Long-Term Assessment of a Sanitary Education and Lumbar Rehabilitation Program for Health Care Workers With Chronic Low Back Pain at the University Hospital of Lille

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A back school was established in 1992 at the University Hospital of Lille (France) for employees with low back pain. We report its medical and socioeconomic benefits with a mean time to follow-up of 4 years. Our retrospective study included 108 health care workers and provides objective data (absenteeism, use of health care) and subjective information (progression of pain and disorder, social and professional impact) before training and a mean of 4 years after training. We found that 92% of the participants were satisfied with the training and that back pain had regressed or resolved for 55% of them. Both the frequency and duration of pain had decreased significantly. Seventy percent continue to apply the advice they received in their everyday life. Dealing with the problems specific to professional activities contributed to reduce the strain experienced on the job by the health care workers and improved their satisfaction at work. Global absenteeism was reduced by 57.8%, whereas it was reduced by 33% for back pain alone 4 years after implementing this program. Our study provides evidence of the positive impact of this type of training on the way back pain is perceived and on everyday life. The assessment of the cost/efficiency ratio completes the list of durable benefits reported here. (J Occup Environ Med. *2001;43:289–294*)

The physical and psychological strain of hospital work and certain work conditions is implied in the occurrence or aggravation of back disorders. As a result, low back pain has become a major public and occupational health care problem.[1,2]

Health care workers undergo most of the risk factors giving rise to low back pain;[3] therefore, they constitute one of the most preferentially affected body of workers. Various epidemiologic studies report a high prevalence of low back pain among hospital employees, ranging from 48% to 65%.[4,5] Low back pain has become a major social and professional problem in hospitals because of the human and economic toll it takes,[6] not to mention its impact on the professional and social lives of affected employees. That is why in 1992, in collaboration with the department of Physical Medicine and Rehabilitation, we created a back school specifically geared to health care workers experiencing low back pain. Our aim was secondary prevention by (1) ensuring sanitary and posture rehabilitation for personnel in their professional and personal lives, and (2) changing a passive subject into a person who actively works on his or her consolidation or cure.

After 1 year, we performed a first study that yielded very positive results on pain perception, professional life, and reduction of use of health care and absenteeism.[7] These en-

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couraging results prompted us to institutionalize the back school.

We now present a 4-year follow-up report on all employees who were trained (mean, 47.5 months; range, 24 to 78 months). We analyzed both objective and subjective criteria, such as use of health care, absenteeism for health reasons, clinical progression and perception of back pain, and impact on professional and everyday life.

Material and Methods

Ours was a 1999 retrospective study of a professional cohort of 108 health care workers at the University Hospital (CHRU) of Lille who received training at the back school between April 1992 and April 1997.

An occupational doctor is in charge of recruiting personnel eligible for training at the back school during regular physical examinations. This doctor is assisted by a physiatrist from the back school, who confirms the indication for training (ie, the primitive nature of the disease, the chronicity and resistance to classical treatments of chronic low back pain).

Inclusion criteria for the study were the occurrence of chronic low back pain, with or without chronic radiculalgia, for which other symptomatic etiologies have been ruled out. Our definition of chronic low back pain is that recommended by the French Agency for the Development of Medical Evaluation, ie, long-lasting pain exceeding 6 months a year with frequent recurrences.[8–10] Exclusion criteria included acute back pain and cases in which medical treatment was not properly followed, because patients may still profit from classic treatments.

A total of 125 people were recruited for training during the period covered by the study; 12 were temporarily excluded either because they were needed in their department or they experienced back pain at the time of the session. Five health care workers refused to participate in the study.

The assessment study included a clinical examination, a medical and socio-professional questionnaire, and two self-questionnaires (EIFEL and Dallas). The collected data encompassed the type and history of back disorders, attempted treatments, rheumatologic functional progression, sick leaves for back pain, and socio-professional conditions. The EIFEL self-questionnaire (Echelle d'Incapacité Fonctionnelle pour l'Evaluation des Lombalgies) is the validated French version of the disability questionnaire by Roland and Moriss[11,12]. It consists of 24 yes/no items and is very informative for longitudinal studies among patients with chronic low back pain. A maximum score of 24 is obtained when low back pain has a severe impact on life.

Quality of life of patients with chronic back pain was assessed by means of the Dallas self-questionnaire. This comprises 16 items given as percentages and examines the impact of pain in four areas: routine activities, professional and recreational activities, anxiety and depression, and social activities.

Administrative data on sick leaves (regardless of the reason, except maternity) were obtained from the Human Resource Department. In our study, we included absenteeism for the period between 2 years before the training at the back school and 2 years after.

The medical and socio-professional data collected concerned the 12-month period before training at the back school and the last 12 months before the study (ie, a mean time to follow-up of 4 years after the back school).

Back School

The back school was created in 1992 at the University Hospital (CHRU) of Lille for health care workers with low back pain. Training sessions for 6 to 8 people are organized three times a year as a part of continuing education. The 5-day sessions last from 9:00 to 5:00 each day, and meals are taken together. In charge of the group is a multidisciplinal team, including:

- a physiatrist from Physical Medicine and Rehabilitation
- physical therapists
- a podiatrist
- a psychologist
- occupational physicians.

Training is presented on the first day, along with the principles of rehabilitation, medical assessment and professional consequences of the disorder, and evaluation of the health care worker's own knowledge of the disorder. This includes a rheumatologic examination; assessment by a physical therapist, podiatrist, and psychologist; a videotape showing an obstacle course; and an evaluation of the working conditions by the occupational doctor. The schedule of the subsequent days includes:

- elementary notions on the anatomy and physiology of the spine
- manipulations by the physical therapist (mobility of the trunk and lower limbs, awareness of posture, tilting of the pelvis, and locking of the lumbar spine)
- an obstacle course to learn and/or correct proper posture (with the help of a videotape)
- balneotherapy and relaxation
- advice for moving heavy loads, and practice.

On the last day, the program information is summarized, the degree of handicap is measured for each participant and an individual follow-up schedule is established, and appropriate professional adaptations are discussed. Six months to 1 year after initial training, employees come back for a day of revision.

Statistical Analysis

Data were encoded and computer-assisted analyses were performed with EPI INFO and SAS software (Cary, NC) on a DELL XPS P166 microcomputer. The findings were subsequently described and the

means, standard deviations, and frequencies were calculated. Analysis of contingency tables was performed with the chi-squared test. Yates' correction was used when cells had expected counts of less than five.

Results

The general characteristics of the population are summarized in Table 1 and are consistent with the current and usual characteristics of hospital personnel: an outstanding predominance of female employees, an aging population (mean age, >42 years), marked seniority (mean seniority, 18 years), and an overrepresentation of nurses and nurses' aides (56.4% of the cohort). In addition, 37% of the population had a body mass index above 25 for women and 27 for men.

Table 2 summarizes the medical characteristics of patients with low back pain. The history of low back pain was long, with an average onset of 11.8 years earlier. Nine percent of the population with low back pain also reported acute episodes of lumbago or sciatica. Sixty percent reported chronic low back pain, and nearly one-third had chronic lumbo-sciatica.

TABLE 1
General Characteristics of the Study Population (n = 108)

Age (years)	42.12 ± 6.12*
Seniority (years)	18.95 ± 5.86*
Body mass index > 25	40 (37%)
Profession	
Nurse and nurse's aide	61 (56.4%)
Cleaning and technical personnel	47 (43.6%)

* Mean ± SD.

TABLE 2
Medical Characteristics of the Population at the Beginning of Back School (n = 108)

No. of years since onset of low back pains (mean ± SD)	11.81 ± 6.42
Chronic low back pain	65 (60.2%)
Chronic low back pain + acute lumbago or sciatica	10 (9.3%)
Chronic lumbo-sciatica	33 (30.5%)

The medical impact of training received at the back school is presented in Table 3. It was assessed by comparing the progression of painful episodes during a 12-month period before training and the year before the assessment, the use of health care, and absenteeism due to back-related disorders. Overall, hospital workers who received training at the back school reported that they still had low back pain but that the frequency of its occurrence and duration of the episodes had decreased significantly. One year before training, 44% of our population reported almost permanent back pain versus 25% 4 years after the program.

Since training at the back school, 44% (n = 48) reported that pain had regressed, 11% (n = 12) that it had resolved, and 33% (n = 36) that the situation remained unchanged. Concerning the use of health care for low back pain, the number of consultations with rheumatologists and general practitioners decreased significantly, along with drug use. Absenteeism due to low back pain also decreased significantly: a total of 469 days of absence were noted (mean, 19.5 days per subject), accounting for 18% of total absenteeism during the year before the study.

The distribution of sick leaves over a period of 4 years (2 years before the training and 2 years after) is given in Fig. 1. The distribution shows an obvious drop in sick leaves lasting over 21 days within the 2 years after training took place and more people without any sick leave (24 vs 9 subjects). Overall absenteeism decreased by 57.8% during this time, with a total of 2564 unworked cumulative days (mean, 24.4 days), as opposed to 6075 cumulative days (mean, 57.4 days) during the 2-year period before training at the back school.

Table 4 summarizes the impact of training on the quality of professional and personal life. This was assessed by means of questions on satisfaction and/or strain at work and on such criteria as playing sports or performing domestic activities. Employees who trained at the back school were particularly pleased with the education they received, with 92% expressing satisfaction. In addition, 74% stated that their condition was improved when working in their home (eg, during housecleaning and/or home improvement), and 68% had resumed a sports activity. The psychological impact of low back pain as assessed by the Dallas scale appeared to be more marked in personal and professional activities (37%) than in sociability or signs of anxiety and depression (19% and 23%, respectively). The functional consequences of low back pain as assessed by the EIFFEL scale were generally low, with a mean score of 6/24.

Discussion

Our study was original in that it focused on the overall evaluation of the back school based on subjective (pain progression) and objective criteria (use of health care and absenteeism), with a mean time to follow-up of 4 years (mean, 47.5 months; range, 24 to 78 months). The diversity of the methods used to implement and assess other European and American back schools makes it difficult for us to compare our results with theirs, particularly with regard to average-length follow-up: most studies present results after 1 year of school operation.[13–17] That is why our quantitative (socioeconomic cost) and qualitative study sheds new light on the long-term benefits of the training.

Another original feature is the way the training itself is implemented: not only is the back school geared to a very specific group of people, namely, health care workers, but it also belongs to a specialized department of the hospital for physical medicine and rehabilitation. Training consists of an intensive 8-hours-per-day, 5-day-per-week intervention program delivered by a specialized multidisciplinal team of physicians, physical therapists, a psychologist,

TABLE 3
Medical Impact of Back School

Parameters	Before Training		After Training		Significance Test	
	n	%	*n*	%	X^2	*P* (X^2)
No. of painful episodes						
None or one	60	55.6	81	75	9.38	0.01
Recurring or permanent	48	44.4	27	25		
Length of painful episodes						
< 3 months	48	44.4	76	70.3	14.5	
> 3 months	60	55.6	22	29.7		< 0.001
Medical consultations						
General practitioner	68	63	43	39.8	13.71	< 0.001
Specialist	42	38.9	23	21.3	8.52	< 0.01
Drug intake	92	85.2	77	71.3	7.25	< 0.01
Absenteeism for low back pain	60	55.6	24	22.2	27	< 0.001

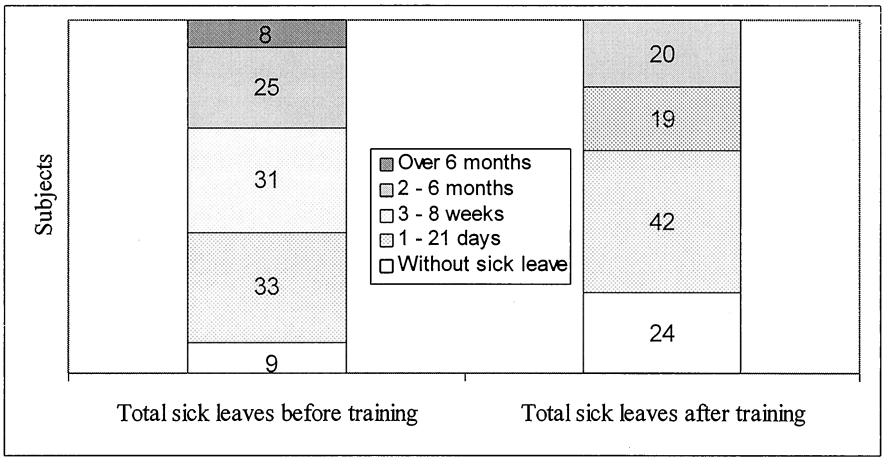

Fig. 1. Distribution of total sick leaves (regardless of the reason, except maternity) before and after training.

TABLE 4
Impact of Training on Professional and Personal Well-Being (*n* = 108)

	Positive Impact		No Impact	
	n	%	*n*	%
Satisfaction with training	99	91.7	9	8.3
Psychological well-being	47	43.5	61	56.5
Satisfaction with job	44	40.7	64	59.3
Physical strain at work	63	58.3	45	41.7
Application of advice for posture at work	75	69.4	33	30.6
Housework	80	74.1	28	25.9
Sports	74	68.5	34	31.5

and an occupational therapist. All of these specialists are employed by the hospital with responsibilities that include teaching at the quarterly sessions of the back school. This requires the entire team to be dedicated to the project, along with the hospital administration and care units, so that training may take place under good conditions and departments may continue to operate smoothly despite the absence of some of their workers.

The first criteria we considered when assessing the qualitative aspect of our back school was the satisfaction of the trainees.[16] Since its creation in 1992, the program has been extremely well perceived by participants, 92% of whom state that they are very satisfied with the sessions, including the extra review session.

Just as many have before us,[13,18] we noted remarkable improvement in the way pain was perceived after training at the back school (some reported regression and even complete resolution of low back pain), even though most trainees continue to experience episodes of acute low back pain (but usually limited to one episode). Such episodes do, however, tend to be shorter, and the number of subjects reporting permanent pain was reduced by 20%.[13,15,16] In light of these results, we can hypothesize that thanks to rehabilitation techniques and posture correction, trainees probably have a better knowledge of their disorder, they learn to manage it more appropriately in everyday life, and they know their limitations in terms of movements. Although the back school does not offer a cure for chronic low back pain, it does seem to lower the patients' fear of painful recurrences by helping them gain knowledge and increasing their range of motion. It also helps trainees learn and practice occupational and posture techniques, especially for weight lifting and work requiring certain postures. This is one of the main objectives of our school inasmuch as it is geared to a specific

body of personnel whose job responsibilities include lifting heavy loads and assuming uncomfortable postures, both of which are high-risk factors for low back pain.[1,3] These techniques are taught in the program when professional situations (eg, how to use a patient-lifting device, make beds) and personal situations (housework, ironing) are role-played. The objective is to help trainees manage their low back pain in everyday life situations. It seems that we have reached our goal, because 69% of the trainees in our study report using the techniques. They report using patient-lifting devices more readily and applying the advice received on motions and posture in their professional activities. This, along with the pain relief they experience, may partly explain why 58% of trainees state that their work feels less difficult to them. A side benefit is that 40% report being more satisfied with their job after training than before. Better job perception may also be due to a shift in interpersonal relationships with colleagues, in particular with those who experience no back pain: participants at the back school relay the information they received to prevent low back pain in professional situations.

Our hypothesis, therefore, is that behavioral changes regarding the perception of disorder, work, and interpersonal relationships lead individuals to change their outlook on what they used to consider a handicap in their team. Although we cannot conclude that a direct cause-and-effect link exists between better job perception and decreased low back pain, we would like to highlight the psychological impact of the training on the perception of low back pain.[19] In the same realm of ideas, recognition of the pathology by the hospital and implementation of training may also add to the benefits felt by health care workers after training at the back school. The program is a part of a global strategy for back pain that the hospital has instituted for its health care workers in that it hosts the school and uses its own human and material resources within a team. Finally, the institution supports the preventive program by investing in occupational devices to help those employees who experience professional difficulties because of low back pain.

All of these characteristics should be considered when interpreting our results, because previously published evaluations of back schools found that intensive training within a specialized center and/or in an occupational setting yielded promising results for training efficiency.[14]

The main conclusions we draw from this study are that our results are most likely due to the global (medical, psychological, technical, and social) management of low back pain within a team and that benefits are long-lasting. Our overall very satisfactory qualitative results agree with those reported in previous studies,[16] but we showed that these results were maintained 4 years later. It seems, therefore, that positive benefits of the training last beyond the 2 years most often reported by other authors.[13–17] Also, objective data such as absenteeism, use of drugs, and health care are consistent with the subjective improvement described by trainees. Sick leaves, regardless of their cause, are markedly shorter after training, particularly leaves that extend beyond 3 weeks. There are also fewer absent employees after the sessions have taken place. At an average of 4 years after training, absenteeism for low back pain was reduced by one-third.

Indisputably, studying all of these objective data was necessary to assess the cost/efficiency ratio, which is greatly criticized as missing from most evaluations of back school programs.[14] The cost of 1 day of sick leave amounts to 1017 francs (155 Euros) for a nurse and 817 francs (124.5 Euros) for a nurse's aide. The overall cost for 1 week of training at the back school is 1387.5 francs (277.5 Euros) per person. The low price is because of the operating mode that was chosen for our back school, ie, with internal hospital human and material resources. Training is considered part of continuous education and therefore needs to show no profit. In light of the lower rates of absenteeism after training at the back school, the cost/efficiency ratio of the school is obviously beneficial for the hospital. It is also beneficial for health economics inasmuch as we showed that there were fewer consultations with physicians, whether specialists or general practitioners, and that drug intake to relieve low back pain was reduced. The socioeconomic benefit is an important one and constitutes our best argument for continuing our preventive program at the back school. In addition, after developing and assessing this program, it was rewarding to find it to be undeniably beneficial in both the short[7] and long run for the health and personal and professional well-being of the hospital employees.

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References

1. Rossi A, Marino G, Barbieri L, et al. Backache from exertion in health personnel of the Istituti Ortopedici Rizzoli in Bologna. A case-control study of the injury phenomenon in the 10-year period of 1987–1996. *Epidemiol Prev*. 1999;23:98–104.
2. Marena C, Gervino D, Pistorio A, et al. Epidemiologic study on the prevalence of low back pain in health personnel exposed to manual handling tasks. *G Ital Med Lav Ergon*. 1997;19:89–95.
3. Alcouffe J, Manillier P, Brehier M, Fabin C, Faupin F. Analysis by sex of low back pain among workers from small companies in the Paris area: severity and occupational consequences. *Occup Environ Med*. 1999;56:696–701.
4. Turnbull N, Dorman J, Fletcher B, Wilson S. Prevalence of spinal pain among the staff of a district health authority. *Occup Med*. 1992;42:143–148.
5. Duquesnoy B, Allaret FA, Verdoncq B. Retentissement psycho-social et professionnel de la lombalgie chronique. *Rev Rhum*. 1997;65:37–45.
6. Scheer SJ, Radack KL, O'Brien DR. Randomized controlled study in industrial low

back pain relating to return to work. Acute interventions. *Arch Phys Med Rehabil*. 1995;76:966–973.
7. Sobaszek A, Edmé JL, Kemoun G, Lorthois C, Thévenon A, Furon D. Mise en place et bilan à un an d'une école du dos au C. H. R. U. de Lille. *Arch Mal Prof*. 1995;56:586–590.
8. Von Korff M, Deyo RA, Cherkin D, Barlow W. Back pain in primary care. Outcomes at 1 year. *Spine*. 1993;18:855–862.
9. Cohen JE, Goel V, Frank JW, Bombardier C, Peloso P, Guillemin F. Group education interventions for people with low back pain. *Spine*. 1994;19:1214–1222.
10. Leboeuf-Yde C, Lauritsen JM. The prevalence of low back pain in the literature. *Spine*. 1995;20:2112–2118.
11. Roland M, Morris R. A study of the natural history of back pain. Part 1: development of a reliable measure of disability in low back pain. *Spine*. 1983;8:141–144.
12. Coste J, Parc JM, Berge E, Delecoeuillerie G, Paolaggi JB. Validation française d'une échelle d'incapacité fonctionnelle pour l'évaluation des lombalgies (EIFEL). *Rev Rhum*. 1993;60:335–341.
13. Harkapaa K, Mellin G, Jarvikoski A, Hurri H. A controlled study on the outcome of inpatient and outpatient treatment of low back pain. Long-term follow-up of pain, disability, and compliance. *Scand J Rehabil Med*. 1990;22:181–188.
14. Koes BW, van Tulder MW, van der Windt DAWM, Bouter LM. The efficacy of back schools: a review of randomized clinical trials. *J Clin Epidemiol*. 1994;47:851–862.
15. Lanes TC, Gauron EF, Spratt KF, Wernimont TJ, Found EM, Weinstein JN. Long-term follow-up of patients with chronic back pain treated in a multidisciplinary program. *Spine*. 1995;20:801–806.
16. Leclaire R, Esdaile JM, Suissa S, Rossignol M, Proulx R, Dupuis M. Back school in a first episode of compensated acute low back pain: a clinical trial to assess efficacy and prevent relapse. *Arch Phys Med Rehabil*. 1996;77:673–679.
17. Torstensen TA, Ljunggren AE, Meen HD, Odland E, Mowinckel P, Geijerstam S. Efficiency and costs of medical exercise therapy, conventional physiotherapy, and self-exercise in patients with chronic low back pain. A pragmatic, randomized, single-blinded, controlled trial with 1-year follow-up. *Spine*. 1998;23:2616–2624.
18. Faas A. Exercises. Which ones are worth trying, for which patients, and when? *Spine*. 1996;21:2874–2879.
19. Van der Weide WE, Verbeek JH, Sallé HJA, van Dijk FJH. Prognostic factors for chronic disability from acute low-back pain in occupational health care. *Scand J Work Environ Health*. 1999;25:50–56.

How Has Coke's Formula Stayed a Secret?

Ever since Dr John Pemberton made the first batch of the soda in 1886, the drink's makeup has been tightly guarded. Coca-Cola offers almost no information about its lifeblood. The only written copy of the formula resides in a Sun Trust Bank vault in Atlanta, says spokesperson Trey Paris (he wouldn't say which branch). This handwritten sheet is not available to anyone except by vote of the Board of Directors, states Frederick Allen in his book *Secret Formula.*

Which is not to say that no one knows the secret. Paris says "a handful" of Coke employees have memorized the formula, but he would not name names. One Coke insider says Company legend holds that three employees know it, including the CEO (Douglas Daft would not comment), and a few others are privy to a portion.

So why can't science offer some clues? Coke contains 17 to 18 ingredients. Distilling natural products like these is complicated since they consist of thousands of compounds. Doing so would cost about $100,000, and even then one would not be able to figure the exact amounts. One ingredient coke does not contain is cocaine. Dr. Pemberton's original formula did include a trace amount, but today's coke does not. When was it removed? That's a secret, too.

From Tucker R. Great Questions of Our Age. *Fortune*, 2000;142(4):42.