate to the autonomy of surgical residents and define what they can and cannot do during any operation.[12]

Some regulations of resident training standards also encourage surgical staff to remain in the operating room at all times while the resident is performing the operation on his/her own, which further leads to reduced autonomy of surgical residents.[9,12]

3. Patient and relatives' point of view

3.1. Safety was considered by patients and their relatives. The patient and their relatives view the presence of a surgical resident to have an effect on safety.[13] According to the *Kempenich JW*[5] study, 95% of patients felt good to have a surgical resident taking part in the care process.

3.2. Complexity of the procedure. The complexity and difficulty of the operation was a major consideration. Patients become worried if surgical residents are allowed to perform complex operations.[5] *Kim HN, et al*[14] reported

on patients who received a hysterectomy by a team of obstetrics and gynecologists. The study revealed that up to 80% of patients wanted to know to what extent gynecologist residents would be involved in the operation and how the gynecologist staff selected this extent. Moreover, 61% of patients wanted to know which part of the gynecology operation was performed by gynecologist residents.[14]

Different points of view between patients and surgical residents were realized. Although 80.6% of patients stated that surgical residents should be able to perform surgeries on their own before graduating from resident training, only 73.1% agreed to allow final year residents to perform a surgery on them even if it was a basic operation.[5]

The question of independence mostly focuses on decision-making and to what extent should surgical residents be given freedom during surgery. Therefore, the focus of this research is to compare the viewpoints of surgical decision-making among relevant stakeholders, namely surgical residents, surgical staff, administrators, and patients and relatives. The results of the study look at factors affecting the autonomy of surgical residents and could be used as academic information to formulate a policy for the surgical resident training program at the Faculty of Medicine, Siriraj Hospital, Mahidol University.

MATERIALS AND METHODS

Siriraj Institutional Review Board Approval (Si 812/2021) was obtained before commencement of the study. For this study, four questionnaires were created to determine how much autonomy and independence in regards to decision-making should surgical residents be given during an operation to compare the perceptions of relevant stakeholders, namely surgical residents, surgical staff, administrators, and patients and relatives. The questionnaire was created by modifying the questionnaire in *Kempenich JW*[5] and *Biondi EA*[6] but the researcher also added more questions in this survey (see appendix). Each survey was specific to the appropriate group, but the questions were similar to those given to other groups for comparison purposes. A five-point Likert scale was used for all questions except two which asked the participants to rate the degree of appropriate independence on a scale from 0 to 10 for a second-year resident and a final year resident in the process of completing the Diplomate of the Thai Board of Surgery.

The surgical resident and staff surveys contained 23 questions, while the administrator survey had 14 questions and patient and relative survey had 16 questions. Each survey was piloted and feedback was solicited from representative individuals in each group. Responses from the surgical resident group were collected using a Google form, while responses from the surgical staff and administrator groups were collected by mail. Last but not least, responses from patients and their relatives were collected directly in person at surgical OPD, and no personally identifiable information was collected. All responses of all groups were collected anonymously. There was no compensation or reward for participation.

Inclusion criteria

1. Surgical resident refers to full-time residents training in all disciplines at the Department of Surgery, Faculty of Medicine Siriraj Hospital (190 persons).

2. Surgical staff refers to staff and Clinical Educators in the Department of Surgery, Faculty of Medicine Siriraj Hospital who presently teach and train surgical residents (58 persons). Surgical staff who are members of the Postgraduate Education Committee of the Department of Surgery were counted as administrators.

3. The administrator refers to positions that control, supervise, train surgical residents and regulate patient safety standards. The administrators include: Head of Department of Surgery, Head of all divisions of the Department of Surgery, all members of the Postgraduate Education Committee of the Department of Surgery, Associate Dean for Postgraduate Studies, Assistant Dean for Postgraduate Studies, Director of Siriraj Hospital, Deputy Director of Siriraj Hospital, Deputy Dean for Quality Development, Deputy Dean for Human Resources, Head of Surgical and Orthopedic Nursing, Head of Operating room Nursing, Head of Disciplinary and Legal Affairs Unit. The total number of administrators was 58.

4. The patient refers to the sample of patients and relatives (over 18), and nonmedical persons receiving care at the Department of Surgery, Faculty of Medicine, Siriraj Hospital.

Three experts checked the validity of the content of questionnaires of surgical residents, surgical staff form, administrators' form. The Content Validity Index (CVI) of these questionnaires was 0.80.

For the reliability of questionnaires, the Cronbach's alpha coefficient (a) was used, with the researcher setting an acceptable coefficient of 0.70 or higher (H_0: α=0.70). The reliability of questionnaires using the Cronbach's alpha coefficient (α) was determined in the surgical resident and surgical staff group, who had a Cronbach's alpha coefficient of 0.87 and 0.8, respectively. The reliability of patient and relatives questionnaire was not tested due to ethical problems.

Statistical analysis

In regards to descriptive statistics, qualitative data, including number and percentage was used. A comparison of scores of relevant questions among surgical residents, surgical staff, administrators and patients and relatives was conducted. The responses were compiled for each survey group, and the median response for each question calculated. Subsequently, the Kruskal-Wallis test was used to analyze the distribution of responses between the survey groups. In cases where a significant difference was identified via the Kruskal-Wallis test, a Dunn Bonferroni's post-hoc pairwise comparison test was used to compare variables among groups.

In certain cases, in which the questions compared two separate questionnaires, especially from the perception of surgical resident and surgical staff, the Mann-Whitney U test was used.

If some questions in the questionnaire regarding patients and relatives were not comparable to other groups, the researcher used descriptive statistics to present this information.

Analysis was done using SPSS Inc or PASW Statistics for Windows, Version 22.0, released in 2009. All data was analyzed and determined as statistically significant when the p-value was < 0.05.

RESULTS

A total of 401 responses were collected; 119 from surgical residents, 26 from surgical staff, 25 from administrators, and 231 from patients and relatives. The response rate for surgical residents, surgical staff, and administrators was 62.2%, 44.8%, and 43.1%, respectively. The number of years of experience working at Siriraj Hospital among administrators, surgical staff, and surgical residents is displayed in Table 1. Patients and their relative's ages are shown in Table 2.

A. Perception of resident participation on quality of patient care

1) How welcome resident participation was in the healthcare process is show in Table 3.

Patients and relatives were more welcoming of resident participation than administrators, surgical staff and surgical residents. The Kruskal-Wallis test showed that there was a statistically significant difference in perception of having surgical residents participate in patient care among the different populations ($p < 0.000$). Pairwise comparisons using the Dunn Bonferroni test revealed that patients and relatives had a significantly higher rating for patient involvement than administrators ($p = 0.031$), surgical staff ($p = 0.020$), and surgical residents ($p < 0.000$). This indicated that patients and relatives have more favorable views of resident participation in patient care than administrators and surgical staff. Surgical residents do not realize how welcoming patients and relatives are of their participation during treatment. The effect on overall quality of care when a surgical resident was involved in the patient care process in the hospital either in OPD, IPD, or in the operating room is shown in Table 4.

When patients and relatives were asked whether quality of care was better with residents involved, 80.9% agreed or strongly agreed and only 3.6% strongly disagreed or disagreed.

2) A comparison of perception amongst administrators, surgical staff, and surgical residents was done to understand the effect of resident participation on quality of care provided. It was divided into two aspects, OPD/IPD and operation room.

In both the OPD/IPD and operating room comparison, the Kruskal-Wallis test showed a statistically significant difference in quality-of-care perception among the different populations (administrators, surgical staff, and surgical residents) with a p-value of <0.000. In OPD/IPD, pairwise comparisons using the Dunn Bonferroni test revealed administrators and surgical staff reported significantly higher effects on overall quality of care provided in hospitals than surgical residents ($p = 0.006$ and $p < 0.000$ respectively). In the operating room, pairwise comparisons using the Dunn Bonferroni test revealed administrators and surgical staff rated a significantly higher effect in the hospital than surgical residents ($p < 0.000$ and $p < 0.000$), respectively.

This information indicates that surgical residents have a positive effect on the overall quality of care in patient care. This valuable effect on overall quality of care was realized and admired by all stakeholders, with the exception of surgical residents themselves.

3) Increasing resident autonomy has impacts on patient safety.

Whether increasing resident autonomy has an impact on patient safety is demonstrated in Table 5.

The Kruskal-Wallis test showed a statistically significant difference in perception in whether increasing resident autonomy would impact on patient safety among different populations (administrators, surgical staff, and surgical residents) with a p-value = 0.001. A Dunn Bonferroni's post-hoc pairwise comparison test was performed (administrator – surgical resident, pairwise comparison $p = 0.021$, surgical staff – surgical resident, pairwise comparison $p = 0.027$). This information indicated that surgical residents believed the more autonomy they

TABLE 1. Years of experience at Siriraj Hospital of administrators, surgical staffs, and surgical residents.

Experience in years at Siriraj Hospital							
	Administrator As an administrator who regulates training		Surgical staff As a surgical staff who trains and teaches surgical residents		Surgical resident As a surgical resident		
	N	%	N	%	Resident years	N	%
0-5	4	16.0	6	23.1	1	29	24.4
6-10	8	32.0	2	7.7	2	33	27.7
11-15	6	24.0	6	23.1	3	18	15.1
16-20	2	8.0	5	19.2	4	27	22.7
> 20	5	20.0	7	26.9	5	12	10.1
Total	25	100.0	26	100	Total	119	100

TABLE 2. Patient and relatives' ages.

Patient and relatives' ages		
Patient and relatives' ages	N	%
18-30	26	11.9
31-40	51	23.4
41-50	38	17.4
51-60	42	19.3
> 60	61	28
Total	218	100

TABLE 3. How welcoming patients and relatives were of resident participation in their healthcare.

Receptiveness of patients and relatives towards resident participation in their healthcare			
	Median*	Mean Rank**	n
Administrator	4 (3,5)	174.28	25
Surgical staff	4 (2,5)	172.44	26
Surgical resident	4 (2,5)	144.22	119
Patient and relative	4 (1,5)	235.64	230
	Median (range)	p < 0.000**	

*A five-point Likert scale

**The Kruskal-Wallis test

Dunn Bonferroni's pairwise comparison (administrator – patient, pairwise comparison p = 0.031), (surgical staff – patient, pairwise comparison p = 0.020), (surgical resident – patient, pairwise comparison p < 0.000)

TABLE 4. Effect of surgical residents' involvement in patient care on the overall quality of care provided in the hospital.

Patient's perception	n	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
My overall hospital and surgical care is of better quality with residents involved	225	2 (0.9%)	6 (2.7%)	35 (15.6%)	120 (53.3%)	62 (27.6%)

Perception of administrators, surgical staffs, and surgical residents were queried regarding the effect of resident participation in patient care and the effect on quality of care provided.

	in OPD and IPD		
	Median*	Mean Rank**	n
Administrator	5 (4,5)	106.86	25
Surgical staff	5 (4,5)	116.42	26
Surgical resident	4 (3,5)	74.26	119
	Median (range)	p < 0.000**	

*A five-point Likert scale
**The Kruskal-Wallis test
Dunn Bonferroni's pairwise comparison
(administrator – resident, pairwise comparison p = 0.006)
(surgical staff – resident, pairwise comparison p < 0.000)

	in the operating room		
	Median*	Mean Rank**	n
Administrator	5 (3,5)	112.42	24
Surgical staff	5 (4,5)	116.35	26
Surgical resident	4 (1,5)	72.62	119
	Median (range)	p < 0.000**	

*A five-point Likert scale
**The Kruskal-Wallis test
Dunn Bonferroni's pairwise comparison
(administrator – resident, pairwise comparison p < 0.000)
(Surgical staff – resident, pairwise comparison p < 0.000)

TABLE 5. Increasing resident autonomy has an impact on patient safety.

	Median*	Mean Rank**	n
Administrator	3 (2,5)	64.50	25
Surgical staff	3 (1,5)	65.85	26
Surgical resident	4 (2,5)	94.21	119
	Median (range)	p = 0.001**	

*A five-point Likert scale
**The Kruskal-Wallis test
Dunn Bonferroni's post-hoc pairwise comparison
(administrator – resident, pairwise comparison p = 0.021),
(surgical staff – resident, pairwise comparison p = 0.027)

had, the more safe care patients received. This perception was different from administrators and surgical staff who believed that too much autonomy for a surgical resident would decrease patient safety.

B. Administrator, surgical staff, and patient and relatives views of autonomy of residents in training

The question whether a surgical resident should perform procedures independently prior to completing residency and entering independent practice is shown in Table 6.

The Kruskal-Wallis test showed a statistically significant difference in perception of whether a surgical resident should perform procedures independently prior to graduating residency and entering independent practice among certain groups, with a p-value = 0.016. A Dunn Bonferroni's post-hoc pairwise comparison found a difference in perception only between surgical residents and patients and relatives (pairwise comparison

TABLE 6. A surgical resident should perform procedures independently prior to graduating residency and entering independent practice.

	Median*	Mean Rank**	n
Administrator	4 (2,5)	215.38	25
Surgical staff	4 (1,5)	173.92	26
Surgical resident	4 (2,5)	224.75	119
Patient and relative	4 (1,5)	189.34	230
	Medan (range)	p = 0.016**	

*A five-point Likert scale
**The Kruskal-Wallis test
Kruskal-Wallis test followed by Dunn Bonferroni's post-hoc pairwise comparison
(surgical resident – patient, pairwise comparison p = 0.024)

p = 0.024). It means surgical staff and administrators agree with patients and relatives regarding the goal of surgical resident training. The perception of whether a surgical resident should perform procedures independently prior to graduating residency and entering independent practice was in agreement among administrators, surgical staff, and patients and relatives.

The questions about if "resident independence" or autonomy is required to ensure a resident becomes a competent surgeon" are shown in Table 7. It reveals that administrators, surgical staff, surgical residents, all agreed that residents require autonomy during training to become a competent surgeon.

TABLE 7. Resident independence or autonomy is required for their development into a competent surgeon.

	Median*	Mean Rank**	n
Administrator	4 (2,5)	103.28	25
Surgical staff	4 (2,5)	78.42	26
Surgical resident	4 (2,5)	83.31	119
	Median (range)	p = 0.081**	

*A five-point Likert scale
**The Kruskal-Wallis test

Calibrating the autonomy of surgical residents was attempted by asking stakeholders to rate on a scale of 0 to 10 (0 being no independence and 10 the most) after various years of training. The researcher chose second-year residents because this was the first step of a resident having to adhere to his or her surgical sub-specialty and final year residents about to graduate and receive the Diplomate of the Thai Board of Surgery the following year. Administrators, surgical staff and each surgical resident were asked to rate on a scale of 0 to 10 (0 being no independence and 10 the most) the appropriate degree of autonomy for a second-year resident and a final year resident. The results are shown in Table 8.

The median scale of autonomy of final year residents rated by surgical residents was 7, whereas administrators and surgical staff rated the median scale of autonomy of a final year resident to be 8. The Kruskal-Wallis test was performed to evaluate the distribution of responses and there was no significant difference among these three groups. The surgical residents rated the median scale of autonomy of second-year residents as 5, whereas administrators and surgical staff rated the median scale of autonomy of the second-year residents as 5 and 3, respectively. The autonomy of surgical residents increased when surgical residents passed each year of training. Finally, all groups rated an appropriate level of autonomy for final year residents, without any statistic significant differences.

C. Administrators' role. Perception of the effect of regulation on reimbursement and liability concerns for the hospital and surgical resident autonomy

Administrators, surgical staff, and surgical residents were asked if they felt regulations regarding reimbursement were responsible for decreased autonomy. Perceptions of the effect of regulations on reimbursement on resident autonomy were investigated. The question if an increase in resident autonomy led to an increase in patient cost care is shown in Table 9. This information indicated that all three groups agreed that when resident autonomy increased, it was likely to increase cost of patient care.

Responses to the more serious question "if patients should get a discount on medical expenses when a surgical resident does an operation?" are shown in Table 10. Surgical residents, and patients and relatives had the same opinion that patients should get a discount on medical expenses, which was the complete opposite response provided by administrators and surgical staff. The Kruskal-Wallis test was performed to evaluate this opinion and the distribution of responses were significantly different ($p < 0.000$). Pairwise comparisons using the Dunn Bonferroni

TABLE 8. Appropriate level of independence for final year surgical residents and a second-year surgical resident on a scale of 0-10.

(No independence -> Fully independent (0-10))

	Final Year Resident Median*	Final Year Resident Mean Rank**	n	Second Year Resident Median*	Second Year Resident Mean Rank**	n
Administrator	8 (3,10)	99.58	25	5 (1,7)	75.50	25
Surgical staff	8 (4,9)	86.38	26	3 (0,8)	57.17	26
Surgical resident	7(3,10)	82.35	119	5 (1,9)	93.79	119
	Median (range)	p = 0.254**		Median (range)	p = 0.001***	

*A scale from 0 to 10
**The Kruskal-Wallis test
***Kruskal-Wallis test followed by Dunn Bonferroni's post-hoc pairwise comparison was used to compare continuous variables among second-year residents. (surgical staff - surgical resident, pairwise comparison p = 0.003)

TABLE 9. The question whether increasing resident autonomy would lead to increased cost of patient care.

	Median*	Mean Rank**	n
Administrator	3 (1,5)	80.86	25
Surgical staff	3 (1,4)	70.38	26
Surgical resident	3 (1,5)	89.78	119
	Median (range)	p = 0.138**	

*A five-point Likert scale
**The Kruskal-Wallis test

TABLE 10. Perception of question: "Should patients receive a discount on medical expenses when a surgical resident performs an operation?"

	Median*	Mean Rank**	n
Administrator	2 (1,4)	107.70	25
Surgical staff	2 (1,5)	104.83	26
Surgical resident	3 (1,5)	197.24	119
Patient and relative	4 (1,5)	216.84	222
	Median (range)	p < 0.000**	

*A five-point Likert scale
**The Kruskal-Wallis test
Kruskal-Wallis test followed by Dunn Bonferroni's post-hoc pairwise comparison
(administrator – patient, pairwise comparison p < 0.000)
(administrator – resident, pairwise comparison p = 0.001)
(surgical staff – patient, pairwise comparison p < 0.000)
(surgical staff – surgical resident, pairwise comparison p = 0.001)
(surgical resident – patient, pairwise comparison p = 0.684)

test revealed that surgical staff and administrators have the same opinion that medical expenses should not be reduced while surgical residents and patients (surgical resident - patient, pairwise comparison p = 0.684) both agreed that the cost should be reduced.

The question of whether increased resident autonomy caused liability concerns for the hospital is shown in Table 11. This table indicated that all three groups agreed that legal liability was not a concern when resident autonomy increased (p = 0.396)

D. Patient and relatives' views on resident participation in the health care process

This section will demonstrate patients' perception regarding all aspects of surgical residency, quality of care provided by surgical residents, informed consent of patients' ability to choose a "true" surgeon, and if surgical staff should be present in the operating room even in basic and uncomplicated operations as well

TABLE 11. Whether an increase in resident autonomy caused liability concerns for the hospital.

	Median*	Mean Rank**	n
Administrator	3 (1,5)	73.29	24
Surgical staff	3 (1,5)	84.69	26
Surgical resident	3 (1,5)	87.43	119
	Medan (range)	p = 0.396**	

*A five-point Likert scale
**The Kruskal-Wallis test

as acceptance of complications incurred by surgical residents. Patients and relatives opinions are shown in Table 12.

As long as surgical outcomes are the same or better with resident participation, 86.7% of patients agreed or strongly agreed to have residents involved in surgical care.

However, who the operating surgeon was and his/her experiences were still the main consideration. If patients have an operation performed by a surgical resident, 80.9 % of patients agreed or strongly agreed to wanting to know how many times the resident had done this operation. Another 72.5% of patients agreed or strongly agreed to wanting to choose the surgeon who operated on them.

Patients and relatives felt comfortable to allow surgical residents to perform only basic and uncomplicated operations without the need for surgical staff in the operating room, however, in complicated operations, 74.4% of patients strongly disagreed or disagreed with allowing a surgical resident to perform the operation by himself or herself without the presence of surgical staff in the operating room. In operations of increasing complexity, there was less willingness to allow resident involvement in surgical procedures.

The presence of surgical staff in operations had a major impact on resident autonomy. Even in complicated operations, 79.5% of patients agreed or strongly agreed to allow residents to carry out a complicated operation with surgical staff controlling the operating room.

Attention in the operation by surgical staff had a big influence on acceptance by patients of incurred operative complications. The majority of patients or 81.8%, (44.1% strongly disagreed or 37.7% disagreed) were unwilling to accept serious complications following an operation by a surgical resident without the presence of surgical staff in the operating room. Even for mild complications, 25.5% of patients could accept operations carried out by surgical residents alone.

E. Comparison of perception in improving surgical residents' autonomy in surgical staff and surgical residents

Table 13 summarizes the comparison of perception in increasing surgical residents's autonomy between surgical staff and surgical residents.

Most of the surgical staff and surgical residents opinions were compared in two questionnaires, one looking at the perception of surgical staff and the other at the perception of surgical residents. Differences in surgical staff and surgical residents were statistically significant for 5 of the 9 parallel items. Surgical staff provided too much direction in either patient care activities ($p = 0.004$) or operative procedures ($p < 0.000$).

Surgical staff tend to follow the plan of residents even if they prefer an alternative plan ($p = 0.432$), but when it comes to making important medical decisions, surgical staff did not take the input of surgical residents as seriously as expected ($p = 0.022$). When the surgical staff changed a surgical resident's method of treatment, a reason was seldom given to the resident to explain the change in treatment regimen ($p = 0.001$). Surgical staff gave too little feedback to surgical residents that could help motivate them to improve their performance ($p = 0.001$).

DISCUSSION

Individuals who receive support when given autonomy (e.g., sensitivity to their perspectives, acknowledgment of their feelings, provision of choices, minimization of controls) from important authority figures, are more motivated to pursue their goals, more satisfied with their work and life, and ultimately become high achievers compared to individuals who are forced or persuaded to pursue the goals of others.[15,16] Self-determination theory states that humans have a natural tendency for autonomous behavior, and those who are able to act autonomously learn and perform better.[6,15,17]

The preparedness of surgeons graduate for independent practice was concerned, owing to a lack of autonomy in their training.[18] This may be due to the fact that surgical residents had fewer opportunities to care for patients since their time as a medical student.[1] More importantly, during the time they practiced in provincial hospitals after finishing their MD, these surgical residents did not have the opportunity to practice surgical skills.[2] In addition, the number of residents seeking fellowship training or subspecialist training after residency has increased, which contributes to the major problem of lack of autonomy in residency.[3]

The issue of resident autonomy or independence becomes even more complicated when there is a discussion of how much autonomy should be afforded to a resident. The aim of this study was to evaluate perceptions regarding resident autonomy from hospital administrators, surgical staff, surgical residents, and patients and relatives.

The first part looked at the effect of resident participation on quality of patient care, and contained three questions:

1.1. How welcome resident participation was by patients and relatives.

In this study, patients and relatives welcomed resident participation in their health care process.

TABLE 12. Patient and relatives' opinions.

Patient and relative's opinions	n	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
As long as surgical outcomes are the same or better with resident participation, I agree with having residents involved in my surgical care.	227	2 (0.9%)	7 (3.1%)	21 (9.3%)	144 (63.4%)	53 (23.3%)
If I have an operation done by a surgical resident, I want to know how many similar previous cases he/she has handled before.	225	4 (1.8%)	9 (4.0%)	30 (13.3%)	105 (46.7%)	77 (34.2%)
You want to choose the surgeon who operates on you.	225	2 (0.9%)	14 (6.2%)	46 (20.4%)	83 (36.9%)	80 (35.6%)
If I had to have a basic and uncomplicated surgery, I would consent to a resident performing the operation,						
A. without the need for surgical staff to be in the operating room while the surgical resident is operating.	229	22(9.6%)	95 (41.5%)	36 (15.7%)	61 (26.6%)	15 (6.6%)
B. with surgical staff controlling the operating room.	229	3 (1.3%)	18 (7.9%)	23 (10.0%)	123 (53.7%)	62 (27.1%)
If I had to have a complicated surgery, I would consent to a resident performing the operation						
A. without the need for surgical staff to be in the operating room while surgical resident is operating.	230	89 (38.7%)	82 (35.7%)	21 (9.1%)	26 (11.3%)	12 (5.2%)
B. with surgical staff controlling the operating room.	205	8 (3.9%)	25 (12.2%)	9 (4.4%)	91 (44.4%)	72 (35.1%)
I could accept mild complications following an operation by a surgical resident without any surgical staff in the operating room.	204	30 (14.7%)	89 (43.6%)	33 (16.2%)	43 (21.1%)	9 (4.4%)
I could accept serious complications following an operation by a surgical resident without any surgical staff in the operating room.	204	90 (44.1%)	77 (37.7%)	6 (2.9%)	24 (11.8%)	7 (3.4%)

TABLE 13. Comparison of perceptions in improving surgical residents' autonomy between surgical staffs and surgical residents.

	Surgical staff			Surgical resident			
	Surgical staff (Median (Range))*	Surgical staff (Mean Rank)**	n	Surgical resident (Median (Range))*	Surgical resident (Mean Rank)**	n	Mann-Whitney test
Residents' self-confidence increases when attending staff allows more autonomy.	4 (3,5)	65.92	26	4 (2,5)	74.55	119	p = 0.283
Decreasing resident autonomy leads to a decreased sense of patient ownership.	4 (1,5)	68.02	26	4 (1,5)	74.09	119	p = 0.471
Surgical staff gives too much direction to a surgical resident regarding patient- care activities.	2 (1,5)	52.27	26	3 (1,5)	77.53	119	p = 0.004
Surgical staff gives too much direction to a surgical resident regarding operative procedures.	2 (1,5)	47.92	26	3 (1,5)	78.48	119	p < 0.000
Surgical staff encourages surgical residents to develop an independent thought process.	4 (2,4)	77.90	26	4 (2,5)	71.93	119	p = 0.478
Surgical resident's input is taken seriously by the surgical staff when making important medical decisions.	3 (1,4)	56.98	26	4 (1,5)	76.50	119	p = 0.022
Surgical staff allows the surgical resident to plan even if surgical staff prefers an alternative plan.	3 (1,5)	67.52	26	3 (1,5)	74.20	119	p = 0.432
When the surgical staff change the surgical resident's method of treatment, staff always explains the reasons before changing the treatment regimen.	4 (1,5)	94.88	26	4 (1,5)	68.22	119	p = 0.001
Surgical staff give feedback to surgical residents that helps them feel motivated to improve their performance.	4 (3,5)	96.65	26	4 (1,5)	67.83	119	p = 0.001

*A five-point Likert scale
** Mann-Whitney test

Surprisingly, it was higher than the welcome afforded by administrators, surgical staff, and surgical residents. Pairwise comparisons using the Dunn Bonferroni test revealed that patients and relatives had a significantly higher acceptance rate of resident involvement than administrators ($p = 0.031$), surgical staff ($p = 0.020$) and surgical residents ($p < 0.000$). This indicated that patients and relatives had more favorable views of resident participation in patient care than administrators and surgical staff. Surgical residents do not realize how much patients and their relatives welcome their participation in treatment.

1.2. The effect on overall quality of care when a surgical resident was involved in patient care, either in OPD, IPD, or in the operating room. In our study, 80.9% of patients and relatives agreed or strongly agreed that the quality of care was better when surgical residents were involved. Our study also compared the perceptions of the administrator, surgical staff, and surgical residents regarding the effect of resident participation on quality of care provided in OPD/IPD and the operating room.

In the OPD/IPD and operating room, pairwise comparisons using the Dunn Bonferroni test revealed that administrators and surgical staff reported statistically significant higher scores on overall quality of care than surgical residents did. This information indicates that surgical residents have a positive effect on overall quality of care provided in either OPD/IPD or the operating room. In the study by *Kempenich JW*[5], the team found that only 3% of the general public had responses indicating that residents had a negative effect on quality of care. This effect on overall quality of care was realized and admired by all groups of stakeholders except the surgical resident.

1.3. Increased resident autonomy has an impact on patient safety.

The prevalence of complications due to resident involvement was completely different to the perception of relevant stakeholders, including administrators, surgical staff, surgical residents, and patients.

Regarding the prevalence of complications due to resident involvement, *Castleberry et al*[19] found that although there was increased morbidity with residents involved, the 30-day mortality rate decreased and there was a lower "failure-to-rescue". Other studies found no increase in complications or morbidity with residents involved.[11,20]

In our study, Dunn Bonferroni's post-hoc pairwise comparison tests were performed and they confirmed that surgical residents believed that the higher the level of autonomy, the better the safety profile was for patients. This perception was different from administrators and surgical staff continue to believe that too much autonomy for a surgical resident will decease patient safety. The ones who have the duty to control autonomy of surgical residents believe that too much freedom will lead to less safety for patients.

The second part looked at the views of administrators, surgical staff, surgical residents, and the views of patients and relatives in training. This step focused on perceptions such as essential autonomy required to become a competent surgeon, proper level of surgical resident autonomy, level of autonomy currently present, and development of autonomy. This second step composed of three questions:

2.1. The reasons why a surgical resident should perform procedures independently prior to graduating residency and starting independent practice are shown in Table 6. The Kruskal-Wallis test found that administrators and surgical staff also agreed with patients and relatives about the goals of surgical training. The perceptions of if a surgical resident should perform procedures independently prior to graduating residency and entering independent practice were in agreement between administrators, surgical staff and patients and relatives.

2.2. The question "resident independence or autonomy is required for development of a resident into a competent surgeon" was explored in Table 7. It revealed that administrators, surgical staff, and surgical residents, all agreed that residents require autonomy during training to develop into a surgeon.

Surgical residents who were surveyed felt most strongly about the importance of performing procedures independently before graduation as important.[9] *Kempenich JW*[5] reported that although most of the teaching faculty, administrators, and the general public felt that residents should perform procedures independently before graduation, their responses were less enthusiastic than those of residents. Among the general public, 80.6% agreed or strongly agreed that residents need to perform procedures independently before graduation. When asked "should the surgical resident be able to perform the surgery on his/her own confidently before graduating resident training", 96% of surgical residents' were in total agreement or agreement, however, from the point of view of surgical staff, that was not as important. When patients were asked if they would consent to a final year resident performing a routine procedure independently, less of them agreed (73.1%; $p = 0.05$).[5]

2.3. Appropriate level of independence for final year surgical residents and second-year surgical resident on a scale of 0-10. In our study, the autonomy of surgical residents could be calibrated by asking them to rate on a scale of 0 to 10 (0 being no independence and 10 the

most) different years of resident training. The median scale of autonomy of final year residents was rated by an administrator, surgical staff, and surgical resident. The Kruskal-Wallis test was done to evaluate the distribution of responses and there was no significant difference among the three groups. The surgical residents rated median scale of autonomy of second-year residents as 5, whereas administrators and surgical staff rated the autonomy of second-year residents as 5 and 3, respectively. The autonomy of surgical residents increased when surgical residents completed each year of training.[4] Finally, all groups rated the appropriate level of autonomy for final year residents without any statistically significant differences.

The results of how much autonomy should be given to a resident, in our study, were different from results observed by *Sterkenburg et al.*[4] In our study, the final year resident rated autonomy as same as surgical staff whereas *Sterkenburg et at*[4] revealed that surgical staff consistently rated the appropriate level of independence as lower than residents. They went on to suggest that: "… it may be necessary for residents to overestimate their ability to stimulate learning."

The third part looked at the role of the administrator. Perceptions of the effect of regulations on reimbursement and liability concerns for the hospital on surgical resident's autonomy were questioned.

When surgical residents perform any operation, the operating time is definitely prolonged. Improper or inadequate treatment decisions, whether in the ward or in the operating room, will increase the cost for patients. If any complications following the operation occur, it will increase medical expenses. In our study, administrators, surgical staff, and surgical residents were asked if they felt regulations regarding reimbursement were responsible for decreased resident autonomy. Our results indicate that all three groups agreed when resident autonomy increased, it was likely to lead to increased cost of patient care.

The question "should patients receive a discount on medical expenses when a surgical resident performs an operation for a patient?" was explored in Table 10. Surgical residents, patients and relatives have the same opinion that patients should receive a discount on medical expenses, which is opposite to the opinion of administrators and surgical staff. Pairwise comparisons using the Dunn Bonferroni test revealed that surgical staff and administrators have the same opinion that medical expenses should not be reduced while surgical residents and patients both agreed that the cost should be reduced. This disagreement is statistically significant. An ethical consideration would be raised if some patients were operated on exclusively by surgical staff, (with the exclusion of any residents, if these patients paid more). Furthermore, how to compensate for higher medical expenses of a patient and relatives should be considered. Most likely, the patient and relatives should not pay extra because of unnecessary medical expenses incurred by surgical residents.

Although *Arriaga AF et al*[11] reported there were liability concerns over complications incurred by surgical residents, it was not clear if it is obstacle for the autonomy of a surgical resident. Our study indicated that all three groups (administrators, surgical staff, surgical residents) agreed that legal liability was not much of a concern as resident autonomy increased ($p = 0.396$).

The fourth part investigated the views of patients and relatives on resident participation.

Patient and relatives' opinions are shown in Table 12.

As long as surgical outcomes are the same or better with resident participation, 86.7% of patients agreed or strongly agreed to have residents involved in surgical care. If guarantees could be provided to patients that outcomes would be the same or better with resident participation, then the general public would be more receptive to their involvement in procedures.

Who the operating surgeon is and how much experience he/she has is still the main consideration. If patients had an operation done by a surgical resident, 80.9% of patients agreed or strongly agreed to wanting to know how many cases the resident had handled before. A total of 72.5% of patients agreed or strongly agreed to wanting to choose the surgeon who operated on them. In a survey of patients who underwent hysterectomy[14] (where 100% of patients had a resident involved in their care), 80% wanted to know what a resident would do during their operation and how they would be supervised.

Reichgott and *Schwartz*[21] found that most negative responses to resident participation were due to patients not being aware of what part of the process the resident would be involved in their care. Patients often had anxiety and did not want surgical residents to have too much autonomy in an operation. This might be due to the fact that patients did not know the true role of surgical residents at the time of admission. The surgical staff should ensure patients know the role of surgical residents. Attention to this issue could allow the teaching faculty to assuage patient fears.[5,21]

Patients and relatives felt comfortable to let surgical residents perform only basic and uncomplicated operations without the presence of surgical staff in the operating room, but in complicated operations, 74.4% of patients

strongly disagreed or disagreed to let the surgical resident perform the operation alone without the presence of surgical staff in the operating room. Regarding resident involvement in surgical procedures with increasing complexity, the general public was less willing. *Kempenich JW*[5] asked the general public if they would welcome resident participation if they did a routine vs complex surgical procedure, and there was statistically significant negative stance for complex surgical procedures.

In our study, the presence of surgical staff in the operation room had a major impact on resident autonomy. Even in complicated operations, 79.5% of patients agreed or strongly agreed to have a resident perform complicated operations with surgical staff controlling the operating room.

The attention of the surgical staff in the operation room had a big influence on patient acceptance of operative complications. The majority of patients, or 81.8% (44.1% strongly disagreed or 37.7% disagreed) could not accept serious complications following an operation by a surgical resident without surgical staff supervision in the operating room. Even in cases of mild complications, only 25.5% of patients could accept the absence of surgical staff.

The fifth part investigated differences in perception between surgical staff and residents in improving the autonomy of a surgical resident.

Surgical staff and surgical residents both endorsed autonomy as important for the development of residents. Surgical staff provided too much direction in either activities related to patient care ($p = 0.004$) or operative procedures ($p < 0.000$). Over direction by surgical staff may make residents more passive, and this may stimulate faculty to exert even more control. Any regulations have made it necessary to increase the presence of attending surgeons in the OR, and this may cause decreased resident autonomy as the OR staff and residents naturally defer to the attending surgeon. *Chalabian* and *Bremne*[9] performed a survey of surgical residents in the late 1990s which revealed that 71% of residents felt that "…mandatory presence of surgeons in the OR was bad."

When making important medical decisions, surgical staff did not take the input of surgical residents as seriously as expected ($p = 0.022$). When surgical staff changed the surgical resident's method of treatment, the staff seldom explained the reasons to the resident before changing the treatment regimen ($p = 0.001$). Hence, surgical residents may express their frustration about staff restriction on opportunities to make decisions and about unexplained changes in patient care plans. Lack of mutual trust is a serious threat to learning and in-patient care teams. Moreover, problems around communication still persist. Surgical staff do not provide enough feedback to surgical residents to help motivate them to improve performance. ($p = 0.001$)

The consistent difference between surgical staff and surgical residents' perceptions of autonomy suggests that a common underlying factor or set of related factors may drive observed differences. Hence, the researcher explored three possible underlying causes.[6]

1. Challenges to self-determination

Scholars have studied trust in leaders and stated having trust in their team leaders was a key driver for employee commitment and effectiveness.[22-24] Being able to build trust between junior and senior team members fosters organizational effectiveness, positive work attitude, goal acceptance, and better performance.[25,26]

Trust is developed between a resident and surgical staff when a competent resident executes a task appropriately.[8] Not challenging residents with appropriate responsibility and independence can lead to stunted learning and development.[3,4,9] Without trust, it is difficult for surgical staff to extend sufficient autonomy to residents.[8] Lack of mutual trust is a serious threat. In in-patient care teams, a major concern is that when surgical staff restrict the independence of "passive" residents whose competence is questioned, they get fewer opportunities for active learning.

Scaffolding strategy[6] is likely to encourage development of competence and enhance their relationships with team members and supervisors. Residents who are reluctant to act autonomously may benefit from more scaffolding in their education, so that they can gradually gain the confidence they need to assume a more independent role in patient care. *Biondi EA, et al*[6] encourages surgical staff to scaffold the learning of residents they view as passive including novices who are reluctant to take on independent roles by giving them decision-making responsibilities in increasingly complex situations after they prove themselves in less challenging settings.

To enhance the scaffolding scheme, the researcher recommends a series of "mentoring program" to address the communication and trust issues between surgical staff (mentors) and surgical residents (mentees). In medicine, mentoring refers to a dynamic and context-dependent process between experience clinicians and junior clinicians to advance the development of the mentees as well as create relationships with mutual benefit between the two parties.[27] In mentoring, goal setting and elaborating expectation at the beginning of the relationship are essential. Research studies regarding mentoring program

in medical school[28-30] suggested that the key success factors are to provide a choice of mentors who share similar clinical and specialties interest (regardless of differences in generation), uses of questionnaire, profile matching, mentor's professional orientation, work-life priorities and share values and interest between mentor and mentee. Mentoring program not only addresses the trust issue but also handles enhance communication through reflective and honest feedback.

In this study, the researcher recommends that surgical staff (mentors) should be trained to be able to assess surgical residents (mentees)' needs, competencies, experiences, personalities, values, beliefs and goals to create the mentoring environment that personalizes and increases their autonomy.

2. Generational differences

Descriptions of generation Y (individuals born after 1982) showed some of the attitudes expressed by surgical residents.[31,32] For example, surgical residents indicated they would like surgical staff to provide more specific expectations, more support, better explanations when residents' treatment plans were changed, and frequent feedback. Most responding residents belong to Generation Y, but the surgical staffs were a composite of generations.

3. Inaccurate self-assessments on the part of both surgical staff and surgical residents[33,34]

The resident and surgical staff groups sometimes rated themselves higher than other groups and there was a lack of insight into how their own behaviors could drive behaviors of the other group. For example, over direction by surgical staff might make surgical residents more passive, and this may stimulate surgical staff to exert more control.

Our study did have some limitations.

First, the response rate of surgical residents, surgical staff, and administrators was 62.2%, 44.8%, and 43.1%, respectively, however, this does not represent real results due to non-responder bias. The sample size calculation was not available for this study.

Second, generalizability may be restricted. The study was conducted within one residency program where autonomy issues may have elicited differences between residents and faculty that would not be evident elsewhere.

Third, the reliability of questionnaires, using the Cronbach's alpha coefficient (α), of the patients and relatives' questionnaire was not tested due to ethical concerns.

Despite these limitations, the strength of our study are that: 1. It characterizes views of resident autonomy from the perspective of four major groups who have a stake in surgical resident training. 2. This study is a multidisciplinary integration of knowledge between social science and medical education discipline.

ACKNOWLEDGEMENTS

The researcher would like to thank Dr. Sasima Tongsai from the Division of Clinical Epidemiology, Department of Research and Development, Faculty of Medicine Siriraj Hospital, Mahidol University for her continuous help with data processing and statistical analysis, Mrs. Sirirat Khawsaard and Mrs. Angkana Seetasang, from the Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University for their continuous help with data collection.

Finally, the researcher would like to thank the Faculty of Medicine Siriraj Hospital, Mahidol Univeristy for granting me the full scholarship for enrolling M.S. Program in Human Resource and Organization Development, National Institute of Development Administration, which delivers professional knowledge in social science to conduct this study.

Conflicts of interest: The authors have no conflicts of interest to declare.

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