

Acute minor thoracic injuries

Evaluation of practice and follow-up in the emergency department

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ABSTRACT

OBJECTIVE To review the management and follow-up of patients with minor thoracic injuries (MTI) treated by emergency or primary care physicians.

DESIGN A multicentre, retrospective study.

SETTING Three university-affiliated emergency departments of the metropolitan region of Quebec city, Que.

PARTICIPANTS Patients older than 16 years of age with suspected or proven rib fractures following traumatic events.

MAIN OUTCOME MEASURES Differences in admission and discharge proportions and disposition management following MTI.

RESULTS Four hundred and forty-seven charts were analyzed. Only 23 patients (5.2%) were admitted during the study period. Admission and discharge proportions were significantly different among the 3 surveyed hospitals, ranging from 1.3% to 15.2% ($P \leq .001$). There were no recommendations of follow-up noted in most (53.5%) of the charts and there were no differences after hospital stratification. Planned follow-up visits were scheduled for 5.7% of discharged patients. Being older than 65 years of age or having multiple rib fractures had no influence on management and follow-up recommendations. Eighty-two patients (18.6%) had unplanned follow-up visits in the emergency department, with inadequate pain relief as the principal reason for consultation (56.1%). There was no significant difference after stratification for age and type of analgesia. Other clinically significant delayed complications were recorded in 8.3% of all MTI patients.

CONCLUSION The proportion of patients admitted for rib fractures was lower than the expected 25%, based on previous publications, and varied across surveyed hospitals. A very low proportion of patients was offered planned follow-up visits or even any follow-up recommendations in view of possible delayed complications and disabilities. Further studies are needed to identify predictors of delayed MTI complications and enhance appropriate use of follow-up resources.

EDITOR'S KEY POINTS

- Rib fractures are associated with disability and are generally not adequately treated; 10% of the patients afflicted with minor thoracic injuries in this study developed important delayed complications within 14 days of discharge from the emergency department (ED).
- Conservative management dictates that elderly patients or patients with more than 3 rib fractures need admission for evaluation, owing to increased risk of complications, such as delayed hemothorax.
- This study demonstrated a significant difference among the hospitals studied in admission and discharge practices for patients suffering minor thoracic injuries seen in the ED; the proportion of patients admitted also varied considerably from previous reports.
- Patients should be prescribed analgesics at the time of discharge, as rib fractures are associated with disability. In this study, 19% of patients returned to the ED for unplanned follow-up; the chief complaint was insufficient analgesia.

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Blessures thoraciques mineures aiguës

Évaluation des façons de faire et du suivi à l'urgence

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RÉSUMÉ

OBJECTIF Faire le point sur le traitement et le suivi des patients qui consultent un médecin de première ligne ou un service d'urgence pour des blessures thoraciques mineures (BTM).

TYPE D'ÉTUDE Étude multicentrique rétrospective.

CONTEXTE Les services d'urgence de 3 hôpitaux universitaires affiliés de la région métropolitaine de la ville de Québec.

PARTICIPANTS Patients de plus de 16 ans présentant une suspicion ou un diagnostic de fractures de côtes d'origine traumatique.

PRINCIPAUX PARAMÈTRES À L'ÉTUDE Différences dans les taux d'admission et de congé, et mode de prise en charge après une BTM.

RÉSULTATS Un total de 447 dossiers ont été analysés. Seulement 23 patients ont été admis durant la période de l'étude. Il y avait des différences significatives dans les taux d'admission et de congé des 3 hôpitaux, les taux variant entre 1,3 à 15,2% ($P \leq ,001$). Dans la majorité des dossiers (53,5%), il n'y avait aucune recommandation de suivi et il n'y avait pas de différence entre les hôpitaux. Au congé, 5,7% des patients avaient un rendez-vous pour un suivi. Le fait d'avoir plus de 65 ans ou d'avoir plusieurs fractures costales n'avait aucune influence sur le traitement et les recommandations de suivi. Quatre-vingt-deux patients (18,6%) sont revenus à l'urgence sans rendez-vous, la majorité en raison d'une analgésie insuffisante (58,1%). Il n'y avait pas de différence significative après stratification pour l'âge et le type d'analgésie. On a enregistré d'autres complications tardives cliniquement importantes chez 8,3% de tous les patients victimes de BTM.

CONCLUSION Le taux de patients admis pour fracture de côte était inférieur aux 25% observés dans les études antérieures, et il variait d'un hôpital à l'autre. On a offert des rendez-vous ou des recommandations de suivi à une proportion minime de patients malgré la possibilité de complications ou d'incapacités tardives. D'autres études seront nécessaires pour cerner les indicateurs de complications tardives des BTM et promouvoir une utilisation appropriée des ressources de suivi.

POINTS DE REPÈRE DU RÉDACTEUR

- Les fractures de côtes entraînent beaucoup d'incapacité et ne sont généralement pas traitées adéquatement; 10% des patients victimes d'une blessure thoracique mineure dans cette étude ont développé des complications tardives importantes dans les 14 jours suivant leur congé du service d'urgence (SU).
- Dans le cas d'un patient âgé ou en présence de plus de 3 fractures costales, le traitement conservateur exige une admission pour évaluation en raison du risque accru de complications telles qu'un pneumothorax.
- Cette étude a observé des façons de faire différentes entre les services d'urgence des hôpitaux étudiés pour ce qui est de l'admission et du congé des patients présentant des blessures thoraciques mineures; en outre, la proportion de patients admis différerait considérablement des rapports précédents.
- Des analgésiques devraient être prescrits aux patients au moment du congé puisque les fractures de côtes causent de l'incapacité. Dans cette étude, 19% des patients sont revenus aux SU pour un suivi non planifié, la majorité en raison d'une analgésie insuffisante.

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Minor thoracic injuries (MTIs) with proven or suspected rib fractures constitute a common presentation in emergency departments (EDs).¹ Most patients with MTI are treated in ambulatory settings and less than 25% are admitted.²

Rib fractures create short- and long-term disability and morbidity.^{1,3} There are very few non-surgical thoracic injuries as painful as rib fractures.^{1,4} Conservative management dictates that elderly patients or patients with more than 3 rib fractures need admission for evaluation⁵⁻⁷ owing to an increased risk of complications, such as delayed hemothorax.⁸

Recently, it has been demonstrated that 10% of the patients afflicted with MTIs developed important delayed complications within 14 days of discharge from the ED.⁹ There are no prospective data about the rate of complications from MTI among ambulatory patients in North America.

Moreover, no study has evaluated the actual practices of follow-up and admissions in EDs since the evolution of the ambulatory care system. We hypothesized that patients with rib fractures were not adequately managed and did not receive appropriate follow-up, and that there were different practices between emergency physicians owing to the lack of guidelines. The objective of the study was to evaluate the management of patients presenting to the ED with MTIs and the proportion of such patients who were admitted.

METHODS

Study setting

This was a multicentre, retrospective study in 3 university-affiliated EDs in the metropolitan region of Quebec city, Que: Hôpital de l'Enfant-Jésus (HEJ), Hôtel-Dieu de Lévis (HDL), and Centre Hospitalier de l'Université Laval (CHUL)—a level 1, level 2, and non-designated trauma centre, respectively. This research was approved by the institutional ethic boards of all 3 hospitals. Patients' charts were identified using the hospital and the emergency administrative databases, with key words *thoracic injuries* and *rib fractures*. This study was conducted from January 1, 2004, to January 1, 2006.

Study participants

Charts of patients who met the following criteria were included in the study: 16 years of age or older, a Glasgow coma scale score of 15, and a final diagnosis of suspected or confirmed rib fractures following MTI. Patients with traumatic chest pain suggesting rib fractures were included even if there was no radiographic evidence of rib fracture.^{10,11} Patient charts were rejected if they included important thoracic (eg, hemothorax) or abdominal (eg, spleen contusion) traumatic lesions, a flail chest, a sternum fracture, or a first- or second-rib fracture.

Outcomes

The main outcome of the study was the proportion of patients admitted and discharged at each hospital. Secondary outcomes evaluated the practices of the emergency or primary care physicians: recommendation of follow-up as well as analgesia in the ED and at discharge.

Data collection

All charts were reviewed with a standardized data collection system that was developed by the main authors (M.E., J.F.S). Standardization of data collection was realized on 10% of the charts.

Statistical analyses

All analyses were performed with SAS software, version 9.1. Descriptive unvaried analyses were used to compare patient management and profiles between hospitals. Student *t* tests or ANOVA (analysis of variance) were used for continuous variables. Fisher or χ^2 tests were used for categorical variables. Our sample size estimation was based on a minimum absolute difference of 10% in admission proportion. With an α level of 5% and a power of 80%, 440 charts were needed. A *P* value of .05 was considered significant.

RESULTS

A total of 649 patient charts were screened; 325 charts (53.0%) from HEJ, 222 (32.2%) from HDL, and 102 (14.8%) from CHUL were reviewed. Of these patient charts, 447 were retained. **Table 1** shows characteristics of the patients with proven or suspected rib fractures, according to admission or discharge status. Overall, 23 patients (5.2%) were admitted. Patients with the following characteristics were significantly ($P < .05$) more likely to be admitted: 65 years of age or older; presence of coronary artery disease, chronic obstructive pulmonary disease, heart failure, or diabetes; use of antiplatelet medications; delay from injury to consultation; and presence of tachypnea. Moreover, a statistically significant difference between admission or discharge proportions according to the hospital was observed. The admission rate was 5.2% (23/447), with 3/237 (1.3%) at HEJ, 10/144 (6.9%) at HDL, and 10/66 (15.2%) at CHUL ($P < .001$). Hospital-stratified analysis of the discharged subgroup showed no significant differences in characteristics (**Table 2**). Patients with 2 or fewer ribs fractures were less likely to be admitted in all institutions. Mean (SD) length of stay in the ED was similar for all 3 hospitals: 276 (421) minutes at HEJ, 273 (352) minutes at HDL, and 219 (202) minutes at CHUL.

Table 2 outlines the physician recommendations that were recorded in the charts. Most of the patients (52.7%) who came to the ED did not have follow-up

Table 1. Characteristics of the 447 patients with proven or suspected rib fractures

CHARACTERISTICS	TOTAL (N = 447), N (%)	ADMITTED (N = 23), N (%)	DISCHARGED (N = 424), N (%)	P VALUE
Hospital				
• HEJ	237 (53.0)	3 (13.0)	234 (55.2)	
• HDL	144 (32.2)	10 (43.5)	134 (31.6)	<.001
• CHUL	66 (14.8)	10 (43.5)	56 (13.2)	
Men	300 (67.6)	13 (59.1)	287 (67.7)	NS
Age				
• ≥ 65 y	125 (28.0)	17 (73.9)	108 (25.5)	<.001
• ≥ 45 y	323 (72.3)	18 (78.7)	305 (71.9)	NS
Past medical history*				
• CAD	51 (11.4)	10 (43.4)	41 (9.7)	<.001
• COPD	41 (9.2)	6 (26.1)	35 (8.3)	.004
• Heart failure	15 (3.4)	3 (13.0)	11 (2.6)	.003
• Osteoporosis	33 (7.4)	4 (13.0)	29 (6.4)	.06
• Diabetes	41 (9.2)	5 (21.7)	36 (8.5)	.03
Medication				
• Antiplatelets	86 (19.2)	9 (39.1)	77 (18.2)	.01
• Anticoagulants	10 (2.2)	0 (0)	10 (2.4)	NS
Delay from trauma to ED consultation†				
• < 24 h	254 (56.8)	19 (86.3)	235 (56.2)	
• 24 to < 48 h	33 (7.4)	0 (0)	33 (7.8)	.02
• ≥ 48 h	154 (34.5)	3 (13.6)	151 (36.9)	
Injury mechanism†				
• Fall from the patient's own height	193 (45.0)	11 (50.0)	182 (44.6)	
• Fall from greater than the patient's own height	88 (20.5)	4 (18.6)	84 (20.6)	
• MVC	49 (11.4)	4 (18.6)	45 (11.0)	NS
• Pedestrian and MVC	4 (0.9)	1 (4.5)	3 (0.7)	
• Direct blunt injury	72 (16.8)	1 (4.5)	71 (17.1)	
• Other	23 (5.4)	1 (4.5)	22 (5.4)	
Abnormal initial ED vital signs				
• Tachypnea (≥ 24 breaths/min)	35 (7.7)	5 (21.7)	30 (7.0)	.02
• Oxygen saturation (≤ 92%)	75 (16.8)	6 (26.7)	69 (16.4)	NS
• Tachycardia (≥ 100 beats/min)	42 (9.5)	3 (13.6)	39 (9.2)	NS
No. of rib fractures on ED radiographs‡				
• 1	111 (25.0)	2 (8.7)	109 (25.9)	
• 2	82 (18.5)	2 (8.7)	80 (18.9)	.001
• 3	42 (9.5)	4 (18.2)	38 (9.1)	
• ≥ 4	34 (7.7)	13 (56.5)	21 (5.0)	
• Clinical diagnosis (ie, no rib fractures on x-ray scans)	175 (39.4)	2 (9.0)	173 (41.2)	

CAD—coronary artery disease, CHUL—Centre Hospitalier de l'Université Laval, COPD—chronic obstructive pulmonary disease, ED—emergency department, HDL—Hôtel-Dieu de Lévis, HEJ—Hôpital de l'Enfant-Jésus, MVC—motor vehicle collision, NS—not significant.

*Smoking habits (current, past, or never) were not significantly associated with admission (data omitted for clarity).

†Missing data were noted on chart review for injury mechanism, delay from trauma to ED consultation, and number of rib fractures on ED radiographs.

Table 2. Characteristics of and follow-up recommendations for discharged patients, stratified by hospital: All statistical analyses were not significant.

CHARACTERISTICS AND RECOMMENDATIONS	HEJ (N = 234), N (%)	HDL (N = 134), N (%)	CHUL (N = 56), N (%)
Age			
• ≥ 65 y	57 (24.4)	38 (28.3)	13 (23.2)
• ≥ 45 y	167 (71.3)	100 (74.6)	38 (67.8)
Past medical history			
• CAD	16 (6.8)	19 (14.1)	6 (10.7)
• COPD	27 (11.5)	7 (5.2)	1 (1.8)
• Diabetes	10 (10.6)	9 (6.7)	2 (3.6)
No. of rib fractures on ED radiographs*			
• 1	64 (27.6)	28 (21.1)	17 (30.3)
• 2	46 (19.8)	23 (17.2)	11 (19.6)
• 3	21 (9.1)	12 (9.0)	5 (8.9)
• ≤ 4	14 (6.0)	7 (5.3)	0
• Clinical diagnosis (ie, no rib fractures on x-ray scans)	87 (37.5)	63 (47.4)	23 (41.1)
Injury mechanism*			
• Fall from the patient's own height	103 (44.9)	52 (41.9)	27 (50.0)
• Fall from greater than the patient's own height	48 (21.0)	28 (22.6)	8 (14.8)
• MVC	26 (11.3)	13 (10.5)	6 (11.1)
• Pedestrian and MVC	2 (0.9)	1 (0.8)	0
• Direct blunt injury	37 (16.2)	25 (20.1)	9 (16.7)
• Other	13 (5.7)	5 (4.0)	4 (7.4)
Follow-up recommendations[†]			
• Come back if there are any red flag symptoms	79 (33.6)	47 (33.1)	13 (20.3)
• Go see family doctor	31 (13.2)	22 (15.5)	12 (18.8)
• Surgical consultation	3 (1.8)		
• No recommendation	123 (52.3)	78 (54.7)	35 (54.7)

CAD—coronary artery disease, CHUL—Centre Hospitalier de l'Université Laval, COPD—chronic obstructive pulmonary disease, ED—emergency department, HDL—Hôtel-Dieu de Lévis, HEJ—Hôpital de l'Enfant-Jésus, MVC—motor vehicle collision.

*Missing data were noted on chart review for injury mechanism and number of rib fractures on ED radiographs.

[†]Patients might have had more than 1 recommendation noted during review.

recommendations recorded in their files. There were no statistically significant differences in the proportions of patients receiving recommendations noted between hospitals. **Table 3** shows physicians' recommendations stratified by age and number of rib fractures. Further stratified analyses of number of rib fractures by hospital did not show any significant trend, but numbers were relatively small. There was no evidence of better follow-up for the patients who had more ribs fractured. There were no follow-up

recommendations recorded for 61.6% of elderly patients.

Eighty-two patients (18.6%) returned to the ED for unplanned follow-up, with the main complaint (56.1%) being insufficient analgesia. Among the patients with unrelieved pain, 40 (48.7%) were 64 years old or younger and 24 (52.2%) had clinically suspected rib fractures. There was no significant difference in distribution of those patients according to number of fractures. The type of analgesia prescribed at discharge was not significantly associated with subsequent visits for uncontrolled pain. Clinically significant delayed complications were also noted in 8.3% of the overall cohort; 3.1% experienced hemothorax.

The analgesia prescribed to patients in the ED and at discharge was also recorded (**Tables 4 and 5**). Acetaminophen and opioids were prescribed more often than nonsteroidal anti-inflammatory drugs in the ED and at discharge. Nonsteroidal anti-inflammatory drugs were prescribed significantly less often for patients 65 years of age or older (5.6% vs 15.7%, $P < .001$). Analgesia, both in the ED and at discharge, varied significantly according to the number of rib fractures ($P < .05$). In the ED, opioid medications were prescribed more often as the number of rib fractures increased; however, this trend was not noted at discharge, when opioids were prescribed less often for those with 3 or more rib fractures.

DISCUSSION

This study demonstrated a significant difference among the hospitals studied in admission and discharge practices for ED patients suffering from MTI, including those with confirmed rib fractures. Lower proportions of admissions occurred in the designated trauma centres. Patient length of stay in the ED was similar across hospitals, eliminating the "ED hospitalization bias" that could have artificially lowered the proportion of in-hospital admissions. Moreover, patients who were discharged had similar characteristics across hospitals, with no influence of age or the number of fractures on management decisions. Although admissions are supervised by specialists, primary care physicians request the consultations. Therefore, we believe that our findings reflect first-line practices, as specialist consultations occurred less than 7% of the time.

More than 50% of the charts had no follow-up recommendations; this is of concern, as it was more

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common for patients with 4 or more fractures or who were 65 years of age or older. Previous publications have shown that those patients might have a higher risk of delayed complications and that they are usually

admitted for evaluation.^{5,7,12} Results from Bakhos et al showed that approximately one-third of elderly patients had pulmonary complications; however, no predictive factors for prognosis could help the emergency

Table 3. Medical recommendations made to discharged patients, according to age and the number of fractured ribs

SPECIFIC HIGH-RISK SUBGROUP OF DISCHARGED ED PATIENTS	N	RECOMMENDATIONS, N (%)*			
		COME BACK IF THERE ARE ANY RED FLAG SYMPTOMS [†]	GO SEE FAMILY DOCTOR	PLANNED ED FOLLOW-UP	NO RECOMMENDATION ^{‡§}
Age					
• ≤ 64 y	322	111 (34.5)	49 (15.2)	22 (6.8)	161 (50.0)
• ≥ 65 y	125	31 (24.8)	17 (13.6)	3 (2.4)	77 (61.6)
No. of rib fractures on initial ED radiographs					
• 0	173	52 (29.7)	22 (12.5)	7 (7.9)	98 (55.7)
• 1	109	39 (35.1)	17 (15.3)	8 (7.2)	54 (48.7)
• 2	80	33 (40.2)	14 (17.2)	6 (7.3)	40 (48.8)
• 3	38	14 (33.3)	19 (21.4)	4 (9.5)	17 (40.3)
• ≥ 4	21	3 (8.8)	4 (11.8)	0	27 (79.4)

ED—emergency department.

*Patients might have had more than 1 recommendation noted during review.

[†] $\chi^2 = 3.88$, $P = .048$ for age stratification.

[‡] $\chi^2 = 4.8$, $P = .027$ for age stratification.

[§] $\chi^2 = 14.01$, $P = .0070$ for fractured rib stratification.

Table 4. Analgesia prescribed in ED and at discharge in total sample (N = 447) and geriatric subgroup (N = 125)

TIME OF PRESCRIPTION	PRESCRIBED ANALGESIA				
	ACETAMINOPHEN, N (%)	NSAIDS, N (%)	OPIOIDS, N (%)	ICE, N (%)	NONE, (%)
In ED					
• Age ≥ 65 y	39 (31.2)	7 (5.6)*	52 (41.6)	0	65 (52.0)
• All	129 (28.9)	70 (15.7)	168 (37.6)	1 (0.2)	246 (55.0)
At discharge					
• Age ≥ 65 y	65 (52.0)	18 (14.4) [†]	18 (14.4)	6 (4.8)	29 (23.3)
• All	249 (55.7)	139 (31.1)	139 (31.1)	25 (5.6)	91 (20.4)

ED—emergency department, NSAID—nonsteroidal anti-inflammatory drug.

* $\chi^2 = 13.29$, $P = .0003$.

[†] $\chi^2 = 22.6$, $P \leq .0001$.

Table 5. Analgesia in ED and at discharge according to the number of fractured ribs

NO. OF FRACTURED RIBS	N	PRESCRIBED ANALGESIA				
		ACETAMINOPHEN, N(%)	NSAIDS, N (%)	OPIOIDS, N (%)	ICE, N (%)	NONE, N (%)
No. of fractured ribs in ED*						
• 0	175	33 (18.9)	21 (12.0)	52 (29.7)	1 (0.1)	113 (64.6)
• 1	111	30 (27.0)	14 (12.6)	33 (29.7)		70 (63.1)
• 2	82	35 (42.6)	17 (20.7)	37 (45.1)		36 (43.9)
• ≥ 3	76	30 (39.5)	18 (23.6)	46 (60.5)		25 (32.9)
No. of fractured ribs at discharge*						
• 0	173	89 (51.4)	64 (36.9)	109 (63.0)	8 (4.6)	32 (18.5)
• 1	109	72 (67.3)	34 (31.8)	76 (71.0)	12 (11.2)	19 (17.8)
• 2	80	58 (73.4)	26 (32.9)	61 (77.2)	1 (1.3)	8 (10.1)

ED—emergency department, NSAID—nonsteroidal anti-inflammatory drug.

* χ^2 P value was < .05 except for ice. Intercostal block was not used in significant proportions of patients (≤ 5).

physicians make decisions about admission.¹³ Our results suggest physicians are not following the recommendations generated from such studies, as there was little follow-up for patients at high risk of complications following rib fractures. We believe the lack of follow-up might be due to the absence of guidelines for follow-up of patients with MTIs. The findings might be affected by the fact that chart-recording must be done quickly in EDs. Also, in ambulatory care settings, space to write notes is often limited to 1 page.

Rib fractures are associated with disability and are generally not adequately treated, as shown by Kerr-Valentic et al.³ Our study seems to support those conclusions. Half of the patients coming back to the ED had a chief complaint of uncontrolled pain. Although we believe that the guidelines for discharge pharmacotherapy seem appropriate, following such guidelines might not provide adequate pain relief for some patients. As in the findings by Mayberry and Trunkey,¹⁴ there were differences in analgesia regimens depending on the number of fractures. Interestingly, more than half of the retrospective cohort received no analgesia in the ED. Our study demonstrates that during the ED phase of treatment for MTI, opioids and acetaminophen are most commonly used for analgesia. Nonsteroidal anti-inflammatory drugs were sometimes used in elderly patients, which is recommended as a precaution.¹⁵ Patients should receive analgesia for pain at discharge and in the ED, as rib fractures are associated with disability.³ Kerr-Valentic and colleagues have also pointed out that management of pain associated with rib fractures needs better attention.³ At discharge, the proportion of patients without prescriptions for analgesia dropped substantially compared with the proportion receiving analgesia in the ED; but 1 out of 5 patients was still sent home without any pain management plan. Emergency physicians should be aware of these findings, and efforts should be made to change the management of MTI, as others have previously suggested.^{3,16}

Surprisingly, patients returning to the ED with uncontrolled pain were younger than 65 years of age, and 50% had no visible rib fractures on the x-ray scans. The latter group could have affected the initial discharge prescriptions by physicians. It is important to note that simple chest x-ray scans have been shown to be inconsistent in the diagnosis of rib fracture.¹¹ Therefore, we suggest that patients with high clinical suspicion of rib fractures should be prescribed analgesia in the same manner as patients with rib fractures seen on radiographs.


Limitations

Although this study had some limitations owing to its retrospective nature, we demonstrated that there were serious delayed complications in 8.3% of patients with MTI, as has been previously shown.^{9,17} This finding

suggests that patients with rib fractures are at risk of delayed complications and current follow-up plans might be inappropriate and insufficient. This retrospective analysis of patient charts could have suffered from misclassification in our database systems. To limit that, we screened samples of the hospital databases to ensure that we missed less than 5% of rib fracture patients (eg, classified under other disease codes).

Retrospective studies depend on information retrieved from records; what is written in the charts might differ from what patients are told at discharge. The follow-up recommendations in **Table 3** help to evaluate this possible bias. One would expect that the charts of patients with suspected higher risk of complications (ie, patients 65 years of age or older with more than 2 rib fractures) would be more thorough. We have found the opposite, as there is substantially less information written in those patients' charts. This seems to confirm that the problem of underreporting is generalized and not specific to some categories of patients. Also, any retrospective study evaluating outcome at follow-up could be limited by "false-negative follow-up." Indeed, some patients might have presented with uncontrolled pain or other delayed complications that were missed, as they did not have mandatory follow-up. Statistical inference analyses should be interpreted with caution, as some categories do have small numbers (less than 30) allocated in different cells. However, we believe that clinical significance is still valuable and supports our conclusion and findings.

Conclusion

Admission and discharge proportions for MTIs or rib fractures are substantially different from previous reports and vary across surveyed hospitals. Follow-up recommendations for patients are insufficient in view of possible delayed complications or disabilities and differ from actual guidelines. The control of pain for thoracic injuries also seems to be insufficient, and we should try to improve methods to alleviate pain. A further prospective study is needed to identify predictors of delayed complications of MTI and enhance appropriate use of follow-up resources. 

Dr Shields is an emergency medicine resident at l'Université Laval in Quebec. **Dr Émond** practises emergency medicine and is a researcher in the Emergency Department at the Centre Hospitalier Affilié Hôpital de l'Enfant-Jésus in Quebec. **Dr Guimont** is an emergency physician and a researcher at the Centre Hospitalier de l'Université Laval. **Dr Pigeon** practises emergency medicine at the Centre Hospitalier Affilié Hôpital Hôtel-Dieu de Lévis in Quebec.

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Contributors

Drs Shields and **Émond** conceived the study and designed the trial. **Dr Émond** obtained research funding. **Drs Émond, Shields, Pigeon,** and **Guimont** supervised the conduct of the trial and data collection. **Dr Émond** provided statistical advice on study design and analyzed the data. **Drs Shields** and **Émond** drafted the manuscript, and all authors contributed substantially to its revision. **Drs Shields** and **Émond** take responsibility for the paper as a whole.

Competing interests

None declared

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