Prevalence of low back pain in working nurses in Zagazig University Hospitals: an epidemiological study
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Introduction

Low back pain (LBP) is a nonspecific condition of acute or chronic pain in or near the lumbosacral spines that can be caused by inflammatory, degenerative, neoplastic, gynecologic, traumatic, metabolic, or other disorders [1]. LBP is a universal health problem. It is a common experience in the life of almost every human being, as well as a growing cause of direct and indirect costs for the social systems in many industrialized countries [2]. Nursing is one of the most risky occupations for back injuries. The etiology of low back pain (LBP) among nurses is usually multifactorial, probably because job demands in nursing is a mixture of physically demanding and mentally demanding tasks.

Background

Nursing is one of the occupations with a high risk for back injuries. The etiology of low back pain (LBP) among nurses is usually multifactorial, probably because job demands in nursing is a mixture of physically demanding and mentally demanding tasks.

Objective

The aim of this study was to identify the prevalence of and risk factors for chronic LBP in nursing personnel working in Zagazig University Hospitals.

Materials and methods

This study is a quantitative, retrospective, analytical, cross-sectional one. It included 150 female nurses who are currently working in Zagazig University Hospitals. All participants completed a self-administered Oswestry Low Back Disability Questionnaire. Data for risk factors of LBP (age, height, weight, BMI, marital state, parity) and working conditions (duration of employment in the current work, average working hours per week, work demands, duration of absence from work in the last year) were collected.

Results

LBP prevailed in 79.3% of the studied group of working nurses. The highest percentage was found among nurses working in the ICU (95.0%) and the least among those working in the outpatient clinics (64.0%). There was a highly significant association between LBP and body mass index (BMI) ($P < 0.001$). A higher incidence of LBP was associated with lifting heavy loads, followed by twisting, prolonged standing, prolonged sitting, walking for long distances, and bending forward.

Conclusion

Prevalence of LBP is high among nurses, resulting in significant medical and socioprofessional consequences. Risk factors necessitate multidisciplinary involvement to reduce the incidence of LBP and related costs.

Keywords:
Egypt, low back pain, nurses, prevalence, Zagazig

Egypt Rheumatol Rehabil 41:109–115
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1110-161X
It has been observed that individuals suffering from LBP might develop major disruptions in their physical, social, and mental well-being, which could affect their occupations. Physical impact includes the loss of physical function and deteriorated general health. Social impact includes decreased participation in social activities. Psychosocial impacts are manifested through insomnia, anxiety, and depression [9].

**Objective**
This study aimed to determine the prevalence of LBP in nursing personnel working in Zagazig University Hospitals, as well as identify risk factors and analyze how individual and occupational characteristics would contribute to the risk of LBP.

**Materials and methods**

**Study design**
This study was based on a quantitative and analytical cross-sectional design. This design was chosen because it is useful and less expensive and enables the researchers to meet the study objectives in a short period of time.

**Target population**
The target population consists of 150 nurses who are currently working in operating departments, ICUs, and outpatient and inpatient clinics in Zagazig University Hospitals. Zagazig University Hospitals is the biggest hospital in Sharkia Governorate in eastern Egypt. All nurses included in this study were given full detailed written information about the reason and aim of the study. Verbal and written consent was obtained from all nurses before enrolling them in the study.

This study was approved by the institutional ethics committee.

**Data collection**
Between November 2011 and November 2012 the participants completed a self-administered Oswestry Low Back Disability Questionnaire [10] at their workplace; a research assistant checked the returned questionnaires onsite to ensure their completeness. The questionnaire was designed to measure a patient’s permanent functional disability and is considered the ‘gold standard’ of low back functional outcome tools. This questionnaire includes 10 items (pain intensity, personal care, lifting heavy weights, walking, sitting, standing, sleeping, sex life, social life, and traveling).

Data on risk factors for LBP (age, height, weight, BMI, marital state, parity), working conditions (duration of employment in current work, average working hours per week, work demands, duration of absence from work in the last year), and therapeutic modalities used to overcome LBP were all collected.

**Low back pain assessment**
For this study, LBP was defined as pain in the lower part of the back. LBP associated with thigh or buttock pain radiating down the lower limb was also acceptable. Chronic LBP was defined as pain lasting for more than 12 weeks in a year. LBP prevalence represents the occurrence of LBP during the preceding 12 months. LBP was classified as follows: no pain if pain occurred for 0 days; mild pain if pain occurred for 1–7 days; moderate pain if pain occurred for 8–30 days; and severe pain if pain occurred for more than 30 days [11].

All participating nurses included in this study were examined carefully at the outpatient clinic of the Rheumatology and Rehabilitation Department, Zagazig University Hospitals. They were subjected to:

1. Full clinical examination, which included inspection, palpation, range of motion, straight leg raising test, and femoral stretch test.
2. Neurological examination to determine the affected dermatomes and myotomes in the case of segmental nerve root lesion.
3. Plain radiograph (anteroposterior and lateral views) of the lumbarosacral vertebrae and sacroiliac joints.
4. MRI of the lumbarosacral vertebrae for a few nurses who suffer from resistant chronic LBP with progressive neurological deficits or when serious underlying pathology was suspected (these cases were excluded from the study).

**Statistical analysis**
Analysis was carried out using descriptive statistics and the testing of hypotheses. The data was analyzed by using Excel 2003, R 2.8.0 the Statistical Package for the Social Sciences (SPSS) for Windows Version 16.0 (SPSS Inc; Chicago, IL, USA) and the EPI Info 3.5.1 Windows Version. The χ²-test was used to examine the association between variables. A P-value less than 0.05 (two-tailed) was used to establish statistical significance.

**Results**

**Demographic characteristics**
Among the 150 studied nurses, 119 (79.3%) suffered from LBP. Chronic LBP complaints (>3 months) were seen in 76.5% (91/119) of nurses, followed by recurrent complaints in 17.6% (21/119) and acute complaints
Prevalence of low back pain in nurses

Abou El-Soud et al. (2011) reported that among nurses, low back pain (LBP) was seen in 49 of 72 nurses (68.1%) with a BMI less than 30 kg/m², whereas it was seen in 70 of 78 (89.7%) nurses with a BMI of 30 kg/m² or more. LBP was seen in 4 of 72 (5.9%) among nurses aged under 2 months. Regarding LBP duration, 29.4% of nurses complained of LBP lasting for 1–7 days, 31.1% had LBP for 7–30 days, and 39.5% had LBP for more than 30 days. Morning stiffness was reported by 46 (38.7%) nurses and nocturnal pain by 96 (80.6%) nurses.

Clinical characteristics of low back pain among studied nurses

Results showed that mild-to-moderate LBP among nurses was associated with paravertebral muscle spasm and diminished lumbar lordosis (68.1%), whereas severe LBP among nurses was usually associated with sensory nerve root affection of the lower limbs along the dermatome supplied by that sensory nerve root (10.08%), and/or motor nerve root affection associated with weakness of the lower limb muscles supplied by that motor nerve root (7.6%), as shown in Table 1.

Individual risk factors associated with low back pain among nurses

There was a significant association between LBP complaints and age of the studied nurses (P < 0.02). LBP was highest among nurses older than 40 years (86.5, P < 0.02), followed by those between 20 and 30 years (83.30, P < 0.03) (Table 2).

The relationship between body mass index and low back pain in the studied nurses

Results showed that there was a highly significant association between BMI and LBP complaints among nurses (P < 0.001). LBP was seen in 49 of 72 (68.1%) nurses with BMI less than 30 kg/m², whereas it was seen in 70 of 78 (89.7%) nurses with BMI of 30 kg/m² or more.

Work-related risk factors of low back pain among the studied nurses

Results showed that the highest percentage of nurses with complaints of LBP was among those working in the ICU (95.0%), followed by the surgical departments (88.1%) and the internal departments (74.6%), and the lowest was in the outpatient clinics (64.0%), as shown in Table 3.

Work-related physical risk factors

LBP was particularly high among nurses who had to lift heavy loads (85.7%). Other related awkward work postures were twisting (83.2%), prolonged standing (73.9%), prolonged sitting (71.4%), walking for long distances (70.6), and bending forward (69.8%) (Table 4).

In this study the highest percentage of LBP complaints was in nurses employed for 20 years or more (86.1%),

Table 1 Clinical characteristics of BMI and LBP complaints among studied nurses

| Positive signs                                      | N (%)  |
|-----------------------------------------------------|--------|
| Paravertebral muscle spasm with diminished lordosis | 81 (68.1) |
| Limited range of motion (ROM) of back               | 92 (77.3) |
| Weakness of muscles of LLs                          | 9 (7.6)   |
| Absent or diminished ankle jerk reflex              | 4 (3.7)   |
| Absent or diminished knee jerk reflex               | 1 (0.84)  |
| Diminished sensations in the LLs                    | 12 (10.08) |
| Positive straight leg raising test                   | 73 (61.3) |
| Positive femoral stretch test                        | 42 (35.3) |

Table 2 Relationship between age and low back pain in the studied nurses

| Ages (years) | Total (N) | Complaint positive (N [%]) | OR (95% CI) | P       |
|--------------|-----------|----------------------------|-------------|---------|
| >18 and <20  | 15        | 8 (53.3)                   | 1           | –       |
| 20–30        | 48        | 40 (83.30)                 | 4.38 (1.04–18.88) | 0.03*   |
| 30–40        | 50        | 39 (78.0)                  | 3.1 (0.79–12.42) | 0.09    |
| >40          | 37        | 32 (86.5)                  | 5.6 (1.17–28.49) | 0.02*   |

Table 3 Low back pain among nurses working in different hospital departments

| Hospital departments | Complaint positive [N (%)] |
|----------------------|---------------------------|
| Internal departments (63) | 47 (74.6) |
| Surgical department (42)   | 37 (88.1) |
| ICUs (20)               | 19 (95.0) |
| Outpatient clinics (25)   | 16 (64.0) |

Table 4 Work related physical risk factors for low back pain among nurses

| Work posture exaggerating LBP Nurses with LBP (N = 119) [N (%)] |
|---------------------------------------------------------------|
| Twisting                                                      |
| No                                                           | 20 (16.8) |
| Yes                                                          | 99 (83.2) |
| Bending forward                                              |
| No                                                           | 36 (30.2) |
| Yes                                                          | 83 (69.8) |
| Weight lifting                                               |
| No                                                           | 17 (14.3) |
| Yes                                                          | 102 (85.7) |
| Prolonged sitting                                            |
| No                                                           | 34 (28.6) |
| Yes                                                          | 85 (71.4) |
| Prolonged standing                                           |
| No                                                           | 31 (26.1) |
| Yes                                                          | 88 (73.9) |
| Walking for long distance (1.6 km)                           |
| No                                                           | 35 (29.4) |
| Yes                                                          | 84 (70.6) |

LBP, low back pain.
followed by those in employment for 10 to less than 20 years (83.3%) (Table 5). Workplace/employment factors such as seniority in the establishment, duration of employment, work shift, and hours of work per month did not have a significant relationship with LBP complaints among nurses (Table 5).

We reported that 35 (29.4%) nurses suffered from mild LBP (lasting for 1–7 days), 37 (31.1%) nurses suffered from moderate LBP, and 47 (39.5%) nurses suffered from severe LBP (Table 6). LBP-related sickness absence clearly represents a major cost to Zagazig University Hospitals. In this study the duration of sick leaves was 1–7 days among 58.8% of nurses with LBP, followed by 8–30 days (25.2%), and then more than 30 days (16%) (Table 6).

Results showed that nurses with LBP sought medical advice for management of their symptoms; 40.33% received medications in the form of NSAIDs and muscle relaxants, 23.53% received physiotherapy, 16.63% used topical preparations, 14.28% required time off work, and 5.88% used a back belt. Results showed that 32.8% of the LBP complaints persisted even with rest in 32.8% of nurses and improved with rest in 67.2%.

Table 5 Relationship between low back pain of the studied group of nurses and workplace/employment factors

| Workplace/employment factors | LBP complaint positive [N (%)] | OR (95% CI) | P |
|------------------------------|--------------------------------|-------------|---|
| Job grade                    |                                |             |   |
| Ordinary nurse (N = 114)     | 90 (78.9)                      | 1.1 (0.4–3.16) | 0.83 |
| Head nurse (N = 36)          | 28 (80.5)                      |             |   |
| Duration of employment (years) |                               |             |   |
| <5 (N = 15)                  | 9 (60.0)                       |             |   |
| 5 to <10 (N = 27)            | 19 (70.4)                      | 1.81 (0.39–8.62) | 0.49 |
| 10 to <20 (N = 72)           | 60 (83.3)                      | 3.33 (0.85–13) | 0.07 |
| ≥20 (N = 36)                 | 31 (88.1)                      | 4.13 (0.84–21.18) | 0.06 |
| Work shift                   |                                |             |   |
| Day shift (N = 55)           | 43 (78.2)                      | 1.12 (0.46–2.7) | 0.79 |
| Rotatory shift (N = 95)      | 76 (80.0)                      |             |   |
| Hours of work/month (h)      |                                |             |   |
| <216 (N = 58)                | 44 (75.9)                      | 1.4 (0.59–3.35) | 0.4 |
| ≥216 (N = 92)                | 75 (88.5)                      |             |   |

Cl, confidence interval; LBP, low back pain; OR, odds ratio.

Table 6 Duration of low back pain in studied nurses and its effect on work productivity (absence from work)

| Duration of back pain complaints | Positive LBP complaint (n = 119) |
|----------------------------------|---------------------------------|
| [N (%)]                          |                                 |
| Duration of the complaints       |                                 |
| No LBP (0 days)                  | 0 (0)                           |
| Mild LBP (1–7 days)              | 35 (29.4)                       |
| Moderate LBP (8–30 days)         | 37 (31.1)                       |
| Severe LBP (>30 days)            | 47 (39.5)                       |
| Duration of absence from work in the last year (days) | |
| 1–7                              | 70 (58.8)                       |
| 8–30                             | 30 (25.2)                       |
| >30                              | 19 (16.0)                       |

LBP, low back pain.

Discussion
LBP is a very frequently occurring phenomenon. Among adults in the general population, 70–85% were believed to experience at least one episode of LBP at some time during their lives [12]. The direct and indirect costs of LBP in terms of quality of life, productivity, and employee absenteeism are enormous, making this common condition the single largest contributor to musculoskeletal disability worldwide [13]. LBP is associated with multiple risk factors, including sex, age, lifestyle, and psychosocial profile, physical demands at the workplace, social support, and pain perception [14]. Hospital workers seem to have higher rates of LBP compared with the general population because of physical and emotional factors involved in their occupation [14].

In the current study we found that the prevalence of LBP complaints was 79.3%. Nurses in Egypt, like their counterparts in Africa and developed countries, also suffer from LBP. A study conducted among nurses in Kanombe Hospital, Kigali, Rwanda, revealed an annual prevalence of LBP of 78% among nurses [15]. This result was consistent with that of Aljeesh and Al Nawajha [16] and Harber et al. [17] who found that the prevalence of LBP among nurses was 70.6 and 79%, respectively. A study conducted in two selected hospitals in Nigeria and Ethiopia also revealed a high 1-year prevalence of LBP (71%) among nurses [18]. Similarly, other studies, one in Greece [19] and another in Turkey [20], also reported that nurses have the highest risk for LBP among all hospital staff.

We recorded that the annual LBP among nurses was chronic in 76.5%, acute in 5.9%, and recurrent in 17.6%. This is consistent with the study by Maul et al. [11], who reported that the annual prevalence of LBP among nurses was high (73–76%) and of chronic type, probably because of the cumulative effects of various work stressors over the years. Results showed that 32.8% of LBP complaints persisted even with rest, and 67.2% improved with rest. This is in agreement with the results of Bejia et al. [21], who found that 30% of complaints persisted and 70% improved with rest and that persistent complaints were due to frequent uninterrupted work with unfixed breaks.

In this study the majority of the nurses reporting a high prevalence of LBP were married (86.55%). This
in agreement with the study by Lela and Frantz [15], who reported a high prevalence of LBP among married nurses (84%) and the statistical test revealed a significant relationship between LBP and marital status \( (P = 0.02) \). Another study by Bejia et al. [21] also found that being married or divorced is considered one of the important risk factors for LBP \( (P < 0.01) \). It was suggested that this could be attributed to the fact that most of them hire maids to help with their domestic work and use public means of transport to and from work as well as to other places [21].

In the present study most of the nurses suffered from localized LBP (68.1%), whereas 10.08% complained of LBP associated with numbness or pain radiating to the lower limbs and 7.6% complained of LBP associated with motor weakness of their lower limb muscles. This is in agreement with a study by Wong et al. [22] who reported that most participants had localized LBP (64.2%), whereas 35.8% complained of LBP associated with numbness or pain radiating to the lower limbs.

In this study, there was a significant association between LBP complaints and age of the studied nurses. LBP was highest among nurses older than 40 years (86.5%, \( P < 0.02 \)), followed by those in the age group 20–30 years (83.30%, \( P < 0.03 \)). The increase in the prevalence of LBP with age concurred with the findings of Sikiru and Hanifa [23], who found that the prevalence of LBP increased with age; age groups less than 35, 36–45, and more than 46 reported LBP of 6.3, 27, and 66.7%, respectively. A cross-sectional survey conducted in Nigeria showed the association between self-reported 12-month prevalence of LBP and age among nurses; the highest percentage of respondents belonged to the age group 31–40 (68.4%) years and the lowest was among respondents over 50 years of age (37.5%) [24]. The lower rate of LBP among the very senior nurses in terms of age and years of clinical practice may be attributed to less patient handling but more administrative duties that often come with being in a higher job cadre. Another explanation might be that experienced and older nurses have increased level of knowledge about injury prevention, avoid carrying harmful physical loads, and have developed better coping strategies for musculoskeletal problems compared with less experienced and younger nurses. From occupational studies, healthy survivor effect describes a continuing selection process such that those who remain in an employment tend to be healthier over time [25]. The healthy worker survivor effect generally attenuates an adverse effect of exposure. It is believed in cross-sectional studies, that survivor effects will typically decrease the observed associations between symptomatic disorders and physically demanding jobs. However, the mechanism of the survivor effect is still poorly understood [26].

In the present study, BMI was significantly associated with LBP complaints among nurses \( (P < 0.001) \). The incidence of LBP complaints in nurses with BMI 30 kg/m\(^2\) or more was 89.7%, whereas in those with BMI less than 30 kg/m\(^2\) it was 68.1%. This result was consistent with that of Bejia et al. [21], who reported that factors associated with LBP among nurses were age, female sex, high BMI, extraprofessional activity, duration of employment, and heavy weight lifting. However, this was in contrast to that reported by Aljeesh and Nawajha; found that there was no statistically significant difference between BMI in relation to LBP; however; the highest percentage of LBP complaints was among nurses with BMI 30 kg/m\(^2\) or more (82.8%) [16].

Results showed that the highest percentage of LBP complaints was among nurses working in the ICU (95.0%), followed by surgical departments (88.1%), and the least percentage was in the outpatient clinics (64.0%). This is in concordance with the study by Harber et al. [17] who recorded that 87.0 and 75.0% of nurses working in the ICU and surgical departments, respectively, complained of LBP. These results could be explained on the basis that ICU and surgical wards are highly demanding departments where nurses sometimes have to take care of unambulatory patients, whereas the outpatient clinics are the least stressful departments with simple work tasks, regular short duration, daytime work shift (6 h/day), and fixed holidays on Fridays.

The high LBP prevalence among nurses can be explained by the high workload and work conditions, particularly the requirement for heavy lifting. This study showed that nurses who were required to lift heavy loads have the highest percentage of LBP (85.7%). Other awkward work postures associated with increased risk of back problems among nurses were twisting (83.2%), prolonged standing (73.9%), prolonged sitting (71.4%), walking for long distances (70.6%), and bending forward (69.8%). This result was in accordance with those of Wong et al. [22] who found that the percentage of nurses with LBP as a result of lifting heavy loads was 87.4% \( (P < 0.001) \). This result was also in agreement with a study by Feng et al. [27] who revealed that physical factors were more strongly associated with severe LBP than with mild LBP (pain lasting for at least 1 day). For example, when nurses increased the number of manual transfers of patients between bed/wheelchair and bath cart by one time in a work day; the risk of pain lasting for at least 1 day increased by 75% and the risk for seeking medical care for LBP increased by 251%. These findings were consistent with previous findings of Chiou et al. [28], Smedley et al. [29], and Alexopoulos et al. [30], who
showed that manual patient handling is the most important risk factor for LBP among nursing staff. Moreover, when the perceived physical exertion in a work day increased by one point, the risk for pain lasting for at least 1 day increased by 27%, and the risk for intense pain and sick leave because of LBP increased by 99 and 48%, respectively. Although an epidemiological study of occupational back pain in Iranian nurses demonstrated that lifting was the most common cause of LBP, the prevalence of LBP among nurses who were required to lift heavy loads was only 30.4%. An explanation might be the large number of nurses (1226) randomly recruited into that study from 13 general hospitals in northern Iran and the use of different questionnaires to cover personal data, professional data, prevalence, and associations of risk factors with LBP [31].

In this study the highest group complaining of LBP was the group that had been employed for 20 years or more (86.1%), followed by those who had been employed for 10 to less than 20 years (83.3%) (Table 5). This was consistent with the study of Aljeesh and Al Nawajha [16], who found that the highest incidence of LBP was in the group of nurses who had been employed for 23–36 years (100%). Similarly, Tinubu et al. [24] showed that the relative risk of work-related musculoskeletal disorders is about four times more among nurses with greater than 20 years of clinical experience than in those with 11–20 years and is about two times more in those with 1–10 clinical years of experience. These results were in agreement with those of June and Cho [32] who showed that nurses with 2–4 years of working experience in the ICU had the greatest probability for back pain.

Workplace/employment factors such as seniority at the establishment, duration of employment, work shift, and hours of work per month have no significant relationship with LBP complaints among nurses. This is consistent with the study by Wong et al. [22] who found that seniority in the establishment (P = 0.164), direct patient contact (P = 0.061), levels of self-reported knowledge on back care (P = 0.11), and previous training in back care (P = 0.831) did not appear to be correlated to LBP. Tinubu et al. [24] also reported that the rate of work-related musculoskeletal disorders was not significantly associated with the number of hours per week in direct patient care. In another study, work on a day shift was a risk factor for low back problems [33].

In this study LBP was mild in 35 (29.4%) nurses, moderate in 37 (31.1%), and severe in 47 (39.5%). This result was consistent with that of Maul et al. [11], who reported that 35% of nurses complained of mild LBP (1–7 days) and 33% of moderate to severe LBP (>8 days) within the preceding 12 months.

LBP-related sickness absence clearly represents a major cost to Zagazig University Hospitals. In this study the most commonly reported sick leave duration was 1–7 days in 58.8% of nurses suffering from LBP, followed by 8–30 days (25.2%) and finally more than 30 days (16%). Similarly, Mitchell et al. [34] found that over 60% of nurses with LBP in the previous 12 months reported an annual duration of 1–7 days. This was also in agreement with the results of Cunningham et al. [35], who revealed that the most commonly reported sick leave duration for this organization (Dublin hospital) was 2 days, an absence that does not necessitate medical certification.

In the current study, nurses with LBP sought medical advice for alleviation of their symptoms; 40.33% received medications in the form of NSAIDS and muscle relaxants, 23.53% received physiotherapy, 16.63% used topical preparations, 14.28% required time off work, and 5.88% wore a back belt. This was consistent with the results of Wong et al. [22], who found that 34.1% of LBP sufferers sought treatment for their symptoms, and of those who sought treatment 60.5% received traditional treatments, 27.7% received modern treatments, and 11.8% received both. Most were never diagnosed by a healthcare professional (88.0%) and only five (1.4%) individuals underwent surgical procedures related to their LBP. Harcombe et al. [36] reported that, of the 1003 nurses with musculoskeletal disorders, 18% required time off work and 24% required modified work duties. This was also in agreement with the results of Mitchell et al. [34] who found that around 60% of all respondents with LBP utilized at least one of the following:

(a) Treatment,
(b) Medication, or
(c) Reduction in activity.

Conclusion
There was a high prevalence of LBP among nurses, resulting in significant medical and socioprofessional consequences. Many risk factors were identified that would necessitate multidisciplinary involvement to reduce LBP incidence and related costs. Working in the same position for long periods, lifting or transferring dependent patients, and treating an excessive number of patients in a single day were the most perceived work-related risk factors for LBP.

Recommendations
We recommend that education programs on prevention and coping strategies for musculoskeletal
disorders be made mandatory for nurses in order to reduce the rate of work-related musculoskeletal disorders, including LBP, and promote efficiency in patient care.

Acknowledgements
Conflicts of interest

None declared.

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