Telerounding and Patient Satisfaction after Surgery

Lars M Ellison, MD, Peter A Pinto, MD, Fernando Kim, MD, Albert M Ong, MD, Alex Patriciu, PhD, Dan Stoianovici, PhD, Haya Rubin, MD, Thomas Jarrett, MD, Louis R Kavoussi, MD, FACS

BACKGROUND: Technologic advances in communications have facilitated the development and diffusion of telemedicine. Most applications have focused on remote outpatient management of medical conditions. We assessed the impact of introducing remote video conferencing during the immediate postoperative period (telerounds) on patient-reported satisfaction with their hospitalization.

STUDY DESIGN: Between October 2002 and June 2003, 85 patients undergoing elective laparoscopic or percutaneous urologic procedures were enrolled in a trial testing the impact of telerounds on patients' satisfaction with their hospitalization. Participants were entered into one of three postoperative care arms: standard once-daily attending bedside rounds; standard once-daily attending level bedside rounds plus one afternoon telerounding visit; or a substitution of one daily bedside round with a robotic telerounding visit. Participants completed a validated patient satisfaction survey 2 weeks after hospital discharge.

RESULTS: Eighty-five individuals (100% response rate) completed the questionnaire. With responses dichotomized to "excellent" or "other," patients in the telerounding arm demonstrated statistically substantial improvements in ratings of examination thoroughness, quality of discussions about medical information, postoperative care coordination, and attending physician availability. Patients in the robotic telerounding arm indicated considerably higher satisfaction with regard to physician availability. After adjusting for age differences, ratings of each of the previously listed aspects of care remained notably improved in the telerounding arm.

CONCLUSIONS: Telerounding either as an additional visit or as a substituted bedside visit is associated with increased patient satisfaction in postoperative care. This type of interaction appears to acceptably facilitate physician communication with hospitalized patients. (J Am Coll Surg 2004;199: 523–530. © 2004 by the American College of Surgeons)

Advances in communications technology, when applied to medical care, challenge accepted norms about the doctor-patient relationship. Traditionally, this relationship is defined by direct face-to-face contact. With the introduction of each advance, be it the telephone in the early part of the 20th century or email at the end of the 20th century, critics argued that patient satisfaction with their doctors would be compromised.

Patient satisfaction with their physicians is a complex constellation of measurable and intangible variables. Duration of physician visits is a moderately strong predictor of overall patient satisfaction with hospital care and with a patient's intent to recommend the hospital to others with similar conditions.[1,2] Physicians have used telecommunication technology, in the form of the telephone, for more than 100 years to facilitate communication with patients.[3] This tool improved patient access to medical care, and has proved an acceptable and valuable mechanism to extend the patient-physician relationship.[4] Advances in wireless communications technology, the widespread availability of broadband data transfer, and the emergence of affordable Web-based digital video systems have allowed novel medical applications to be explored and implemented.

To date, most research related to telemedicine has been limited to assessing the feasibility and effectiveness of remote medical education and cognitive consultation.[5-8] Telemedicine has been used by various specialties as a tool for collaboration between geographically isolated medical centers. In the surgical disciplines, telementoring, in which

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From the Brady Urological Institute, Johns Hopkins Medical Institution, Baltimore MD.
Correspondence address: Lars Ellison, MD, 4860 Y St, Suite 3500, Sacramento, CA 95817.

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one physician is able to watch and "talk" another physician through a surgical procedure has been successfully tested in a number of different venues.[9-16] In addition, remote management of ICUs by intensivists demonstrated shorter lengths of stay and lower costs when compared with units staffed by generalist physicians.[17-21]

Physician-patient dialogue appears to be an important factor in recuperation for hospitalized individuals.[22] For postsurgical patients, the bedside visit often serves as a verbal reassurance that recovery is progressing as anticipated. Because of increasing demands on physician time and practical limitations in predicting availability, telecommunication technology may facilitate patients' access to their physicians. We performed a prospective randomized controlled trial to examine the impact of two different forms of attending surgeon bedside videoconferencing (telerounds) on patient-reported satisfaction with their hospitalization.

METHODS

Study design

This was a prospective randomized controlled trial of telerounding and its impact on patient satisfaction with postoperative care. Patients in the control arm received attending bedside visits alone. Patients in the first intervention arm were managed with attending bedside rounds and an additional telerounding visit. Sequentially, a third arm of attending teleround visit only on the second postoperative day was added. Patient satisfaction was measured using a validated instrument mailed to the participants 2 weeks after discharge from the hospital. The institutional review board approved the protocol, and all patients provided written informed consent before study enrollment.

Patients

Eligible patients were: individuals older than 18 years, able to understand and read English, and scheduled for a minimally invasive surgical procedure with an expected hospital stay of less than 72 hours. Patients undergoing the following laparoscopic procedures were considered eligible: donor nephrectomy, adrenalectomy, radical nephrectomy, partial nephrectomy, retroperitoneal lymph node dissection, and pyeloplasty. In addition, patients undergoing percutaneous procedures for kidney stone removal and treatment of upper tract urothelial cancers were considered eligible. Those unable to provide consent or those who did not wish to participate were not included in the study. One patient refused to participate. All other eligible patients consented to participate.

Instrument

We constructed a 23-item questionnaire to allow patients to rate various aspects of their hospital care (Appendix 1). Items about postoperative care by physicians were taken from the Patient Judgments of Hospital Quality instrument. These previously designed and tested items used a validated response scale (1, poor to 5, excellent).[23] Five items asked patients to rate their baseline health status and their health status during the hospitalization. Ten items allowed those randomized to the telerounding arm to evaluate the telecommunications system and to indicate their level of interest in having this system incorporated into usual postoperative care. The instrument was field tested on a set of 10 patients during the technical development phase of this project.

Video conferencing system

The Web-based video conferencing system used for the telerounding group was comprised of commercially available computer components. The unit brought to the patient room included a laptop computer with an 866 mHz CPU, a unidirectional microphone, digital camera, PCMI card using 108.11b wireless technology, Cisco wireless access point, and Microsoft NetMeeting software. The base unit for the attending surgeon consisted of the same peripheral configuration attached to a desktop computer in the academic urology offices. Patient confidentiality was maintained by encrypting the data before transmitting it over a secure wireless Internet link.

The robotic telerounding system used similar Web-based telecommunications, but the unit was mounted on a remotely controlled service robot (In Touch Health). This robot was driven into the patient room by a remote workstation. A joystick interface was used to steer the robot and operate the zoom, pan tilt, and focus functions of the camera (Fig. 1).

Study protocol

Patients were enrolled between October and December 2002 from the urologic clinics of LRK and TJ. After clinical evaluation and a shared decision to treat the condition with a minimally invasive surgical procedure, the research coordinator approached each patient independently. The study was discussed and the patient

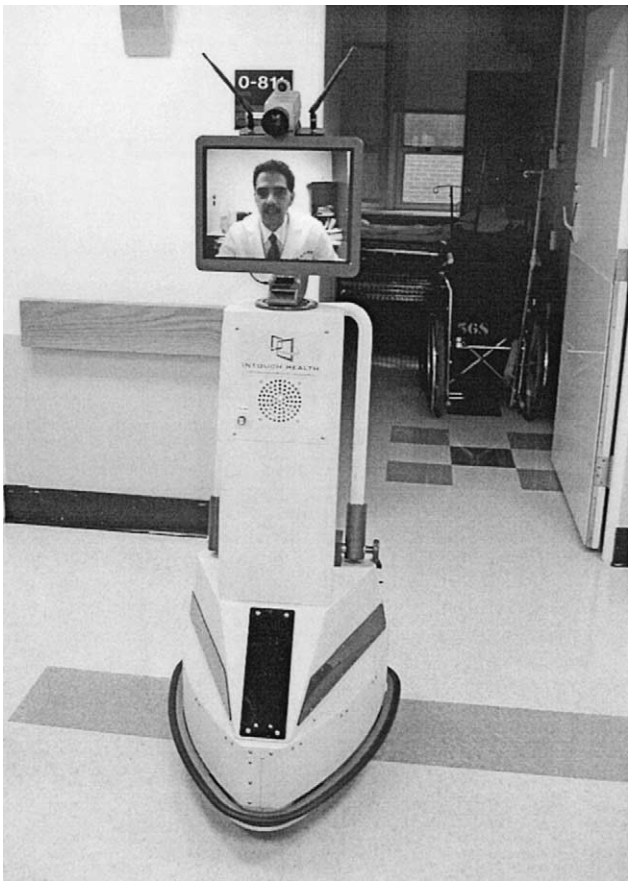

Figure 1. Telerounding service robot.

given the opportunity to consent to involvement. To achieve equal numbers in the control, telerounding intervention arm, and telerobotic intervention arm, participants were randomized 2:1 (intervention: control). The first 42 participants were randomized to either the telerounding arm that received daily attending level bedside visits plus afternoon telerounds, or the control arm that received attending bedside visits alone. The second 43 patients were randomized to either the telerobotic arm that received substituted attending level bedside visits on postoperative day 2, or the control arm that received attending bedside visits alone.

The study began on the first postoperative day. All patients were seen and examined twice daily by the fellow and resident surgical team. Patients randomized to standard rounds were seen once daily by the attending of record at the bedside. All attending rounds lasted 3 to 5 minutes.

Telerounding patients were seen once at the bedside by the attending, and then again by the attending using the Web-based video conferencing system during usual resident afternoon rounds. The video conferencing system was brought to the patient's room, where the vital signs and fluid measurement from the nursing flow sheet were relayed. The attending, from a geographically remote office, then conversed with the patient for 3 to 5 minutes and visually examined the incisions and drain effluent. Alterations in postoperative management were relayed to the resident or nursing staff, and the encounter concluded.

Robotic telerounding participants were seen at the bedside by the attending on the first postoperative day. A resident accompanied the service robot on subsequent days, and provided the objective data discussed earlier. An identical telerounding encounter then occurred between the attending and patient.

Outcomes measures

The primary outcomes measure was patient ratings of postoperative care. Independent variables identified included baseline demographic information extracted from the medical record and perceptions of health and independence both before and during the hospital stay.

The patient-rated assessment of the telerounding system was measured with 10 additional questionnaire items answered by individuals in the intervention arm. The items provided opportunity to assess the quality of the telerounding system and the participants' willingness to have it become a standard part of postoperative care.

Statistical analysis

Independent *t* tests compared patient characteristics and satisfaction scores between the study groups. Chi-square analyses were used to evaluate group differences in categoric measures. All statistical tests were two-sided, and all hypotheses were evaluated at the 0.05 significance level.

Items measuring ratings of postoperative care were dichotomized to reflect responses of "excellent" versus all other responses. Analyses were performed, dichotomizing results to combine very good and excellent ratings with similar results; the "top box" analysis is presented because it provides for greater interpretability (on the positive side, the proportion with the highest achievable rating and on the negative side, the proportion with some opportunity for improvement). Logistic regression analyses that treated the satisfaction outcomes variable as

Table 1. Baseline Patient Characteristics

Characteristics	Standard rounds n = 29	Telerounds n = 29	Robotic telerounds n = 27	p Value
Baseline factors				
Age (y)	57.0	49.7	58.8	0.03
Male (%)	59	57	58	0.85
Disease (n)				
Cancer	19	19	22	—
Donor nephrectomy	4	5	0	—
Obstruction	7	6	5	0.99
Earlier hospitalization (%)	0.10	0.10	0.18	0.13
Self-rated health (1–5)	3.7	3.5	3.4	0.28
Hospital factors				
Pain control (1–5)	2.3	1.8	2.4	0.58
Assistance (1–5)	1.8	1.4	1.7	0.16
Length of stay (d)	2.6	2.8	2.6	0.47
Appropriateness of LOS (1–5)	2.7	2.8	2.6	0.99

LOS, length of stay.

dichotomous were also performed to confirm the observed univariate results.

RESULTS

A total of 85 patients were enrolled in the study: 29 patients in the telerounding arm, 27 patients in the robotic telerounding arm, and 29 patients in the control arm. Eighty-five (100%) individuals responded after three mailings of the questionnaire. Baseline demographics and hospitalization characteristics are shown in Table 1. For the baseline variables, there was no difference in gender distribution, disease categories, rates of previous hospitalization, and self-reported health status. Patients in the telerounding arm were, on average, younger than those in the standard care arm (49.7 years versus 57.0 years, $p = 0.03$). There were no appreciable differences in regard to measured hospital factors between the intervention arms. There were no minor or major adverse events among the patients randomized to the telerounding arm.

Most patients gave high ratings for their care. Figure 2 graphically demonstrates the proportion of patients reporting excellent care by item. When comparing the standard rounding group to the telerounding group, statistically appreciable differences between study groups were noted for the items addressing examination thoroughness, quality of discussions about medical information, postoperative care coordination, and attending physician availability. The odds ratios generated from crude and age adjusted logistic regression predicting the impact of telerounding on patient satisfaction are presented in Table 2. After adjustment for differences in age and pain, telerounding beneficially affected patient ratings of examination thoroughness, quality of discussions about medical information, postoperative care coordination, and attending physician availability. Telerounding did not alter patient perceptions of physician respect or resident interactions. Rather than demonstrating a decrease in ratings of personal attention, for this item, telerounding showed a trend toward considerable beneficial effect.

Improvements in satisfaction when comparing the standard rounding arm to the telerounding arm were seen only for the item addressing physician availability. This item remained notably improved even after adjustment for differences in age and pain score.

A summary of the evaluation of the telerounding system by individuals randomized to the telerounding arm is presented in Table 3. Greater than 95% of patients believed that their care was as good, if not better, as a result of the introduction of the technology. Two-thirds of patients stated they would feel comfortable having telerounds as part of their future everyday hospital care. Three-quarters of patients believed that telerounds should become a standard practice for postoperative management.

DISCUSSION

Telerounding was associated with greater patient satisfaction with postoperative care. Patients in the tele-

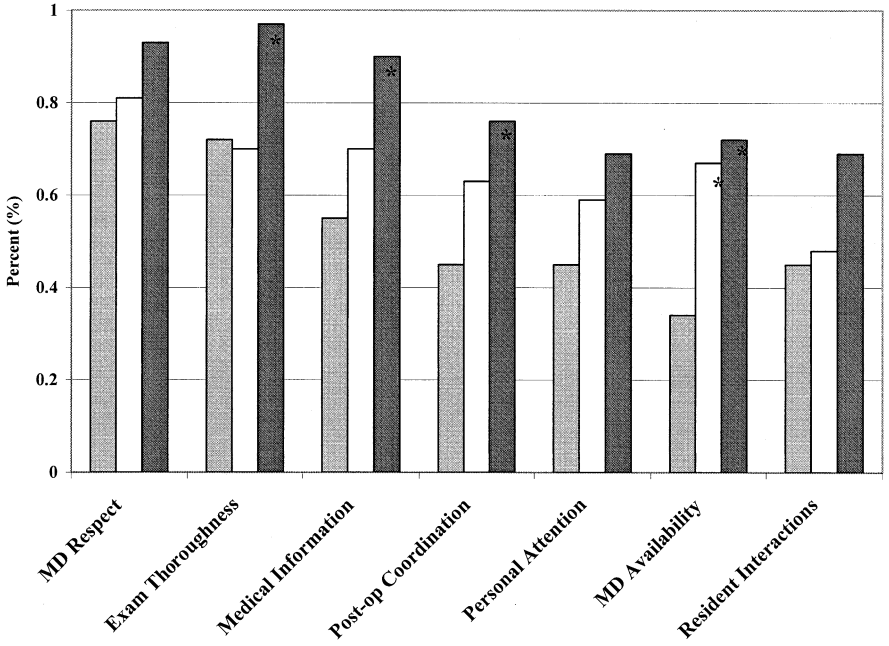

Figure 2. Univariate analysis of satisfaction reported as excellent by item. Light gray bar, standard care; white bar, robotic telerounds; dark gray bar, telerounding. *Indicates significant difference from standard rounds (chi-square $p < 0.05$).

rounding arm gave higher ratings to examination thoroughness, quality of medical information conveyed, and coordination of care. Patients randomized to the robotic telerounding arm also indicated improvements in satisfaction scores. These differences reached significance only for the item about physician availability. A high proportion of patients involved in the telerounding arm believed that this technology should be introduced into usual postsurgical care, and most patients thought their care was equivalent to or better than the care they would have received with standard rounds.

Communication is central to the practice of medicine. Patients must be able to relay information about symptoms so that physicians can process the data and make treatment decisions. Although palpable physical findings are an important component of gathered information, many decisions about established patients are made based on in-depth conversations. We find that deviations from well-established critical pathways for postoperative recovery serve as a sensitive indicator of potential postoperative complications. Availability of laboratory testing and radiographic imaging, although not a substitute for physical examination, are key elements of the monitoring recovery.

Advances in technology and decreased costs have made high-quality video communication available to in-

Table 2. Crude and Age Adjusted Logistic Regression of Patient Satisfaction Items Comparing Standard Rounding Arm to Telerounding Arm

	Crude		Adjusted*	
Satisfaction items	**Odds ratio**	**95% CI**	**Odds ratio**	**95% CI**
Respect from physicians	4.30	0.8–22.8	3.97	0.7–21.5
Examination thoroughness	10.6	1.2–92.0	14.4	1.5–137
Medical information	7.04	1.7–28.6	7.53	1.8–32.0
Postoperative coordination	3.87	1.3–11.9	3.80	1.2–11.9
Personal attention	2.73	0.9–8.0	2.82	0.9–8.5
Physician availability	4.99	1.6–15.3	6.11	1.8–20.3
Resident interactions	2.73	0.9–8.0	2.33	0.8–7.1

*Adjusted for age and pain rating.

Table 3. Patient Evaluation of the Telerounding System (%)

Variables	Poor	Fair	Good	Very good	Excellent
Video quality	7.7	15.4	42.3	26.9	7.7
Audio quality	3.9	11.5	50.0	19.2	15.4
	Strongly disagree	**Disagree**	**Not sure**	**Agree**	**Strongly agree**
My care was better because of telerounding.	3.9	0	53.9	38.5	3.9
I feel telerounding should be a regular part of patient care in the hospital.	0	3.9	19.2	57.7	19.2
I could easily communicate with my doctor using the telerounding system.	0	3.9	15.4	57.7	23.1
If I were hospitalized again I would feel comfortable with telerounding on an everyday basis.	0	0	34.6	46.2	19.2
If my MD was out of town I would rather teleround with my MD than be treated by a partner.	0	23.1	57.7	11.5	7.7

dividuals worldwide. But little is known about patient perceptions of Internet-based technology and its application to medical care.[24] Just as the introduction of the telephone 100 years ago was heralded as the death knell for the doctor-patient relationship, so too, modern critics have decried the use of email and video conferencing as the development of increasing barriers to "appropriate" medical care.[3] Some have suggested that separation from the bedside will necessarily lead to medical errors and potentially avoidable morbidity and mortality. The literature, limited though it may be, would suggest otherwise. Early studies of the use of remote critical care physicians for ICUs managed by internists demonstrated a considerable improvement in measurable patient parameters.[18-20] Notably, ICU stays and ventilation-weaning periods were shorter, and medical mistakes and adverse outcomes fewer. In addition, telemedicine has provided patients in remote geographic regions access to specialty medical care that would otherwise be unavailable. The application of telemedicine has advanced considerably for the surgical field as well. There is a growing body of literature about telementoring of surgical cases.[12,14,15,25-27] There are now a number of centers that have reported outcomes of patients operated on by less experienced physicians, with the verbal and visual assistance of a senior surgeon watching the procedure from a remote location. These studies have shown no measurable increase in adverse event rates and have provided a mechanism for dissemination of novel surgical techniques.

We performed our study to examine the impact of telerounding on patient satisfaction. The robotic telerounding arm was designed to allow for the assessment of the impact of a loss of direct bedside interaction during daily rounds. Although the effect size was attenuated because of sample size, there appeared to be a net positive effect of the inclusion of telecommunication in the care of postoperative patients. We acknowledge that the finding among this group of patients treated with an elective minimally invasive surgical procedure may not translate to either those patients with longer hospitalizations or those undergoing more complicated open surgical procedures.

From a policy perspective, this technology has a number of regulatory challenges. First, patient safety remains the central tenet of health care. The primary end point of this study was patient satisfaction. We did not power the study to measure patient safety. The examination of this issue will require a larger multiinstitutional study. Second, with the introduction of HIPAA regulations, the secure control of patient level medical information is critical. It is important to ensure the security of the wireless network. Finally, although mechanisms of reimbursement for cognitive services have developed, these will need considerable modification if applied to the postoperative setting.

Telerounding is a novel use of currently available technology that notably augments patient satisfaction with postoperative hospital care. This may represent a window into future patient care that gives patients increased access to their physicians. Providing an acceptable and timely mechanism for inpatient/provider interaction has the potential to decrease lengths of stay and morbidity.

Appendix

Endourology Patient Satisfaction Survey

Please think about what it was like to stay on the in-patient urology service at Johns Hopkins Hospital.

YOUR HOSPITAL STAY

1. Before this hospitalization how many times have you been admitted to the Johns Hopkins Hospital and stayed more than one night?	Never Once Twice Three or more	☐ ☐ ☐ ☐
2. Which of the following best describes your health condition when you were admitted to the hospital?	Excellent Very Good Good Fair Poor	☐ ☐ ☐ ☐ ☐
3. During your hospital stay how much help did you need with everyday activities (eating, dressing, using the bathroom, getting out of bed)?	A lot of help Quite a bit of help Some help A little help Never needed help	☐ ☐ ☐ ☐ ☐
4. During your hospital stay, how much pain did you experience?	A lot of pain Quite a bit of pain Some pain A little pain No pain at all	☐ ☐ ☐ ☐ ☐
5. Do you think the amount of time you spent in the hospital was . . .	About right Too short Too long Not sure	☐ ☐ ☐ ☐

REGARDING POSTOPERATIVE CARE BY YOUR DOCTOR(S)

	Exc	Very good	Good	Fair	Poor	Doesn't apply
6. The courtesy and respect you were given by the doctor(s) was	☐	☐	☐	☐	☐	☐
7. The doctors' ability to diagnose problems, the thoroughness of examinations, and their skill treating your condition was	☐	☐	☐	☐	☐	☐
8. The information you were given by your doctor(s) about your illness and treatment was	☐	☐	☐	☐	☐	☐
9. The coordination of my postoperative care and recovery by the doctors on my medical team was	☐	☐	☐	☐	☐	☐
10. The frequency of personal attention I received by the doctor(s) was	☐	☐	☐	☐	☐	☐
11. The availability and promptness of the doctor(s) when I needed to be seen was	☐	☐	☐	☐	☐	☐
12. The interactions I had with the medical staff-in-training and the interns were	☐	☐	☐	☐	☐	☐

REGARDING TELEROUNDING

13. How many times a day, on average, did you have direct contact with your doctor?	☐ None ☐ Once ☐ Twice ☐ Three or more
14. How many times a day, on average, did you have video contact with your doctor?	☐ None ☐ Once ☐ Twice ☐ Three or more times
15. My care was better because of telerounding (video contact).	☐ Strongly agree ☐ Agree ☐ Not sure ☐ Disagree ☐ Strongly disagree ☐ NA
16. I feel that telerounding (using a video camera) should be a regular part of patient care in the hospital.	☐ Strongly agree ☐ Agree ☐ Not sure ☐ Disagree ☐ Strongly disagree
17. The quality of the video was . . .	☐ Poor ☐ Fair ☐ Good ☐ Very Good ☐ Excellent
18. The quality of the sound was . . .	☐ Poor ☐ Fair ☐ Good ☐ Very Good ☐ Excellent
19. I could easily communicate with my doctor using the telerounding system.	☐ Strongly agree ☐ Agree ☐ Not sure ☐ Disagree ☐ Strongly disagree
20. If I were hospitalized again, I would feel comfortable with telerounding (video visits with the doctor) on an everyday basis.	☐ Strongly agree ☐ Agree ☐ Not sure ☐ Disagree ☐ Strongly disagree
21. If my doctor was out of town and I was hospitalized, I would rather be seen by my doctor with telerounds (video) than be directly cared for by one of his/her partners.	☐ Strongly agree ☐ Agree ☐ Not sure ☐ Disagree ☐ Strongly disagree

Author Contributions

Study conception and design: Ellison, Pinto, Ryan, Ong, Patriciu, Stoianovici, Rubin, Jarrett, Kavoussi
Acquisition of data: Ellison, Pinto, Ong, Jarrett, Kavoussi
Analysis and interpretation of data: Ellison, Rubin, Jarrett, Kavoussi
Drafting of manuscript: Ellison
Critical revision: Ellison, Pinto, Rubin, Kavoussi
Statistical expertise: Ellison
Obtaining funding: Kavoussi
Supervision: Kavoussi

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REFERENCES

1. Rubin HR. Patient evaluations of hospital care. A review of the literature. Med Care 1990;28(9 Suppl): S3–9.
2. Nelson EC, Rubin HR, Hays RD, Meterko M. Patient judgments of hospital quality. Response to questionnaire. Med Care 1990;28(9 Suppl): S18–22.
3. Aronson SH. The Lancet on the telephone 1876–1975. Med Hist 1977;21: 69–87.
4. Pinnock H, Bawden R, Proctor S, et al. Accessibility, acceptability, and effectiveness in primary care of routine telephone review of asthma: pragmatic, randomised controlled trial. BMJ 2003; 326: 477–479.
5. Whited JD, Hall RP, Foy ME, et al. Teledermatology's impact on time to intervention among referrals to a dermatology consult service. Telemed J E Health 2002;8:313–321.
6. Fieschi M. Information technology is changing the way society sees health care delivery. Int J Med Inf 2002;66:85–93.
7. Maclean JR, Ritchie LD, Grant AM. Telemedicine: 'communication' by any other name? Br J Gen Pract 1997;47:200–201.
8. Dunn EV, Conrath DW, Bloor WG, Tranquada B. An evaluation of four telemedicine systems for primary care. Health Serv Res 1977;12:19–29.
9. Rassweiler J, Frede T. Robotics, telesurgery and telementoring—their position in modern urological laparoscopy. Arch Esp Urol 2002;55:610–628.
10. Marescaux J, Leroy J, Rubino F, et al. Transcontinental robot-assisted remote telesurgery: feasibility and potential applications. Ann Surg 2002;235:487–492.
11. Rassweiler J, Binder J, Frede T. Robotic and telesurgery: will they change our future? Curr Opin Urol 2001;11:309–320.
12. Marescaux J, Leroy J, Gagner M, et al. Transatlantic robot-assisted telesurgery. Nature 2001;413:379–380.
13. Link RE, Schulam PG, Kavoussi LR. Telesurgery. Remote monitoring and assistance during laparoscopy. Urol Clin North Am 2001;28:177–188.
14. Cheah WK, Lee B, Lenzi JE, Goh PM. Telesurgical laparoscopic cholecystectomy between two countries. Surg Endosc 2000;14: 1085.
15. Janetschek G, Bartsch G, Kavoussi LR. Transcontinental interactive laparoscopic telesurgery between the United States and Europe. J Urol 1998;160:1413.
16. Allen D, Bowersox J, Jones GG. Telesurgery. Telepresence. Telementoring. Telerobotics. Telemed Today 1997;5:18–20, 25.
17. Grundy BL, Jones PK, Lovitt A. Telemedicine in critical care: problems in design, implementation, and assessment. Crit Care Med 1982;10:471–475.
18. Nenov V, Klopp J. Remote analysis of physiological data from neurosurgical ICU patients. J Am Med Inform Assoc 1996;3: 318–327.
19. Dorman T. Telecardiology and the intensive care unit. Crit Care Clin 2001;17:293–301.
20. Celi LA, Hassan E, Marquardt C, et al. The eICU: it's not just telemedicine. Crit Care Med 2001;29(8 Suppl):N183–189.
21. Rosenfeld BA, Dorman T, Breslow MJ, et al. Intensive care unit telemedicine: alternate paradigm for providing continuous intensivist care. Crit Care Med 2000;28:3925–3931.
22. Krupat E, Fancey M, Cleary PD. Information and its impact on satisfaction among surgical patients. Soc Sci Med 2000;51: 1817–1825.
23. Ware JE Jr, Hays RD. Methods for measuring patient satisfaction with specific medical encounters. Med Care 1988;26: 393–402.
24. Bratton RI. Patient and physician satisfaction with telemedicine for monitoring vital signs. J Telemed Telecare 2001;7(Suppl 1): 72–73.
25. Lee BR, Png DJ, Liew L, et al. Laparoscopic telesurgery between the United States and Singapore. Ann Acad Med Singapore 2000;29:665–668.
26. Bauer J, Lee BR, Stoianovici D, et al. Remote percutaneous renal access using a new automated telesurgical robotic system. Telemed J E Health 2001;7:341–346.
27. Larkin M. Transatlantic, robot-assisted telesurgery deemed a success. Lancet 2001;358:1074.