

## Evaluation of postoperative complications following elective surgeries of dogs and cats at private practices using computer records

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### Abstract

This study was designed to determine the frequency of postoperative complications following elective surgeries (castration, ovariohysterectomy, onychectomy) of dogs and cats from private practices and to evaluate the use of electronic medical records for this type of research. All elective surgeries performed during the study period at 5 private practices were included. The surgical techniques and materials used for each procedure were similar across practices, but the interpretation of "complication," the amount of detail recorded on the primary medical record, and the intensity of follow-up varied. The frequencies and types of complications varied by species and procedure. The postoperative complication frequencies ranged from 1% to 24% for all complications and 1% to 4% for severe complications. The results of this study describe populations of elective-surgery patients at private practices, provide data for educating clients about the risks associated with these procedures, and demonstrate how computerized records can be used to collect practice-specific medical information.

### Résumé

**Évaluation des complications postopératoires après chirurgies électives chez des chiens et des chats en pratique privée utilisant des dossiers informatisés**

L'étude était destinée à déterminer la fréquence des complications postopératoires après chirurgies électives (castrations, ovariohystérectomies, onychectomies) chez des chiens et des chats traités en pratique privée et pour évaluer l'utilisation de dossiers informatisés pour ce genre de recherche. Toutes les chirurgies effectuées au cours de cette étude dans 5 cabinets privés ont été incluses. Les techniques chirurgicales et le matériel utilisé dans chacune des procédures étaient semblables chez tous les participants, mais l'interprétation de «complication», la quantité de détails recueillis dans le dossier médical original et l'ampleur du suivi étaient variables. Les fréquences et les types de complications variaient selon les

espèces et les procédures. La fréquence des complications postopératoires variait de 1 à 24 % pour toutes les complications et de 1 à 4 % pour les complications graves. Les résultats de cette étude décrivent des populations de patients ayant subi des chirurgies électives en pratique privée, procurent des données pour renseigner les clients sur les risques associés à ces procédures et démontrent comment les dossiers informatisés peuvent être utilisés pour recueillir de l'information médicale pertinente au type de pratique.

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### Introduction

Most veterinarians in private practice now have access to a computer in the clinic. A 1992 survey of American Veterinary Medical Association veterinarians found that over 55% of the practitioners in mixed or small animal practice used a computer in the office (1). However, the extent to which these systems are used for maintaining medical information and the usefulness of the stored information has not been reported.

The computerized medical record offers great potential for improving health care (2,3). The ability to store and retrieve massive amounts of information nearly instantaneously should provide the clinician with an important tool in daily practice. The potential benefits for individual patient care are substantial and include warnings for potential drug interactions, reminders for a particular test or recheck, graphical presentation of test results, and accurately performing intricate calculations. However, the most important advancements in medical care will likely come from the ability to use aggregate information from patient populations (3-9). This will allow for evaluation of medical activities across different practice settings, as well as quality improvement-type programs within practices.

Most clinical studies are performed at teaching or referral hospitals. The potential for selection bias and the nonrepresentative nature of the cases pose a threat to validity and extrapolation of results of many studies utilizing these databases (10). Patients seen at private (nonreferral) practices are representative of the cared-for animal population from the geographical area of the clinic. Thus, data gathered at the private practice level are less prone, though not immune, to selection bias (7,10).

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There are several reasons for the dearth of studies using private practice cases, including the comparatively small case load within individual practices, the lack of collaborative networks between researchers and private practitioners, and the difficulty of retrieving the necessary medical information from the medical records. Presumably, computerization will reduce these barriers by allowing easier access to medical data from private practices.

Postoperative complications (POCs) following neutering surgeries, in specific, or surgeries, in general, have been reported from veterinary teaching or referral hospitals (11–15). The reported frequency of complications varied, even for the same procedure, among studies. Case definition, source population, degree of follow-up, data source, and definition of complications can all influence these frequencies. We have limited information about POCs following these routine procedures at private practices. This information would be very useful to properly prepare and charge for these procedures and to inform clients of potential risks.

The objectives of this study were to evaluate the potential usefulness of electronic veterinary medical records systems from selected private practices for use in epidemiological studies, to describe the population of dogs and cats undergoing elective surgery in these private practices, and to determine the frequency of POCs following canine and feline elective surgeries at these private practices.

## Methods and materials

The data sources for this prospective study were private veterinary practices that utilized 1 of the 4 most common proprietary practice software systems in small animal practices in Ontario. A convenience sample of 5 practices was targeted for inclusion in the study with eligibility criteria including that their current system had been used for more than 2 y and that they were located within 150 km of Guelph. Additionally, their practice software system had to be capable of storing coded medical data and down-loading the required fields of data from the cases into a nonproprietary format (ASCII).

Six practices, representing the 4 practice management software systems, were visited. Three proprietary systems required system modification from the vendor to participate. Retrieval software was obtained from 2 of the system vendors (AVS: Advanced Veterinary Systems, National Information Systems Corporation, Eau Claire, Wisconsin, USA; Compu-trust: Compu-trust Incorporated, West Hill, Ontario) but was not available for 1 system (PSI: PSI, Effingham, Illinois, USA). Thus, 1 practice could not participate because of software system limitations. One system (Impromed: Impromed Incorporated, Oshkosh, Wisconsin, USA) of those evaluated had adequate existing search and retrieval functions, but none of them had published documentation for the retrieval component of their system. It would not have been possible to develop the search and retrieval protocols for this study without the aid of personnel from the software vendors. By the end of the study, at least 1 staff member at each practice had been able to down-load the data without assistance.

This study was designed to minimize time commitment of personnel and changes to existing practice protocols. A brief description of the study, including the

purpose and some general definitions, was provided to each clinic at the initial visit. Each practice was instructed to record in the electronic medical record any adverse event during or after elective surgery. It was also encouraged to record all contacts with elective surgery patients, even if no abnormalities were noted. One investigator (FLP) visited the clinics to retrieve the electronic records at approximately monthly intervals.

Elective surgery cases were defined as dogs and cats undergoing elective ovariohysterectomy, castration, or onychectomy. Complications were defined as adverse health outcomes associated with an elective surgery that occurred within 3 wk of the procedure. Pre-existing conditions and conditions unrelated to the surgery (diabetes, hit by car, etc.) were excluded as a POC. The list of potential complications identified in a previous study of POCs was provided as a guide (15). Procedures performed as a treatment (ovariohysterectomy for pyometra, onychectomy for tumor, etc.) were excluded from the analysis.

The study period varied among clinics from 5 to 13 mo in the interval from February 1993 to March 1994. The study period began at each practice when system modifications had been completed and recording of POCs had been verified. The cases from 1 practice (E) represent only 6 mo of data collection, because this practice's management software system was changed and the practice dropped out of the study.

All practices recommended that elective neutering procedures be performed at 5 or 6 mo of age. Anesthesia protocols varied across practices with at least 5 different pre-anesthetic combinations being routinely used. The induction agents being used included thiobarbiturate, ketamine hydrochloride/diazepam, and xylazine hydrochloride/ketamine hydrochloride. The gas anesthetic agent was either halothane or isoflurane.

The surgical techniques and materials used for each procedure were similar across the 5 practices (A,B,C,D and E), with minor variations within and between practices. Absorbable suture (cat gut or glycolic acid polymer) was used for internal ligations, and abdominal wall and subcutaneous closures. Cutaneous sutures were primarily nonabsorbable suture (polyamide polymer), but some clinicians within 2 practices (C and D) used absorbable suture (glycolic acid polymer). A mid-line abdominal approach was used for all ovariohysterectomies. Subcuticular sutures were used at 1 practice (E), but in the other practices, cutaneous sutures were routinely used as the final layer of closure for ovariohysterectomies. All practices used subcuticular sutures to close canine castrations and did not close feline castrations. For feline castrations, the method of occlusion of the testicular artery, which varied even within practices, was either ligation of the spermatic cord with absorbable suture or tying a knot in the spermatic cord. All practices used surgical glue for skin closure of onychectomies.

The follow-up protocol varied substantially among practices. Three practices (A,B,C) kept canine castrations and canine and feline ovariohysterectomies in hospital following surgery and 4 (A,B,C,E) kept onychectomies overnight. All practices sent uncomplicated feline castrations home on the day of surgery. Two practices (D,E) discharged all routine ovariohysterectomies and castrations on the day of surgery. Some practices

**Table 1. Number and percentages of elective surgeries performed at 5 private veterinary practices**

Surgery	Practice					Total
	A	B	C	D	E	
<b>Dogs</b>						
OHE <sup>a</sup>	176 (26%)	54 (19%)	53 (18%)	51 (21%)	17 (22%)	351 (22%)
Castrate	127 (19%)	58 (20%)	44 (14%)	46 (19%)	20 (25%)	295 (19%)
Total	303 (45%)	112 (39%)	97 (33%)	97 (41%)	37 (47%)	646 (41%)
<b>Cats</b>						
OHE	76 (11%)	34 (12%)	35 (12%)	19 (8%)	6 (8%)	170 (11%)
OHE & Onychectomy	105 (15%)	35 (12%)	65 (22%)	34 (14%)	6 (8%)	245 (15%)
Castrate	82 (12%)	49 (17%)	39 (13%)	42 (18%)	19 (24%)	231 (15%)
Castrate & Onychectomy	83 (12%)	41 (14%)	45 (15%)	31 (13%)	5 (6%)	205 (13%)
Onychectomy	29 (4%)	18 (6%)	16 (5%)	16 (7%)	5 (6%)	84 (5%)
Total	375 (55%)	177 (61%)	200 (67%)	142 (59%)	41 (53%)	935 (59%)
<b>All</b>						
Total	678	289	297	239	78	1581

<sup>a</sup>Ovariohysterectomy

(A,C,D) routinely called the owner 1 to 2 d after surgery, while others called only sporadically. All practices had at least 1 scheduled recheck visit for all canine and feline ovariohysterectomies. One practice (C) did not record recheck visits having “no abnormal findings” in the computer record. The other practices (A,B,D and E) entered the patient contact regardless of findings.

None of the practices routinely recorded coded diagnoses in their computer system prior to the study. Although codes for procedures and some diagnoses were provided with 2 of the systems (AVS, Impromed), the codes were different at each practice, even when they had the same system. Additional codes were required at each practice for some of the complications.

The data collection procedure varied across the practices because of differences in the software systems. Cases and follow-up visits were identified by procedure (billing) codes. The minimum data collected for each elective procedure and follow-up visit were a unique identifier (patient and client name or number), breed, sex, date of birth, date of service, service code (procedure), and diagnosis code (including complications). Receptionists or technologists entered nearly all of the data into the computer record.

For data quality assessment, elective surgeries identified in the computer records were compared with clinic surgery logs for a 6-week period to verify that all elective procedures were being identified. Additionally, a random sample of 10 surgeries each for canine and feline ovariohysterectomy and castration procedures was selected for a total of 40 surgeries per practice (A,B,C and D). The primary records were available for the random sample cases, except for 5 records at practice A (unavailable for administrative reasons). The computerized data were compared with the primary record for accuracy and completeness of procedures, diagnoses, and complications. The absence of a diagnosis or complication on the primary record was assumed to indicate that no abnormality was identified at that visit. Similarly, if no diagnosis or complication was entered

in the computer record, it was considered the same as a code for “no abnormality noted.” An entry from the primary record was considered a complication if it had been recorded as a complication on the computer record, or if the primary record indicated that a specific action, such as resuturing or antibiotic administration, was initiated. Thus, any omissions noted were meaningful complications not merely inconsequential variations, such as swelling at the incision site. As these cases represented a census of elective surgery patients seen at these practices during the study period, the analysis was restricted to descriptive statistics.

## Results

### Procedures and patient demographics

Nearly 60% (range, 53% to 67%) of the elective surgery patients were cats (Table 1). Overall, more canine ovariohysterectomies were performed than canine castrations and slightly more feline castrations were performed than feline ovariohysterectomies. However, these patterns varied across clinics.

Onychectomy, as a procedure performed alone, represented a small percentage (range, 4% to 7%) of the elective procedures. However, the majority of feline ovariohysterectomies (59%; range, 50% to 65%) and nearly half of the feline castrations (47%; range, 21% to 54%) underwent onychectomy at the time of neutering, making onychectomy the most frequently performed elective procedure (34%; 534 onychectomies/1581 total surgeries) in this study.

Of the castration patients, 3.5% (10/289) and 0.8% (3/396) were identified as cryptorchid by procedure code for dogs and cats, respectively.

Median age for the patients at the time of neutering was within 3 mo of the practice recommended age of 6 mo, except for the canine castration patients. The canine castration cases had median ages greater than 12 mo at 2 of the clinics (range of medians, 7.6 to 12.5 mo). The cats that had onychectomy only were

**Table 2. Frequency of omission of at least 1 postoperative complication (POC) and demonstration of omission effect on POC frequencies observed by comparing the primary medical record POC and computer record POC from a random sample of surgeries at 4 private veterinary practices**

	Practice			
	A	B	C	D
<b>Omission Errors</b>	3% 1/35	8% 3/40	20% 8/40	2% 1/40
<b>POC Frequencies</b>				
Primary Record	43% 15/35	8% 3/40	23% 9/40	18% 7/40
Computer Record	43% 15/35	0% 0/40	5% 2/40	15% 6/40

**Table 3. Percentage of surgeries with any follow-up (recheck) information in computerized record at 5 private veterinary practices**

Surgery	Practice				
	A	B	C	D	E
<b>Dogs</b>					
OHE <sup>a</sup>	85% 149/176	48% 26/54	NA <sup>b</sup>	88% 45/51	53% 9/17
Castrate	67% 85/127	3% 2/58		78% 36/46	60% 12/20
<b>Total</b>	77% 234/303	25% 28/112		84% 81/97	57% 21/37
<b>Cats</b>					
OHE <sup>c</sup>	82% 148/181	35% 24/69		87% 47/53	67% 8/12
Castrate <sup>c</sup>	28% 46/165	3% 3/90		71% 52/73	38% 9/24
Onychectomy	31% 9/29	0% 0/18		62% 10/16	40% 2/5
<b>Total</b>	55% 203/372	15% 27/177		77% 109/142	46% 19/41
<b>All</b>					
<b>Total</b>	64% 437/678	19% 55/289		80% 190/239	51% 40/78

<sup>a</sup>Ovariohysterectomy

<sup>b</sup>Not available as this practice did not enter recheck visits when no abnormalities were noted

<sup>c</sup>Includes cats with concurrent onychectomy

much older (range of medians, 21.2 to 34.7 mo) than those cats that had elective neutering (range of medians, 6.9 to 8.3 mo).

#### Data quality

When the elective procedures in the computer record were compared with procedures in the practice surgery log for a 6-week period, all surgeries were correctly identified. However, occasional minor discrepancies for the date of surgery were found ( $\pm 1$  day).

When data from the computer records were compared with the primary record for the random sample of cases at each practice, the elective procedures were identical. One or 2 diagnoses identified in the primary records were omitted on the computer records at each of the practices, resulting in omission rates ranging from 2% to 5%. Only 1 of the complications indicated in the computer records (from practice A) could not be verified in the primary records. Omission of complications was the most prominent problem identified with data quality and it resulted in a dramatic underestimation of the frequency of POCs in the computer records for some of the practices (Table 2).

The frequency of having at least 1 follow-up contact following surgery was variable across the practices and

surgical procedures (Table 3). For patients with ovariohysterectomy, for which each practice had at least 1 planned follow-up visit, the follow-up frequency ranged from 35% to 88%.

#### Postoperative complications

The frequency of POCs recorded in the computer records varied from 1% to 24% among these practices (Table 4). Within practices, POCs occurred more frequently for ovariohysterectomies than castrations for both dogs and cats. The cats that had ovariohysterectomy or castration and onychectomy performed at the same time had higher frequencies of complications than did cats with ovariohysterectomy or castration as a single procedure. If only major surgery-site complications (infection, abscess, dehiscence, chewed out sutures) were considered, the overall frequencies of POCs were between 1% and 4%. Again, POCs were more frequent for ovariohysterectomies than castrations with ovariohysterectomy cases accounting for 90% of these complications. Surgical site infection or abscess occurred in 1% to 3% of the elective surgery cases at these practices.

The types of complications reported varied across practices and procedures. Granulomatous reaction at the suture site was the most frequently reported

**Table 4. Percentage of surgeries with recorded postoperative complications following elective procedures performed at 5 private veterinary practices**

Surgery	Practice Number				
	A	B	C	D	E
<b>Dogs</b>					
OHE <sup>a</sup>	35% 61/176	4% 2/54	4% 2/53	14% 7/51	30% 5/17
Castrate	32% 41/127	2% 1/58	0% 0/44	0% 0/46	15% 3/20
Total	34% 102/303	3% 3/112	2% 2/97	7% 7/97	22% 8/37
<b>Cats</b>					
OHE	31% 24/76	0% 0/34	0% 0/35	11% 2/19	0% 3/6
OHE & Onychectomy	28% 29/105	0% 0/35	22% 14/65	38% 13/34	50% 3/6
Castrate	1% 1/82	0% 0/49	0% 0/39	0% 0/42	5% 1/19
Castrate & Onychectomy	8% 7/83	2% 1/41	9% 4/45	10% 3/31	20% 1/2
Onychectomy	3% 1/29	0% 0/18	31% 5/16	12% 2/16	40% 2/5
Total	17% 62/372	1% 1/177	12% 23/200	14% 20/142	17% 7/41
<b>All</b>					
Total	24% 164/678	1% 4/289	8% 25/297	11% 27/239	19% 15/78

<sup>a</sup>Ovariohysterectomy

**Table 5. Percentage of surgeries with postoperative complications following elective procedures performed at a private practice (A) by age**

Surgery	Age (months)				Total
	<7	7 to 12	13 to 24	>24	
<b>Dogs</b>					
OHE <sup>a</sup>	28% 16/58	40% 17/43	36% 12/33	34% 12/35	34% 57/169
Castrate	15% 4/26	38% 20/53	28% 7/25	35% 6/17	31% 37/121
Total	24% 20/84	39% 37/96	33% 19/58	35% 18/52	32% 94/290
<b>Cats</b>					
OHE <sup>b</sup>	27% 17/64	26% 14/53	26% 7/27	16% 3/19	26% 41/163
Castrate <sup>b</sup>	0% 0/49	1% 1/68	5% 1/20	8% 1/12	2% 3/149
Onychectomy	33% 1/3	0% 0/1	0% 0/7	0% 0/14	4% 1/25
Total	16% 18/116	12% 15/122	15% 8/54	9% 4/45	17% 45/337
<b>All</b>					
Total	19% 38/200	24% 52/218	24% 27/112	23% 22/97	22% 139/627

<sup>a</sup>Ovariohysterectomy

<sup>b</sup>Includes cats with concurrent onychectomy

complication of canine ovariohysterectomies, followed by excessive patient attention to, or dermatitis at, the surgery site; abscess at the surgery site; and seroma. For canine castrations, the most frequently reported complications, in descending order, were excessive patient attention to the surgery site, scrotal hematoma or edema, granulomatous reaction at the suture site, abscess at the surgery site, and dehiscence. Excessive patient attention to the surgery site was the most common complication reported for feline ovariohysterectomies, followed by granulomatous reaction at the suture site, chewed out sutures, abscess at the surgery site, dehiscence, and anorexia. Only scrotal swelling or hematoma

was reported for feline castrations. For onychectomies, the reported complications were bandaged paw or hemorrhage, excessive patient attention to the surgery site, and abscess. Infrequently reported complications for the elective procedures included lethargic or quiet intermittent pain, sore paws, cystitis, slow recovery, and "rough" recovery. No deaths were reported.

The lowest POC frequencies for dogs at practice A were in the youngest age group (Table 5). However, potential confounders, such as, breed and weight (at last visit, not at date of surgery), were not recorded adequately for adjustment in the analysis. There was little change in frequency of POC with age for cats.

## Discussion

The practices that participated in this study were all modern, progressive facilities. They were not randomly selected and likely represented practices at the upper end of the "quality" scale. The surgical facilities and materials used were similar across practices. Therefore, the frequencies of POCs observed in these practices would be expected to be lower and more homogeneous than those from a more representative sample of practices. However, the frequencies of POCs varied substantially among these practices.

Three factors were identified that contribute to observed variation across practices. First, the follow-up protocols varied greatly among practices. The chances of identifying a POC should increase with more intense follow-up. Second, the interpretation of complication varied among practices. The broader the definition of complication used, the higher the POC rates. The practices were provided with a list of possible complications, but the final decision as to what constituted a complication, and whether or not to record it, was at the discretion of the individual practitioner. Third, complications were poorly recorded in some of the practice computer systems, even though the participants knew that the data were being collected for this research. Although the discrepancy rates per record were lower than some previously reported from a veterinary teaching hospital (16) or recorded in the human literature (17,18), the proportion of the complications that were omitted was very high at some of the practices. For instance, 2 practices had omission error rates of 8% and 20%, but these represented 100% and 89%, respectively, of the total number of complications observed in the primary record for the random sample cases at each practice.

The practices with the highest POC frequencies, which in general had the most intense follow-up protocols and fewest omissions of POCs from their electronic records, reported frequencies similar to those previously reported for canine (31.5%) and feline (>20%) ovariohysterectomies, but higher than those recorded at the Veterinary Teaching Hospital, Ontario Veterinary College (17.7% and 16.3%, respectively) (12,13,15). However, the lack of consistent definitions for complications across practices, in this study, and across studies makes comparisons difficult. The frequencies of POC were low for feline castrations but approached those of ovariohysterectomies for canine castrations. To our knowledge, there are no published reports with which the POC frequencies following castration or onychectomy can be compared.

The frequency of POCs was lowest in dogs less than 7-months-old and highest in dogs 7- to 12-months-old for both ovariohysterectomies and castrations at 1 practice in this study. This finding may be confounded by breed and size at time of surgery, as larger breeds may be more likely to be neutered at an older age than smaller breeds. Larger dogs (>50 kg) have been reported to be at higher risk for POCs following ovariohysterectomies than are smaller dogs (13). Other studies from teaching hospitals have reported contradictory results. One study reported the lowest rate of POCs in dogs less than 1 y of age (15), while another reported the highest rate of complications following ovariohysterectomies in dogs less than 1-year-old (12). The latter study included some nonelective surgeries performed by

more experienced surgeons than those doing the elective procedures. The methodological weaknesses in all of these studies, including this one, preclude firm conclusions on the effect of age on POC rates in either dogs or cats. However, in studies where both species have been reported (including the present study), the frequency of POCs has varied the least with age in cats, indicating that age may not be as influential as a risk factor for POC in cats as in dogs (15).

When the POCs were restricted to more universally acknowledged complications (infection, dehiscence, chewed out suture), the practices reported more similar frequencies of POCs. It is likely that these problems would be recorded more consistently as complications than less serious problems. Clinicians are more likely to record observations they consider most clinically relevant (19). Thus, even in practices where over-all recording is low, these potentially severe problems are probably well-documented in the primary record. Additionally, there should have been agreement among clinicians and technicians that these are POCs and appropriate to record as such for this study.

The frequencies of surgical site infection (range 1% to 3%) found in the present study were comparable with reported frequencies of 2.7% (2/73) for canine ovariohysterectomy at Dykstra Veterinary Hospital, Kansas State University (12), 2.3% (55/2475) for elective surgeries at the Veterinary Teaching Hospital, Ontario Veterinary College (15), and 2.5% (27/1100) for clean surgeries at the Veterinary Medical Teaching Hospital, University of California, Davis (14). No deaths were reported from the 1581 cases in this study. Previous studies from teaching hospitals suggest that 1 to 2 deaths would be expected in this population if death rates were similar to those for healthy animals undergoing surgery at veterinary teaching hospitals (15).

Many private practices have invested substantial resources to acquire and maintain practice management computer systems. One objective of this study was to determine the accessibility and usefulness of these computerized data systems, as they are currently used in practice, for research. The minimal alteration of data recording imposed by the study should have resulted in data quality similar to that of routinely collected data. This approach not only assesses usefulness for research but also usefulness for practitioners wishing to use their system for retrospective review of cases or for quality improvement.

There was little standardization of medical record keeping or use of the computer system for storage of medical data among these practices. All of them had to alter their recording routine to accommodate coded diagnoses. Therefore, the data access protocol currently has to be customized to each site.

None of the systems we evaluated allowed easy data manipulation. As in this study, it is often necessary to transfer the data to other software systems for analysis. Even getting the data out in ASCII format with delimited fields required extensive communication with software support staff or an additional module for the system.

Currently, the primary use of these practice management systems is administrative not medical, which affects the quality of the data from the standpoint of medical information. The computer systems proved to be excellent for identifying patients by procedure when the

procedure was billable (such as surgery). However, in some of the systems, nonbillable procedures (recheck examinations, suture removal) were not recorded as completely. Other electronic medical data (diagnoses, complications) generated for this study were not being used administratively or clinically and had many omissions. With recognition of these deficiencies, corrective actions can be implemented relatively easily to improve data quality.

The data from a practice can provide the basis for quality improvement within the practice. One can assess compliance to practice protocol, as with the follow-up contact results on this study. Additionally, with an established data collection mechanism and baseline POC frequency, each practice could monitor changes in complication types and frequencies, as procedures or suture materials are changed. One can also look within the practice for factors that might influence POCs. For instance, in 1 practice, 72% of the infections at surgical sites were found in cases done by a surgeon who performed 41% of the elective surgeries. There are many possible reasons for the increased frequency of infections for that surgeon's cases, but realizing that there is a difference between surgeons may provide clues to lowering POCs at that practice.

This study demonstrates the usefulness of some private practice computer systems, describes the challenges of working with current systems, and reports the occurrence of POCs following elective surgeries. These results from private practices should help practitioners to better understand the magnitude and types of complications and provide clients with a better description of the risks associated with these routine procedures.

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## Books Received/Livres reçus



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- Darcel C. *A Collection of Essays on Comparative Medicine: And a Bibliography of References to the ELISA Test*. Palliser Animal Health Laboratories Ltd., Lethbridge, Alberta, 1996. 78 pp. \$39.00
- DeGrazia D. *Taking Animals Seriously: Mental Life and Moral Status*. Cambridge University Press, New York, 1996. 302 pp. Hardcover: ISBN 0-521-56140-X: \$59.95; Softcover: ISBN 0-521-56760-2: \$18.95

*Grâce à la générosité d'un grand nombre d'éditeurs, la Revue vétérinaire canadienne est en mesure de tenir ses lecteurs au courant des nouvelles publications rendues disponibles aux médecins vétérinaires. On encourage les lecteurs qui désirent obtenir une de ces publications à entrer en contact avec leur bibliothèque, avec les éditeurs listés ci-bas ou avec les librairies aux facultés de médecine vétérinaire.*

- Johnson-Delaney C. *Exotic Companion Medicine Handbook for Veterinarians*. Wingers Publishing, Florida, 1996. ISBN 0-9636996-4-4. \$79 US + S&H
- Thomas RB. *The Old Farmer's 1997 Almanac (Special Canadian Edition)*. Yankee Publishing Incorporated, Dublin, New Hampshire, 1996. 223 pp. ISSN 0078-4516. \$3.00 US