

Cast-Related Complications in Patients with Limb Fractures: A Cross-Sectional Study

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Abstract

Background and Objectives: Casting is the most commonly used method of treating fractures and protecting injured limbs. Nevertheless, inappropriate casting can cause severe complications. This study investigated the frequency of cast-related complications and some of the associated factors. **Materials and Methods:** A cross-sectional study was conducted on 289 patients with limb fractures requiring casting. The study was conducted from November 1, 2020, to December 31, 2021. Postcasting complications were assessed using a checklist. Patients were instructed to examine the cast at home and report any complications to the researcher by telephone. Frequency, percentage, Chi-square, Fisher's exact test, and univariate and multivariate logistic regression were used to analyze the data. **Results:** The mean age of the patients was 36.51 ± 1.72 years. Most patients (52.6%) had a short-leg cast. The mean duration of the cast was 2.66 ± 1.23 weeks. Most casts (82%) were applied by nurses. Totally, 85.5% of patients experienced at least one complication. Pain, numbness, movement disorders, swelling, and burning under the cast were the most common complications in the 1st week and occurred in 69.9%, 50.5%, 45%, 43.3%, and 39.4% of patients, respectively. In the regression analysis, patients' marital status, age, place of residence, mobility status, sex, and body mass index of patients as well as the person who applied the cast and his work experience, were associated with some of the complications ($P < 0.05$). **Conclusion:** More than two-thirds of the patients who participated in this study experienced at least a cast-related complication, indicating a high frequency of complications and the need to develop an appropriate follow-up program to prevent or timely diagnose and treat cast-related complications.

Keywords: Casting, complications, fractures, orthopedic

INTRODUCTION

Bone fractures are a global health issue. Fractures can lead to impaired health, disability, reduced quality of life, absenteeism, reduced productivity, and impose significant costs on individuals, families, and communities.^[1] According to the World Health Organization, the global incidence of fractures is 14/10,000 people per year, with fractures of the lower limb, arm, and other fractures accounting for 26%, 14%, and 5%, respectively. Fractures of the lower limbs account for the most common fractures.^[2]

Immobilization of fractured limbs has been practiced for 1000 of years. Before modern casting materials became prevalent, people used a variety of materials to make rigid molds. Over the centuries, immobilization has evolved from using simple

wooden splints to plaster of Paris, fiber, and soft casts.^[3] Casting is the most commonly used modality in the management of fractures.^[4] Casts are used not only to immobilize fractures but also to protect injured limbs and relieve pain.^[5] As an orthopedic treatment, casts are often used as a routine treatment for traumatic injuries and various musculoskeletal conditions. Casting and cast removal are usually performed by orthopedic

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physicians, residents, nurses, and plastering technicians.^[6] Although casting is a treatment, it can lead to complications.^[7] Significant complications of casts and splints are rare but can be more serious than many physicians suspect.^[8]

Complications can occur when the cast is applied, during immobilization, and during cast removal.^[6] These include deep-vein thrombosis (DVT),^[3,9] soft-tissue injuries, venous injuries,^[3] skin injuries such as pressure sores (due to incorrect or inadequate padding), skin rashes, compartment syndrome, thermal burns (due to the use of hot water or hot materials), deformities, and even cast-saw injuries.^[6] Infections may also occur rarely after the application of casts and splints but can lead to significant morbidity and mortality if overlooked.^[8] Many of these complications can be easily diagnosed, prevented, or treated timely by careful examination of the affected area and, if necessary, removal of the cast or splint.^[8] Despite the importance of proper casting and cast care, and the detrimental effects of cast complications, there are few reports on the quality of cast care and the prevalence of cast-related complications, especially in Iran. In one of the few studies in this field, Ekwall *et al.* in Sweden investigated the complications of fiberglass and hybrid casts applied for leg, ankle, and forearm fractures and reported that 25% of patients experienced complications such as chafing, loosening and poor fit of the cast, swelling, numbness, wetting, breakage of the cast, and dislocation requiring surgery a few days after the cast was applied.^[10] Adib-Hajbaghery *et al.* evaluated the quality of care before, during, and after casting in 188 patients with limb fractures and reported that the quality of care before, during, and after casting was mostly moderate.^[4] In a study in Iraq, Mohsin and Atiyah reported that nurses had limited knowledge and skills regarding cast complications.^[11] In a study of cast-related complications in a pediatric hospital in Ohio, the prevalence of cast complications was 5.62 per 1000 at 6 months, but decreased to 1.6 per 1000 at the next 10 months after a quality improvement program.^[3] In another study, the rate of skin complications was 13.6 per 1000 casts, which then decreased to 6.6 per 1000 after an educational intervention.^[12] Delasobera *et al.* also reported two cases of toxic shock syndrome and necrotizing fasciitis in children with casts.^[8] However, we found no study on the prevalence of specific cast complications in Iran. Therefore, this study was conducted to determine the incidence of cast-related complications in patients admitted to hospitals in 2020.

MATERIALS AND METHODS

Study design, setting, and participants

A cross-sectional study was performed in patients with limb fractures and in need of casts. The study was conducted from November 1, 2020, to December 31, 2021, on patients referred to an orthopedic physician's office or admitted to hospitals affiliated with Kashan University of Medical Sciences, Kashan, Iran. The sample size was calculated using the results of a previous study by Ekwall, which reported that 25% of patients with casts experienced at least one complication.^[10] Then, using

the formula for estimating a proportion $[(Z_{1-\frac{\alpha}{2}})^2 * p(1-p) / d^2]$

and considering $\alpha = 0.05$ and $P = 0.25$, 289 patients were estimated to be needed for the study.

Inclusion criteria were age of at least 18 years, having an active telephone number, recent application of plaster or fiberglass casts on the lower and/or upper limbs, application of the cast at the entrance or at least 24 h before the study and they were still in the hospital, no wound and no external or internal fixators on the casted limb/s, and inclination to participate in the study. People who did not answer phone calls for three consecutive days were excluded from the study.

Data collection instruments

The data collection instruments included three parts. The first part included questions on patients' demographic characteristics, including sex, age, marital status, education level, job, smoking, place of residence, comorbidities, former history of casting, mobility, medication history, and body mass index (BMI). There were also questions about the type of limb in the cast and the type of cast applied. The second instrument included two questions on the qualifications and work experience of the casting staff. The third part of the instrument was a 26-item checklist on immediate, delayed, and late cast complications, and the time of occurrence of each item. We developed the checklist based on the relevant literature.^[9,13,14] The content validity index and content validity ratio (CVR) of the items in the checklist were confirmed by 10 faculty members from the School of Nursing and Midwifery, Kashan University of Medical Sciences. The CVR of the items ranged from 0.82 to 0.96, whereas the CVR of the items ranged from 0.79 to 0.93. The reliability of the checklist was evaluated using the inter-rated agreement method. For this purpose, two trained observers used the checklist to independently assess 10 patients during the 1st week after casting. The Kappa agreement indicator was calculated to be 0.92.

Data collection

After the study was approved by the university ethics committee, sequential sampling was performed to select eligible patients for the study. In the above-mentioned hospitals, casting was performed only in the morning and evening shifts and in the emergency departments. The physician's office was active only during evening shifts. Therefore, a member of the data collection team (i.e., the first researcher or one of the two research assistants trained in the assessment of patients with casts) was present in the hospital emergency departments or in the office of the relevant physician during these shifts to find and recruit eligible patients. After explaining the purpose and procedures of the study to eligible patients, the researchers invited them to participate in the study, and if they agreed, their personal and clinical data were recorded.

Using the complication assessment checklist, the researcher taught patients to assess their casts and the potential complications. For instance, they were taught how to find and check for a pulse and how to check the limb for DVT. Those

who had a wound in their casted limb were also instructed to frequently assess and report symptoms of infection such as fever, localized warmth, and a foul odor beneath the cast.

All patients were followed up for 3 months through telephone contacts. For this purpose, each patient was contacted every other day during the 1st week after discharge and once a week during the following weeks. During the telephone calls, patients were asked about the occurrence of complications and their answers were recorded in the checklist. If patients indicated a complication that was not on the checklist, it was added to the checklist items.

Ethical considerations

Ethical approval of the current study was sought from the Research Council and the Research Ethics Committee of Kashan University of Medical Sciences and Healthcare Services (approval code: IR. KAUMS. NUHEPMREC.1399). The objectives of the study were explained to all participants. Participants were assured that their personal information would be kept confidential and that they were free to participate in or withdraw from the study. In addition, all study participants were provided with a written informed consent form, which they signed at the start of the study.

Data analysis

Data analysis was performed using SPSS software version 16 (SPSS Inc., Chicago, IL, USA). Frequency and percentage were calculated to describe the characteristics of the participants and the frequency of complications that occurred. Chi-square and Fisher's exact tests were used to examine the relationship between complications and relevant variables. Logistic regression analysis was performed to determine the variables associated with each cast-related complication. For this purpose, univariate logistic regression was first conducted to determine the factors associated with each complication. Then, all variables with $P \leq 0.15$ were entered into the multivariable model and analyzed using the forward method. The significance level was set at <0.05 .

RESULTS

A total of 289 patients were assessed in this study, all of whom completed the study. The mean age of the patients was 36.51 ± 1.72 years. Most patients were male (63.3%), 48.8% had a BMI of 25 and over, 44.6% had a history of the previous casting, 75.8% had no comorbid disorders, and 52.6% had a short-leg cast. The mean duration of the cast was 2.66 ± 1.23 weeks (ranging from 1 to 8 weeks). All casts were fiberglass casts, and mostly (82%) were applied by nurses [Table 1].

Totally, 85.5% of patients experienced at least one complication during the study. Table 2 shows the most common complications that occurred during the 1st week after cast application and during the entire 8-week follow-up. Pain, numbness, movement disorders, edema, and burning under the cast were the most common complications in the 1st week and occurred in 69.9%, 50.5%, 45%, 43.3%, and 39.4% of patients, respectively. Of

Table 1: Characteristics of the patients and casting staff

Variables	Frequency (%)
Sex	
Female	106 (36.7)
Male	183 (63.3)
Marital status	
Single	106 (36.7)
Married	183 (63.3)
Education level	
Illiterate	22 (7.6)
Elementary school	56 (19.4)
Secondary school	42 (14.5)
High school diploma	126 (43.6)
Academic	43 (14.9)
Qualification of the casting person	
Nurse	237 (82)
Physician	52 (18)
Job	
Unemployed	90 (31.1)
Self-employed	129 (44.6)
Official jobs	43 (14.9)
Student	27 (9.3)
Smoking	
No	232 (80.3)
Yes	57 (19.7)
Place of residence	
Urban	241 (83.4)
Rural	48 (16.6)
Comorbidities	
Diabetes mellitus	16 (5.5)
Hypertension	8 (2.8)
Cardiac disorders	11 (3.8)
Other diseases	24 (8.3)
Multi-comorbid	11 (3.8)
No comorbidities	219 (75.8)
The earlier history of casting	
No	160 (55.4)
Yes	129 (44.6)
The casted limb	
Lower extremities	181 (62.6)
Upper extremities	108 (37.4)
Upper and lower extremities	0
Type of the cast	
Long-leg cast	27 (9.3)
Long hand cast	24 (8.3)
Short-leg cast	152 (52.6)
Short-hand cast	86 (29.8)
Mobility	
Relatively active	264 (91.3)
Relatively inactive	25 (8.7)
Age group	
<30	124 (42.9)
≥30	165 (57.1)
Work experience of the casting person (years)	

Contd...

Table 1: Contd...

Variables	Frequency (%)
2-3	8 (2.8)
>3	281 (97.2)
BMI*	
<18.5 (underweight)	6 (2.1)
18.5-24.99 (normal)	142 (49.1)
25-29.99 (overweight)	92 (31.8)
≥30 (obese)	49 (17)

*Cutoff based on WHO standards. BMI: Body mass index, WHO: World Health Organization

the 19 complications observed in this study, 13 occurred with the highest frequency.

Overall, 15.2% of patients had their casts opened at home for reasons such as severe pain, distal bruising, and numbness. Numbness was significantly associated with the qualification of casting staff ($P = 0.02$) and the type of limb with the cast ($P = 0.03$). Patients with a higher BMI, those who were married, patients with a comorbid condition, those with a history of drug use, and those whose cast was applied by a nurse experienced severe pain ($P < 0.05$).

The incidence of burning sensation beneath the cast, coldness of the affected extremity, swelling, and impaired strength of the casted limb was significantly higher in patients with a lower limb cast ($P < 0.01$). The incidence of burning sensation beneath the cast, coldness, pallor, swelling, impaired strength, joint stiffness, and restriction in mobility of the affected limb, and also removal of the cast without a physician's prescription was significantly higher in patients whose casts were applied by a nurse than in patients whose casts were applied by a physician ($P < 0.05$). Pressure ulcers occurred more frequently in females and in those over 30 years of age ($P < 0.05$). Joint stiffness and decreased mobility of affected limbs also occurred more frequently in patients with lower limb casts and in patients with less mobility during convalescence ($P < 0.05$). In addition, bruising of the affected limb occurred more frequently in patients who lived in urban areas ($P < 0.05$) [Table 2].

Logistic regression showed that married people were 2.20 times more likely to complain of severe pain in the 1st week after casting than single people. For each year that the patient's age increased, the odds of reporting impaired mobility in the casted limb increased by 1.01. In addition, patients whose casts were applied by a physician were 8.06 times more likely to report impaired mobility in the casted limb than those whose casts were applied by a nurse. Patients whose casts were applied by staff with more than 3 years of experience were also 0.20 less likely to report impaired mobility in the casted limb. Furthermore, patients who lived in urban areas were 2.58 times more likely to report impaired mobility in the casted limb than those who lived in rural areas. The odds of reporting limb numbness, edema, coldness of the limb, a burning sensation beneath the cast, and pallor of the casted limb were 2.33, 3.74, 3.43, 3.19, and 4.3 times higher, respectively, in people

whose casts were applied by a physician than in those whose casts were applied by a nurse. Women were 1.68 times more likely to report a burning sensation beneath their cast than men. In addition, those who were relatively active were 0.13 less likely to report paled color in their casted limbs than those who were relatively inactive. In addition, women were 7.137 times more likely than men to develop a pressure ulcer in the 1st week after casting. Furthermore, each unit increase in BMI was associated with a 1.1-fold increase in the odds of early cast opening. People who lived in urban areas were also 3.041 times more likely to report bruising on the casted limb than those who lived in rural areas [Table 3].

DISCUSSION

Of a total of 289 patients with casts, 85.5% experienced at least one complication during the study. Ekwall *et al.* in Sweden reported that 25% of patients with casts experienced complications after casting.^[10] Difazio *et al.* in Boston, studied 5514 patients with casts and reported that a total of 75 skin complications occurred in 73 patients.^[12] In a study of cast-related skin complications, the incidence of skin complications was significantly lower in long-leg casts with foam (0.9%) than without (4.3%).^[15]

The current study followed patients for all potential cast complications, whereas other studies only assessed some common complications. For example, Ekwall *et al.* examined patients only for numbness, wetting and breakage of the cast, swelling, and loosening of the cast.^[10] Difazio *et al.* studied only skin-cast complications.^[12] Of the 26 complications investigated in the present study, 19 complications were observed. Among them, pain, impaired mobility of the casted limb, numbness, and swelling were the most common and occurred in more than half of the patients. However, in a study in Ohio, cast-saw burn, erythema, and blisters were the most common cast-related complications.^[6]

Of the 19 complications that occurred in this study, decreased limb strength and joint stiffness were noted only after the removal of the cast. Numbness occurred more frequently in patients whose casts were applied by nurses and in those who had a short-leg cast. Perhaps, patients with a short-leg cast did not take it seriously and continued their activities as they did before the cast was applied. This can put pressure on the nerves of the affected limb and cause numbness. Numbness in the lower extremities may indicate pressure on the peroneal nerve, and if persistent, can lead to foot drop and paralysis.^[14] Therefore, patients with lower limb casts should be assessed frequently for numbness and taught to report this complication if it occurs.

Our findings also showed that pain was more common in patients with a short-leg cast, in married patients, in those with a BMI of 25 or more, and in those without concomitant diseases. A burning sensation beneath the cast was also more common in patients with a short-leg cast. People with a short-leg cast and married patients may continue their routine

Table 2. The 10 most common complications occurred in the first and 8 weeks after casting

Variables	Complications									
	Pain, n (%)	Impaired mobility of the casted limb, n (%)	Numbness, n (%)	Edema, n (%)	Burning sensation under cast, n (%)	Paled color of the casted limb, n (%)	Cold ness in the extremity, n (%)	Pressure sore of limb, n (%)	Early cast opening, n (%)	Limb bruising, n (%)
Sex										
Female	79 (74.5)	51 (48.1)	54 (50.9)	42 (39.6)	49 (46.2)	23 (21.7)	24 (22.6)	4 (3.8)	9 (8.5)	13 (12.3)
Male	123 (67.2)	79 (43.2)	92 (50.3)	83 (45.4)	65 (35.5)	45 (24.6)	36 (19.7)	1 (0.5)	10 (5.5)	13 (7.1)
P	0.19	0.41	0.91	0.34	0.07	0.57	0.54	0.06*	0.31	0.14
Age group										
<30	79 (63.7)	48 (38.7)	57 (46)	49 (39.5)	45 (36.3)	34 (27.4)	26 (21)	0	6 (4.8)	8 (6.5)
≥30	123 (74.5)	82 (49.7)	89 (53.9)	76 (46.1)	69 (41.8)	34 (20.6)	34 (20.6)	5 (3)	13 (7.9)	18 (10.9)
P	0.47	0.06	0.18	0.26	0.34	0.17	0.94	0.07*	0.30	0.19
Marital status										
Single	62 (59)	40 (38.1)	47 (44.8)	43 (41)	38 (36.2)	24 (22.9)	17 (16.2)	0	3 (2.9)	6 (5.7)
Married	140 (76.1)	90 (48.9)	99 (53.8)	82 (44.6)	76 (41.3)	44 (23.9)	43 (23.4)	5 (2.7)	16 (8.7)	20 (10.9)
P	0.002	0.07	0.14	0.55	0.39	0.83	0.14	0.08	0.05	0.14
Casting staff										
Nurse	150 (63.3)	88 (37.1)	111 (46.8)	89 (37.6)	82 (34.6)	46 (19.4)	39 (16.5)	5 (2.1)	18 (7.6)	22 (9.3)
Physician	52 (100)	42 (80.8)	35 (67.3)	36 (69.2)	32 (60.5)	22 (42.3)	21 (40.4)	0	1 (1.9)	4 (7.7)
P	0.001	0.001	0.007	0.001	0.001	0.001	0.001	0.58*	0.13	0.71
Type of limb										
Lower	124 (68.5)	82 (45.3)	86 (52.5)	78 (43.1)	78 (43.1)	41 (22.7)	41 (22.7)	5 (2.8)	15 (8.3)	19 (0.5)
Upper	78 (72.2)	48 (44.4)	60 (55.6)	47 (43.5)	36 (33.3)	27 (25)	19 (17.6)	0	4 (3.7)	7 (6.5)
P	0.50	0.88	0.018	0.94	0.10	0.64	0.30	0.16*	0.12	0.24
Place of residence										
Rural	167 (69.3)	99 (41.1)	123 (51)	107 (44.4)	93 (38.6)	56 (23.2)	49 (20.3)	4 (1.7)	15 (6.2)	17 (7.1)
Urban	35 (72.9)	31 (64.6)	23 (47.9)	18 (37.5)	21 (43.8)	12 (25)	11 (22.9)	1 (2.1)	4 (8.3)	9 (18.8)
P	0.61	0.003	0.69	0.37	0.50	0.79	0.68	0.60*	0.59	0.01
BMI										
<18.5	6 (100)	4 (66.7)	4 (66.7)	5 (83.3)	3 (50)	3 (50)	3 (50)	0	0	1 (16.7)
18.5-24.99	89 (62.7)	62 (43.7)	68 (74.9)	58 (40.8)	61 (43)	29 (20.4)	26 (18.3)	2 (1.4)	8 (5.6)	11 (7.7)
25-29.99	69 (75)	41 (44.6)	46 (50)	42 (45.7)	32 (34.8)	23 (25)	19 (20.7)	2 (2.2)	6 (6.5)	8 (8.7)
≥30	38 (77.6)	23 (46.9)	28 (57.1)	20 (40.8)	18 (36.7)	13 (26.5)	12 (24.5)	1 (2)	5 (10.2)	6 (12.2)
P	0.04	0.72	0.59	0.20	0.57	0.32	0.25	0.87*	0.64	0.71
Mobility										
Relatively active	181 (68.6)	113 (42.8)	134 (50.8)	112 (42.4)	103 (39)	66 (25)	54 (20.5)	5 (1.9)	18 (6.8)	22 (8.3)
Inactive	21 (84)	17 (68)	12 (48)	13 (52)	11 (44)	2 (8)	6 (24)	0	1 (4)	4 (16)
P	0.11	0.02	0.79	0.35	0.62	0.06	0.67	0.69*	0.58	0.20
First-week frequency (%)	202 (69.9)	130 (45)	146 (50.5)	125 (43.3)	114 (39.4)	68 (23.5)	60 (20.8)	5 (1.7)	19 (6.6)	26 (9)
Cumulative eight-week frequency (%)	207 (71.6)	136 (47)	166 (57.4)	150 (51.9)	122 (42.2)	80 (27.7)	71 (24.6)	36 (12.5)	44 (15.2)	43 (14.9)

*Fisher's exact test. Data presented as n (%), P values are based on the Chi-square test for the frequencies at the end of the first week. BMI: Body mass index

Table 3: Results of multivariate logistic regression analysis for determining the factors associated with cast-related complications

Complications	Characteristics	B	SE	P	OR (95.0% CI)
Pain	Marital status (1=Married)	0.792	0.263	0.003	2.207 (1.31-3.69)
	Constant	0.110	0.904	0.017	0.115
Impaired mobility of the casted limb	Age	0.019	0.008	0.023	1.019 (1.01-1.04)
	Casting person (1=Physician)	2.087	0.385	0.000	8.060 (3.79-17.12)
	Work experience of casting person (1≥3 years)	-1.634	0.856	0.060	0.200 (0.04-1.06)
	Place of residence (1=Urban)	0.95	0.351	0.007	2.588 (1.30-5.15)
	Constant	0.7	0.887	0.847	1.187
Numbness	Casting person (1)	0.849	0.323	0.009	2.337 (1.24-4.40)
	Constant	-0.127	0.130	0.330	0.881
Edema	Casting person (1)	1.320	0.329	0.000	3.742 (1.96-7.13)
	Constant	-0.509	0.134	0.000	0.601
Burning sensation beneath the cast	Gender (1)	0.523	0.256	0.041	1.688 (1.02-2.78)
	Casting person (1)	1.161	0.320	0.000	3.194 (1.70-5.98)
	Constant	-0.845	0.174	0.000	0.430
Paled color of the casted limb	Casting person (1)	1.460	0.354	0.000	4.306 (2.15-8.62)
	Mobility status (1=Inactive)	-2.042	0.790	0.010	0.130 (0.02-0.61)
	Constant	-1.369	0.165	0.000	0.254
A cold sensation in the extremity	Casting person (1)	1.235	0.333	0.000	3.439 (1.79-6.59)
	Constant	-1.625	0.175	0.000	0.197
Pressure sore beneath the cast	Sex (1=Female)	1.965	1.125	0.081	7.137 (0.78-64.71)
	Constant	-5.204	1.003	0.000	0.005
Early opening of the cast	BMI	0.105	0.049	0.034	1.111 (1.01-1.22)
	Constant	-5.440	1.380	0.000	0.004
Bruising of the limb	Place of residence (1)	1.112	0.447	0.013	3.041 (1.26-7.30)
	Constant	-2.578	0.252	0.000	0.076

BMI: Body mass index, OR: Odds ratio, CI: Confidence interval, SE: Standard error

activities, which may also predispose them to swelling and increases pressure in the cast. Improper application of the cast due to a lack of skill on the part of the cast personnel can may also lead to swelling and pain. Overweight patients are also more prone to swelling and pain, especially if they do not limit their activities. A study of diabetic patients also found that patients with a BMI >30 were more susceptible to cast-related complications.^[16] Some studies have shown that the skills of the casting personnel and the quality of postcasting care have a significant impact on the occurrence of cast-related complications.^[11,17] Therefore, it is not only necessary for casting staff to have a high level of knowledge and skills regarding casting, cast-related complications, and their prevention^[11] but also to teach patients how to prevent, identify, and report these complications on time. According to the results of our study, more attention should be paid to patients with short-leg casts, married and overweight patients.

The present study showed that pressure ulcers were more common in females, in people over 30 years of age, and in those who used no medication. Swelling, pallor, and coldness at the end of the casted limb were also significantly related to the qualifications and work experience of the casting staff and the type of cast. Regardless of these cases, untrained casting staff and poor cast care have been shown to have significant effects on the incidence of cast-related complications, particularly

pressure ulcers.^[12] An inexperienced casting team may not be able to maintain the fractured limb in proper alignment. They may also apply inadequate or incorrect padding under the cast, particularly over the bony prominences, which then increases the risk of pressure ulcers.^[18]

In the present study, patients whose casts were applied by a nurse were more likely to attempt early cast removal. Furthermore, joint stiffness and decreased mobility of the affected limbs were more common in urban patients, patients with reduced mobility during convalescence, in patients with a lower limb cast, and in patients whose casts were applied by a nurse. Joint stiffness is a common complication of the cast and is largely related to immobility and inadequate patient education about the need for isometric movements when the cast remains in place.^[9,17] Educating patients about appropriate exercises and isometric contractions of the casted limb can prevent or reduce this problem and also help maintain joint mobility.^[14] In general, most cast-related complications can be prevented by proper cast fitting and educating patients about cast care.^[19,20]

In the regression analysis, although patients' marital status, age, place of residence, mobility status, sex, and BMI, as well as the casting person and his/her work experience, were associated with some of the complications, the person applying the cast was the most common variable associated with six of the 10

most common cast-related complications. Therefore, nurses and physicians involved in the application and care of casts should be trained in the use and care of casts. Patients should also be educated about the care of casts.

CONCLUSION

In the present study, 85.5% of patients experienced at least one complication during the time they had the cast. Pain, impaired mobility of the casted limb, numbness, swelling, burning sensation beneath the cast, pallor and coldness of the affected extremity, pressure sore, early opening of the cast, and bruising of the limb were the most common cast-related complications in this study. Many of the cast-related complications are related to the skill and experience of the casting staff. Therefore, many of the complications can be prevented by continuing the education of casting staff on proper casting technique, cast care, and cast complications, and by educating patients on proper cast care.

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Conflicts of interest

There are no conflicts of interest.

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