

2023-2024

THÈSE

pour le

DIPLÔME D'ÉTAT DE DOCTEUR EN MÉDECINE

Qualification en médecine générale

**Effect of educational interventions in
middle school on adolescent's knowledge
of acute pain management methods**

**Impact des interventions éducatives
dans les collèges sur les connaissances
des adolescents en matière de méthodes
de gestion de la douleur aiguë**

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Née le 24 novembre 1987 à MARSEILLE (13)

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Née le 14 novembre 1996 à ANGERS (49)

Sous la direction de M. LEVAILLANT Mathieu ■

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« Au moment d'être admis(e) à exercer la médecine, je promets et je jure d'être fidèle aux lois de l'honneur et de la probité. Mon premier souci sera de rétablir, de préserver ou de promouvoir la santé dans tous ses éléments, physiques et mentaux, individuels et sociaux. Je respecterai toutes les personnes, leur autonomie et leur volonté, sans aucune discrimination selon leur état ou leurs convictions. J'interviendrai pour les protéger si elles sont affaiblies, vulnérables ou menacées dans leur intégrité ou leur dignité. Même sous la contrainte, je ne ferai pas usage de mes connaissances contre les lois de l'humanité. J'informerai les patients des décisions envisagées, de leurs raisons et de leurs conséquences. Je ne tromperai jamais leur confiance et n'exploiterai pas le pouvoir hérité des circonstances pour forcer les consciences. Je donnerai mes soins à l'indigent et à quiconque me les demandera. Je ne me laisserai pas influencer par la soif du gain ou la recherche de la gloire.

Admis(e) dans l'intimité des personnes, je tairai les secrets qui me seront confiés. Reçu (e) à l'intérieur des maisons, je respecterai les secrets des foyers et ma conduite ne servira pas à corrompre les mœurs. Je ferai tout pour soulager les souffrances. Je ne prolongerai pas abusivement les agonies. Je ne provoquerai jamais la mort délibérément.

Je préserverai l'indépendance nécessaire à l'accomplissement de ma mission. Je n'entreprendrai rien qui dépasse mes compétences. Je les entretiendrai et les perfectionnerai pour assurer au mieux les services qui me seront demandés.

J'apporterai mon aide à mes confrères ainsi qu'à leurs familles dans l'adversité. Que les hommes et mes confrères m'accordent leur estime si je suis fidèle à mes promesses ; que je sois déshonoré (e) et méprisé(e) si j'y manque ».

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Cette thèse est pour vous tous. Je vous aime.

Liste des abréviations

1 st	First
2 nd	Second
8 th	Eighth
9 th	Ninth
B. Delessert	Benjamin Delessert
HAS	French National Authority for Health
i.e	That is to say,
i.g	For Example,
INSEE	French National Institute for Statistics and Economic Studies
J. Lurçat	Jean Lurçat
Q	Question
SPI	Social Position Indices
vs	Versus

Plan

SERMENT D'HIPPOCRATE

RESUMÉ

ABSTRACT

INTRODUCTION

MATERIEL AND METHOD

RESULTS

- 1. General**
- 2. Basal characteristics**
- 3. Basal knowledge**
- 4. Effects of an educational intervention**
 - 4.1. Primary outcome
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DISCUSSION AND CONCLUSION

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Effect of educational interventions in middle school on adolescent's knowledge of acute pain management methods.

HALLAKOUN Laura, PIPET Anaé

Cette thèse a été réalisée en étroite collaboration. Laura a lancé le projet en développant l'idée principale, en effectuant les premières recherches, en commençant la fiche de thèse et en contactant le directeur de thèse. Anaé a rejoint l'équipe peu après, et ensemble nous avons complété la bibliographie et finalisé la fiche de thèse, validée par la Direction de Médecine Générale. Nous avons ensuite géré ensemble les démarches auprès du comité d'éthique.

Concernant le questionnaire, nous avons d'abord collaboré sur le format, puis réparti nos recherches selon les douleurs traitées. Laura a pris en charge la rédaction du questionnaire tandis qu'Anaé s'est occupée de la mise en page. Nous avons ensuite réparti les sessions de distribution du premier questionnaire dans les collèges concernés. Concernant notre présentation, nous avons élaboré ensemble le format et la structure du diaporama, réparti la rédaction selon nos recherches respectives, puis Anaé a réalisé la mise en page avant une relecture collective. Nous avons également répété l'intervention afin d'harmoniser notre présentation. Nous avons effectué la distribution du deuxième questionnaire ensemble.

Pour le recueil de données, nous avons chacune pris en charge un collège et nous avons défini ensemble, les informations à extraire pour les analyser. Anaé a réalisé les analyses statistiques. Nous avons régulièrement travaillé ensemble, particulièrement pour la discussion de la thèse. Laura a rédigé le texte final, et Anaé a réalisé les tableaux, les figures et la mise en page. Les relectures et modifications ont été effectuées ensemble.

En somme, cette thèse représente un travail d'équipe avec des rôles définis, tout en maintenant une collaboration et une communication continues.

RESUMÉ

Objectif

Améliorer les connaissances des élèves de classes de 4ème et de 3ème sur les méthodes médicamenteuses et non médicamenteuses de prise en charge des douleurs aiguës les plus souvent rencontrées dans cette population.

L'éducation à ces méthodes pourrait être un bon moyen de sensibiliser les adolescents à la douleur aiguë et de permettre une meilleure gestion de celle-ci à l'âge adulte.

Méthode

Essai contrôlé et randomisé. 179 élèves de 4ème et de 3ème de deux collèges du Maine-et-Loire ont été inclus dans cette étude.

177 élèves ont répondu à un questionnaire anonyme permettant d'évaluer leurs connaissances sur les méthodes de prise en charge de la douleur aiguë.

6 classes ont été tirées au sort et 92 élèves ont participé à notre intervention pédagogique. Le même questionnaire anonyme a été distribué 3 mois après cette intervention à tous les collégiens inclus dans cette étude.

Le critère de jugement principal était une amélioration des connaissances des élèves ayant participé à l'intervention par rapport à ceux qui n'y avaient pas participé.

Les critères de jugement secondaires étaient d'évaluer les connaissances de base et l'évolution des connaissances en fonction du genre, de l'âge et du collège dans les deux groupes.

Résultats

Notre étude a montré une augmentation générale des connaissances de 13,9% entre le groupe intervention et le groupe contrôle en faveur du groupe intervention sur l'ensemble du

questionnaire. Nous avons noté une augmentation des connaissances du groupe intervention par rapport au groupe contrôle dans chaque question du questionnaire avec, des différences significatives entre les deux groupes après l'intervention pour les méthodes de prise en charge des céphalées ($p=0,011$ pour les méthodes non-médicamenteuses et $p=0,016$ pour les méthodes médicamenteuses), des douleurs abdominales ($p=0,006$ pour les méthodes non-médicamenteuses et $p<0,001$ pour les méthodes médicamenteuses) et des méthodes non-médicamenteuses de prise en charge du mal de dos ($p=0,002$).

Notre intervention semble avoir encouragé les collégiens à privilégier les méthodes non-médicamenteuses de gestion de la douleur aiguë, telles que le repos ou les exercices de respiration, plutôt que d'attendre que la douleur disparaisse ou d'avoir recours à des médicaments. Nous avons également constaté une augmentation du pourcentage d'élèves qui se tournent vers un adulte en cas de douleur.

Dans l'ensemble, nous avons remarqué que les filles ont de meilleures connaissances de base des méthodes de gestion de la douleur aiguë et une meilleure augmentation des connaissances globales par rapport aux garçons après l'intervention.

Conclusion

Notre étude a montré qu'il est possible d'augmenter les connaissances des adolescents sur les méthodes médicamenteuses et non-médicamenteuses de gestion de la douleur aiguë par le biais d'une intervention pédagogique.

Compte tenu de la prévalence de la douleur aiguë dans cette population et de son impact à court et long terme sur leur vie quotidienne, nous pensons que le thème de la douleur aiguë devrait être intégré dans les programmes de prévention de la santé des adolescents.

ABSTRACT

Aim

To assess the impact of an educational intervention in middle school student's knowledge of medicinal and non-medicinal methods of managing most common acute pain they may encounter.

Method

A randomized controlled trial was conducted. Two middle schools were targeted in the French county of Maine-et-Loire. Students were randomized according to their classes. An anonymous questionnaire was distributed before randomization. Half of the classes benefited from the intervention of medical residents on the management of frequent pain. The same questionnaire as the initial one was administered 3 months after this intervention to all the students included in this study.

The main outcome measures were an improvement in knowledge of the student who had taken part in the intervention (intervention group) compared with those who had not (control group).

The secondary outcome was to evaluate basal knowledge and changes in knowledge regarding to gender, age, and school in both groups.

Results

177 8th and 9th grade students from 11 classes in two middle schools in Maine-et-Loire (6 classes from Jean Lurçat school in Angers and 5 classes in Benjamin Delessert school in Saumur) were included in this study. 6 classes were selected at random, and 92 students took part in our educational intervention.

Our study showed a general increase of 13.9% of correct answers between the intervention group and the control one in favor of the intervention group on the entire questionnaire.

This improvement in the proportion of correct answers was observed for each question, with significant differences between the two groups after the intervention for methods of managing head pain ($p=0.011$ for non-medicinal methods and $p=0.016$ for medicinal methods), abdominal pain ($p=0.006$ for non-medicinal methods and $p<0.001$ for medicinal methods) and non-medicinal methods for managing back pain ($p=0.002$).

Furthermore, our intervention seems to have encouraged adolescents to favor non-medicinal methods of managing acute pain, such as rest or breathing exercises, rather than waiting for the pain to pass or resorting to medication.

We also noticed an increase in the percentage of students willing to turn to an adult in case of pain.

Overall, we noticed that girls have a better basal knowledge of methods of managing acute pain especially regarding menstruation pain and a better increase in overall knowledge in comparison with boys (+17.0% vs + 5.5%) in the intervention group.

Conclusion

Our study has shown that adolescent's knowledge of medicinal and non-medicinal methods of managing acute pain can be increased by using an educational intervention in middle school.

Given the prevalence of acute pain in this population and its short- and long-term impact on their daily lives, we believe that the topic of acute pain should be incorporated into health prevention programs for adolescents.

This could enable teenagers to manage their pain better both now and in adulthood, for themselves and for those around them.

INTRODUCTION

Pain is the second most common reason for adolescents to consult a general practitioner (1), with acute pain being the first type of pain experienced by them. (2) In addition, studies showed that acute pain can significantly affect the adolescent's life by causing, for example, school absences, sleep disorders, a decrease in their academic performances or disturbances in their social activities, making pain management in this population, a public health issue. (3)

According to Lagerløv in 2016, the risks of physical and socio-emotional consequences of pain are reduced by good tolerance and good management of it. (3)

However, unlike chronic pain, the literature on acute pain in adolescents remains limited. A quantitative study conducted in 2016 identified the most common acute pains encountered in adolescents: back pain, abdominal pain, headache, and traumatic pain (1) such as sprained ankle.

This same study found that adolescents mainly turn to their parents (40%) and friends (31%) for managing these pains, and 12% rely on internet research when they have a health issues. Only 12% of adolescents turn to their general practitioner for their health problems. (1)

The fact that adolescents mainly turn to their close circle, particularly their parents, might find an explanation in the attachment theory. This theory suggests that parents, especially mothers, play a fundamental role in the way children and adolescents experience and overcome pain, particularly by imitating their parent's behavior when faced with pain and their education on this subject during childhood. (3)

It is therefore necessary to recognize the importance of the role of the environment and, mainly, the family environment, in the management of acute pain in adolescents. Literature tells us that some parents have difficulty managing their child's pain for several reasons such

as the different experience of pain between children, adolescents and adults, and personal affects of pain. (2)

The Lagerløv study of 2016 concludes that a release from this family environment could be beneficial in the management and feeling of acute pain. (3) This work opens an interesting path concerning the ability of adolescents to develop a certain autonomy in the management of their acute pain and to grasp the issues and risks involved in pain management.

Correct use of drugs, even in middle school ages is a major issue as paracetamol and ibuprofen are the main analgesics used to treat acute pain and are easily accessible in personal home pharmacies. (3,4) Education at that stage is required as self-medication with over-the-counter analgesics tends to begin during adolescence (5), and because most overdoses on English and American adolescents are known to occur using drugs available without a prescription. (6)

This topic is becoming urgent as we have observed during the last decade, an increase in the use of over-the-counter analgesics in this population. (3)

This subject is even more topical given that a study carried out in 2019 in an audience of medical students showed that only 5.7% of the students surveyed were satisfied with their current knowledge on acute pain management. This study proved that interventions with medical students significantly increase their knowledge of acute pain. (7) A study carried out in Ecuador in 2007 among students aged 10 to 13 found that interventions, focusing on self-medication, reduce the risks of misuse in the short and long term. (8) This study concludes that, through this type of intervention, it is possible to favorably modify the behavior of adolescents regarding their use of medications, in the short term, as well as to reinforce it in the long term, by repeating these interventions over time. (8)

All these factors point in favor of opening a path for carrying similar interventions with adolescents.

Educational interventions for health prevention in middle schools are already organized in France as part of the Health Promoting School System, as adolescence is a period of life exposed to risky behaviors through the discovery and search for autonomy, the modified parental relationship, the transformation of the body and the importance of peers and groups. (9) These preventive actions carried out by the Health Promoting School System aim to improve the health of populations while reducing social inequalities in health, by targeting various socio-professional backgrounds. (10) They mainly focus on areas such as nutrition, the use of screens and sex education (10) but none stand on educational interventions focused on pain management.

This led us to the hypothesis that interventions in middle schools could improve adolescent's knowledge of acute pain management methods and promote their autonomy by providing information adapted to their age and pre-existing knowledge.

The aim of our study is to demonstrate the increase in the knowledge of 8th and 9th year students in middle schools in Maine-et-Loire about methods of managing acute pain through an educational intervention.

MATERIEL AND METHOD

The study was designed as a randomized, controlled trial in middle schools of Maine-et-Loire in France. All the students included underwent a survey in the form of a questionnaire on their knowledge of managing pain. (Supplementary file I) After undergoing the survey, classes were randomly affected by the intervention or the control group. In the intervention group, an educational intervention took place, but not in the control group. Both groups filled again the initial questionnaire three months after the intervention. For ethical matters, an educational session was proposed to all schools after the final survey.

The study was carried out with the approval of the Academic Director of National Education Services in the Maine-et-Loire Department. Schools were proposed by email to join the study.

Parents of the students from the schools included were informed through a letter sent using the digital exchange platform already used by middle schools, giving them the opportunity to refuse their child's participation.

All 8th and 9th grade students attending school at the time of the distribution of the first questionnaire, without a parental refusal, voluntarily agreed to complete the anonymous questionnaire were included. Those students who were absent that day or whose parents had refused were not included.

The study lasted 7 months from December 2023 to June 2024 with the educational intervention in February 2024.

The Ethics Committee of the University of Medicine of Angers approved our study, and the different times of our study were carried out with the permission of the heads of each middle school and organized with the help of school nurses.

Questionnaires and Educational Intervention

The questionnaires distributed were anonymous. (Supplementary file I) The only information asked of students was their age, gender, class, and parent's occupations. Parent's occupations were classified into 6 categories according to the INSEE classification. (11)

The questionnaires consisted of 12 questions. They were completed in our presence within a time limit of 20 minutes, without human or digital assistance. We checked that they were fully completed before collecting them.

The first two questions were single-answer questions about who adolescents would turn to in the event of pain or for medication. The next 10 questions were single- or multiple-choice questions concerning, for each pain most frequently encountered by adolescents, the medicinal and non-medicinal methods used to manage it. These questions were structured as pain experiences that the student's social environment might encounter in daily life.

We designed these situations and developed the answers to the questions based on scientific recommendations for the management of the pain described, (12, 13, 14, 15, 16) as well as our knowledge and experience as medical residents.

The educational intervention was given using Microsoft PowerPoint and covered the most common pain experienced by teenagers (traumatic pain such as sprained ankle, back pain, headache, menstrual pain and abdominal pain). For each type of pain, questions were asked about how to manage it, both with non-medicinal methods and medicinal methods. (Supplementary file II)

The knowledge provided by this intervention was based on the recommendations of the French Social Security websites and the French National Authority for Health (HAS) for the management of each pain discussed as well as on the symptoms leading to seeing a doctor. (12, 13, 14, 15, 16) The presentation lasted 30 minutes, and students were able to ask questions during or after the presentation.

Measurements and outcomes

The educational intervention was constructed before analyzing the answers to the first questionnaire so that our presentation would not be influenced by the student's answers. The first 2 questions had no right or wrong answers. Students were asked to choose a single answer from the 5 items proposed. We then calculated the percentage of students who chose each answer.

The next 10 questions each are composed of 5 items with correct or incorrect answers. Some questions had only one correct answer and others had multiple correct answers, which was specified in the question wording. Students were asked to tick the answers they considered correct and leave those they considered incorrect unticked. Our basal and medium-term measurements were performed by calculating the percentage of correct answers per item and per question. The percentage of correct answers per question corresponds to the percentage of correct answers to all the items making up the question. The main outcome was an improvement in knowledge of the student who had taken part in the intervention (intervention group) compared with those who had not (control group).

The secondary outcome was to evaluate basal knowledge and changes in knowledge regarding to gender, age, and school in both groups.

Statistical analysis

Quantitative variables were expressed as Mean and standard deviation. Qualitative variables were expressed as number and percentage. Comparison of the two groups before and after the intervention was performed using Fisher test. All p values presented were for a 2-sided test, and the threshold of significance was defined as a p value < 0.05 . These statistical analyses were performed using R Studio software.

RESULTS

1. General

We applied to 8 Maine-et-Loire middle schools through the Health Promoting School System to carry out our study. 2 schools gave us their agreement: the Benjamin Delessert public school in Saumur and the Jean Lurcat public school in Angers, making a total of 11 classes (6 classes from Jean Lurcat school in Angers and 5 classes in Benjamin Delessert school in Saumur) with 179 students for our sample.

The first anonymous questionnaire was distributed to 177 students (2 parents contacted us to express their refusal) late December 2023 and early January 2024. 6 classes were selected at random using a digital application to take part in the intervention in February 2024 (3 classes per school i.e. 96 students in the intervention group). The students in the classes not drawn at random made up the control group, i.e. 81 students. However, 4 students from the initial intervention group were absent at the time of the intervention, making a total of 92 students who benefited from the intervention. (Figure 1)

The same anonymous questionnaire was redistributed to all classes at the end of May/beginning of June 2024, i.e. 162 students (89 students in the intervention group and 73 students in the control group). (Figure 1)

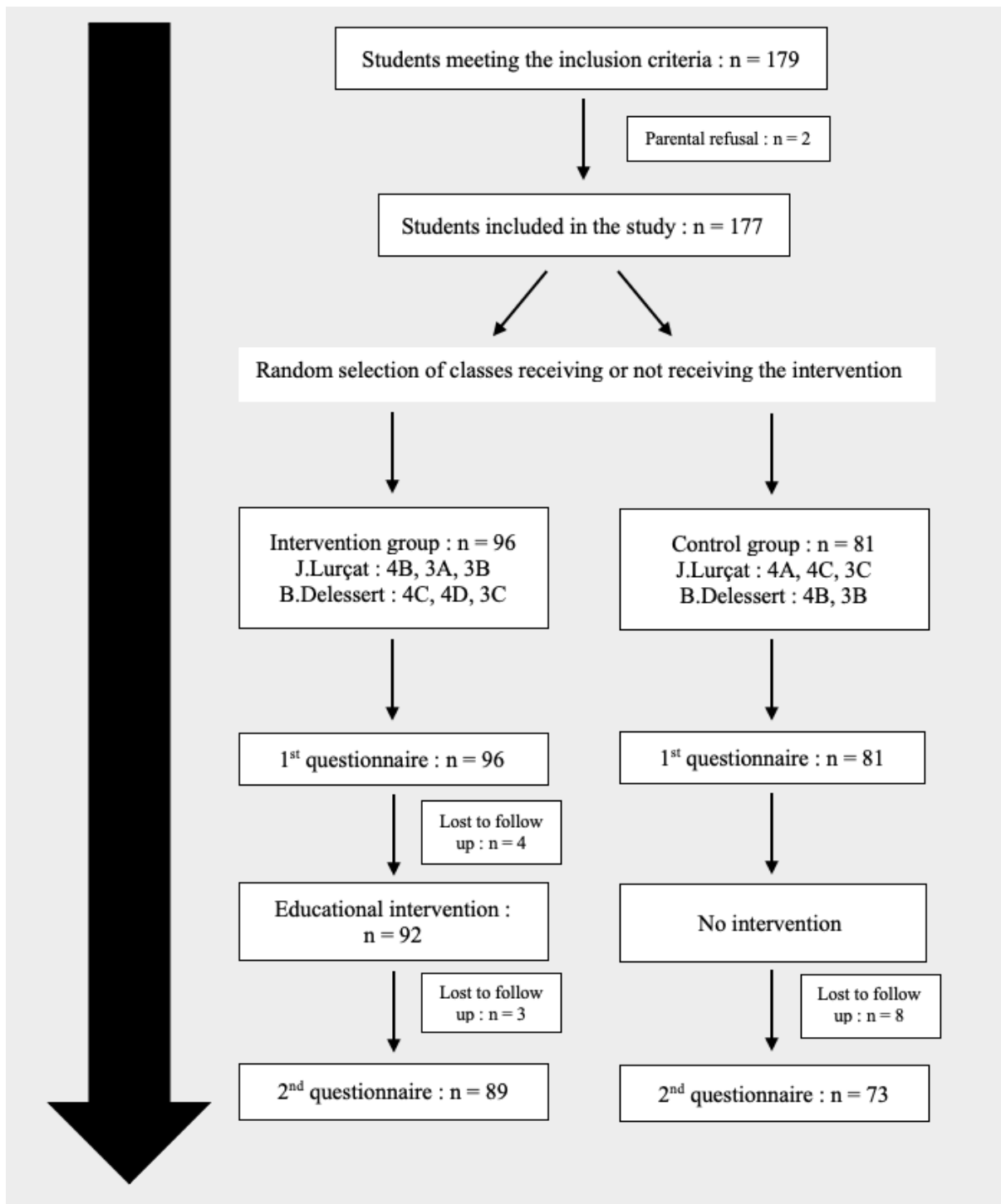


Figure 1 : Flow chart of the study.

4th grade in France is equivalent of 8th grade in the USA, and 3rd grade to 9th grade.

2. Basal characteristics

177 8th and 9th grade students from 11 classes in middle schools in Maine-et-Loire were recruited and completed the first anonymous questionnaire for our basal measurements. 162 students completed the second anonymous questionnaire for our medium-term measurement. (Figure 1)

The intervention group included a larger number of girls ($p=0.032$), with a comparable age ($p=0.170$). (Table 1)

We classified the parent's occupations into 6 categories according to the INSEE classification. (11) We found that most students did not know their parent's occupations (44.8% in the intervention group and 60.5% in the control group), making this data unusable for our study. (Table 1)

Table I : Basal characteristics of the two groups of the study.

4th grade in France is equivalent of 8th grade in the USA, and 3rd grade to 9th grade.

		Intervention group (n = 96)		Control group (n = 81)	
Gender	Girls	62	64.6%	38	46.9%
	Boys	34	35.4%	42	51.9%
Age	12	1	1.0%	1	1.2%
	13	40	41.7%	47	58.0%
	14	41	42.7%	26	32.1%
	15	14	14.6%	7	8.6%
	16	0	0.0%	0	0.0%
	Mean age	13.7		13.5	
School	Jean Lurçat	48	50.0%	50	61.7%
	Benjamin Delessert	48	50.0%	31	38.3%
Classes	8th grade	46	47.9%	53	65.4%
	9th grade	50	52.1%	28	34.6%
First parent profession	Farmers	2	2.1%	0	0.0%
	Artisans, traders and business leaders	4	4.2%	3	3.7%
	Executives and higher intellectual professions	7	7.3%	7	8.6%
	Intermediate professions	9	9.4%	4	4.9%
	Employees	35	36.5%	27	33.3%
	Workers	6	6.3%	4	4.9%
	Without jobs	7	7.3%	7	8.6%
	Not known	26	27.1%	29	35.8%
Second parent profession	Farmers	2	2.1%	0	0.0%
	Artisans, traders and business leaders	2	2.1%	1	1.2%
	Executives and higher intellectual professions	3	3.1%	3	3.7%
	Intermediate professions	7	7.3%	1	1.2%
	Employees	24	25.0%	20	24.7%
	Workers	6	6.3%	2	2.5%
	Without jobs	6	6.3%	4	4.9%
	Not known	43	44.8%	49	60.5%

3. Basal knowledge

Basal knowledge was similar in both groups if we look at the first questionnaire as a whole (approximately 36.5% of correct answers). (Table II) (Supplementary file III)

We saw that the question that students answered best was question 6 on medicinal methods of managing headaches (88.1% of correct answers) and that the question with the least correct answers was question 10 on medicinal methods of managing menstrual pain (0.6% of correct answers). (Table II)

We observed that girls had better basal knowledge than boys (39.5% of correct answers on the entire questionnaire vs 32.6% for boys). (Table II)

We noticed that the biggest difference between boys and girls in basic knowledge was concerning question 9 about non-medicinal methods for managing period pain (34.3% more correct answers from girls than boys). (Supplementary file IV)

Table II : General basal knowledge. *Percentage corresponds to correct answers to all items for each question. 4th grade in France is equivalent of 8th grade in the USA, and 3rd grade to 9th grade.*

		First questionnaire
Overall	Q3 : Traumatic pain, non-medicinal	26.6%
	Q4 : Traumatic pain, medicinal	58.8%
	Q5 : Headache, non-medicinal	44.6%
	Q6 : Headache, medicinal	88.1%
	Q7 : Back pain, non-medicinal	25.4%
	Q8 : Back pain, medicinal	50.8%
	Q9 : Menstrual pain, non-medicinal	39.0%
	Q10 : Menstrual pain, medicinal	0.6%
	Q11 : Abdominal pain, non-medicinal	11.3%
	Q12 : Abdominal pain, medicinal	19.8%
	Mean	36.5%
Girls	Mean	39.5%
Boys	Mean	32.6%
8th grade	Mean	38.5%
9th grade	Mean	34.0%
J. Lurçat	Mean	35.6%
B. Delessert	Mean	37.6%

4. Effects of an educational intervention

4.1. Primary outcome

We found no statistical difference in knowledge amongst intervention and control groups before the intervention. (Supplementary file V) The educational intervention led to a better knowledge of non-pharmaceutical ways of managing pain, as we observed a decrease in the percentage of students answering « wait for the pain to pass » (-16.5% in the intervention group vs -3.8% in the control group) and an increase in answering « I try to reduce pain by resting, by calming down or by doing breathing exercises » (+31.6% in the intervention group vs +3.9% in the control group). The trends of turning toward an adult for medication increased in the intervention group (+11.6%) and decreased in the control group (-6.6%). (Table III)

We noted an increase of 7.2% of students ticking the response « call your doctor » for taking medication in the control group. (Table III).

There was also a decrease in the percentage of students ticking the answer « taking the medicine by himself » (-13.5% in the intervention group vs. -5.4% in the control group) after the educational intervention. (Table III)

Table III : Percentage of answers at each item concerning the questions 1 and 2.

Question 1 = What do you do first when you have pain ?						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questionnaire	Control group 2 nd questionnaire	Evolution before/after control group
Wait for the pain to pass	47.9%	31.5%	-16.5%	40.7%	37.0%	-3.8%
Taking a medicine	26.0%	15.7%	-10.3%	28.4%	24.7%	-3.7%
Try to reduce the pain with non-medical methods	15.6%	47.2%	31.6%	23.5%	27.4%	3.9%
Going to see a health professional	6.3%	5.6%	-0.6%	6.2%	4.1%	-2.1%
Calling medical services such as 15 or 18	1.0%	0.0%	-1.0%	0.0%	1.4%	1.4%
Other	3.1%	1.1%	-2.0%	0.0%	4.1%	4.1%

Question 2 = When someone wants to take a medication, what you tell him to do first ?						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questionnaire	Control group 2 nd questionnaire	Evolution before/after control group
Call your doctor	24.0%	23.6%	-0.4%	16.0%	23.3%	7.2%
Ask the pharmacist for advice	13.5%	15.7%	2.2%	17.3%	19.2%	1.9%
Ask your parents for their opinion	46.9%	58.4%	11.6%	51.9%	45.2%	-6.6%
Calling medical services	1.0%	1.1%	0.1%	0.0%	4.1%	4.1%
To take it by himself	14.6%	1.1%	-13.5%	13.6%	8.2%	-5.4%

Our study showed an increase in the knowledge of the intervention group compared to the control group with a general increase of 13.9% between the two groups in favor of the intervention group on the entire questionnaire (evolution of +12.1% in the intervention group vs -1.8% in control group). (Table IV)

We observed that there was a decrease in knowledge in certain questions between the first and second questionnaires in the control group, which was not the case in the intervention group, where there was an improvement in knowledge in each of the questions. (Figure 2)

When we looked at the percentages of correct answers, we noticed that this increase of knowledge was greater for questions on non-medicinal methods about head pain (question 5) and medicinal methods about back pain (question 8) or abdominal pain (question 12). (Table IV) (Figure 3)

Table IV : Overall evolutions between intervention et control group.

The evolution corresponds to the difference in correct answers between the 1st questionnaire and the 2nd questionnaire.

	Evolution intervention group	Evolution control group	Difference between evolutions
Q3 : Traumatic pain, non-medicinal	5.6%	1.3%	4.2%
Q4 : Traumatic pain, medicinal	11.1%	-1.4%	12.5%
Q5 : Headache, non-medicinal	18.0%	-4.6%	22.6%
Q6 : Headache, medicinal	3.5%	-12.2%	15.7%
Q7 : Back pain, non-medicinal	14.7%	-0.4%	15.1%
Q8 : Back pain, medicinal	26.2%	0.5%	25.8%
Q9 : Menstrual pain, non-medicinal	7.9%	2.4%	5.4%
Q10 : Menstrual pain, medicinal	1.1%	0.1%	1.0%
Q11 : Abdominal pain, non-medicinal	12.2%	-1.7%	13.9%
Q12 : Abdominal pain, medicinal	20.8%	-2.2%	23.0%
Mean	12.1%	-1.8%	13.9%

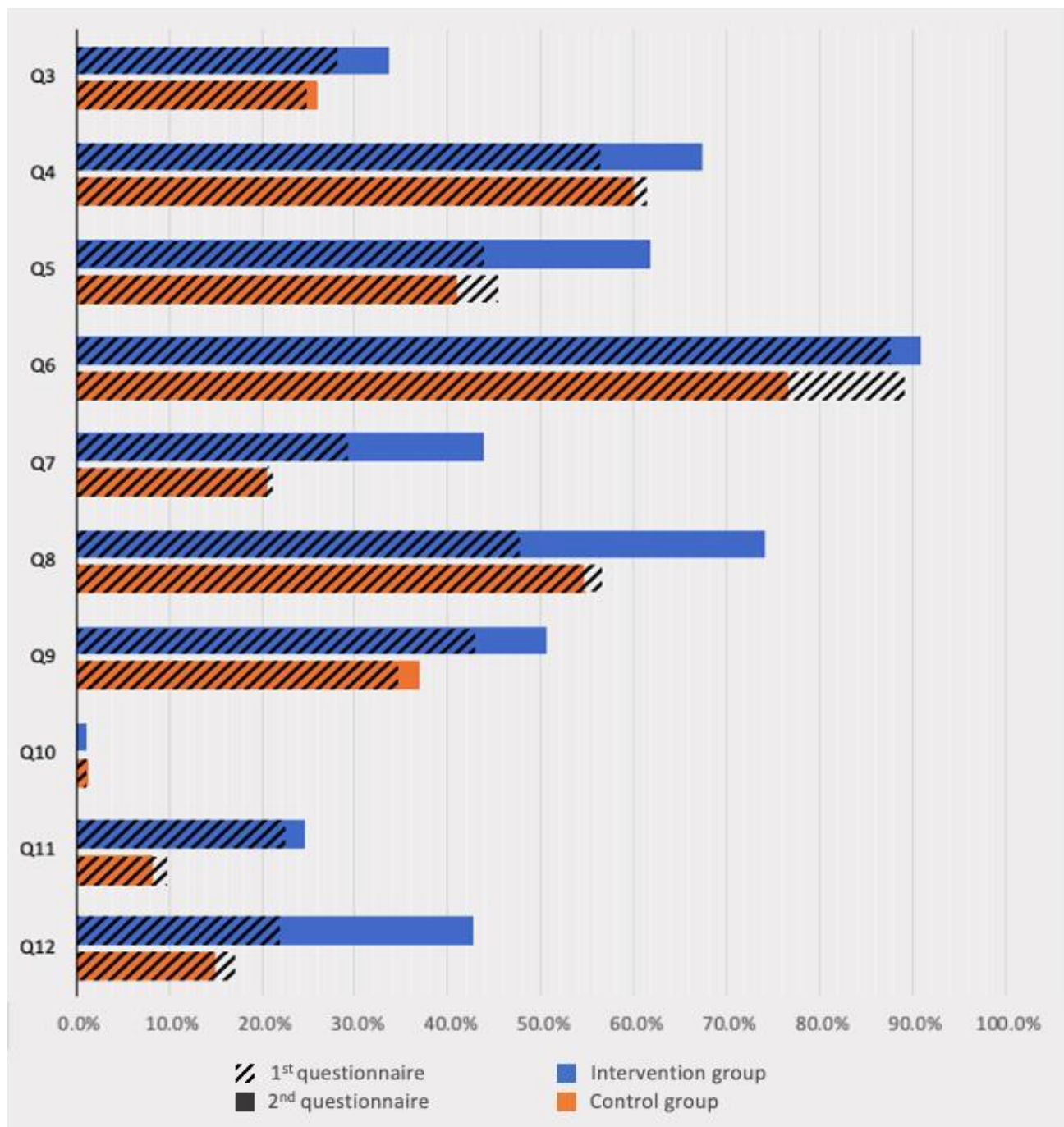


Figure 2 : Representation of the correct answers on 1st and 2nd questionnaire for the intervention and control group.

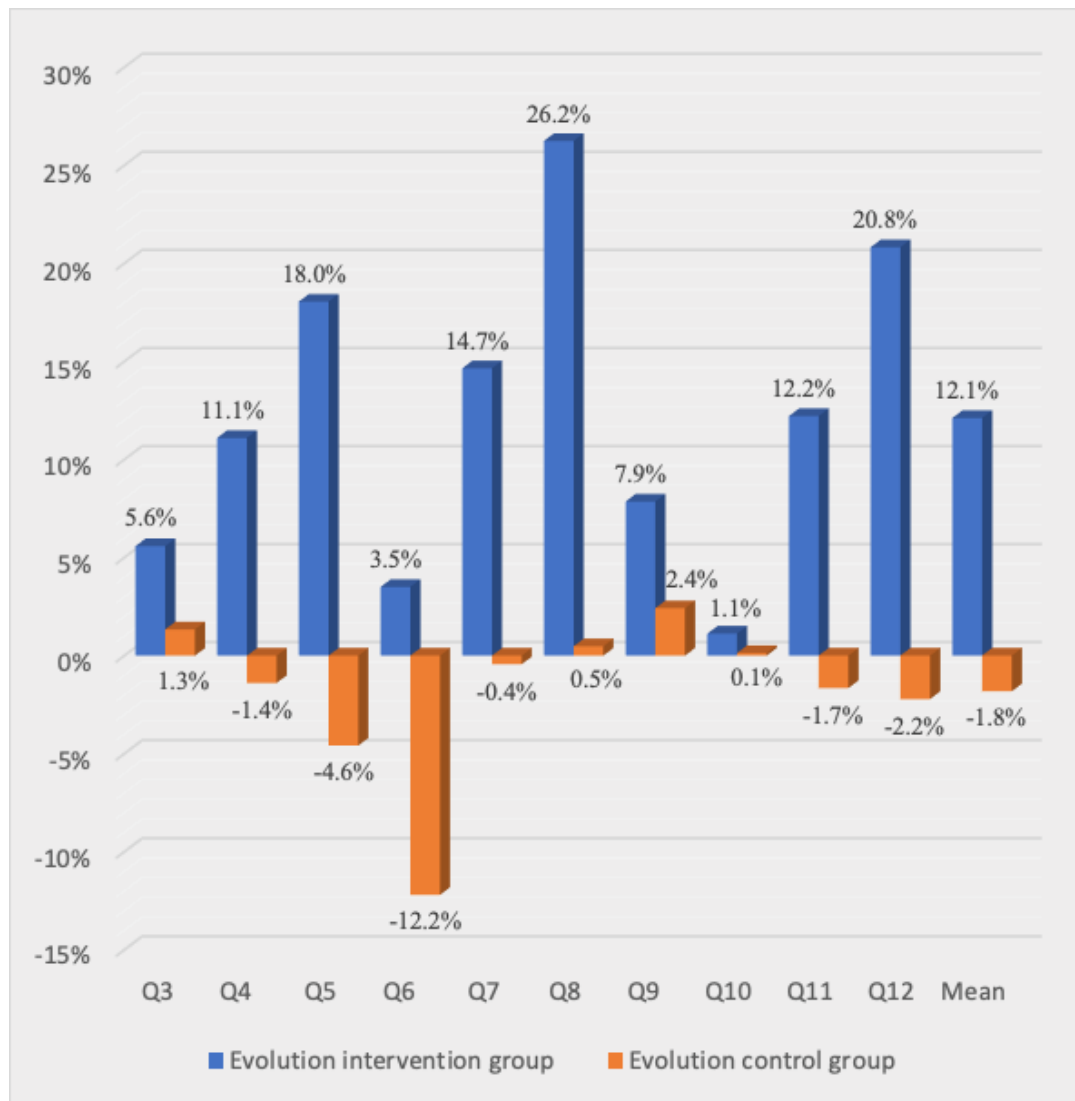


Figure 3 : Representation of the difference in evolutions between the two groups.

The evolution corresponds to the difference in correct answers between the 1st questionnaire and the 2nd questionnaire.

Our statistical analysis showed that the increase of knowledge after the intervention was significant for questions concerning methods of managing headache (non-medicinal methods $p=0.011$ and medicinal methods $p=0.016$), abdominal pain (non-medicinal methods $p=0.006$ and medicinal methods $p<0.001$) and non-medicinal methods of back pain ($p=0.002$). (Table V)

Table V : P value between the two groups at the 2nd questionnaire.

p < 0,05 was consider significant

	Intervention group (n=89)	Control group (n=73)	p value
Q3 : Traumatic pain, non-medicinal	33.70%	26.00%	0.308
Q4 : Traumatic pain, medicinal	67.40%	60.30%	0.411
Q5 : Headache, non-medicinal	61.80%	41.10%	0.011
Q6 : Headache, medicinal	91.00%	76.70%	0.016
Q7 : Back pain, non-medicinal	43.80%	20.50%	0.002
Q8 : Back pain, medicinal	74.20%	54.80%	0.127
Q9 : Menstrual pain, non-medicinal	50.60%	37.00%	0.111
Q10 : Menstrual pain, medicinal	1.10%	1.40%	1
Q11 : Abdominal pain, non-medicinal	24.70%	8.20%	0.006
Q12 : Abdominal pain, medicinal	42.70%	15.10%	< 0.001

We observed that overall, the increase in knowledge of medicinal and non-medicinal methods in the intervention group was very alike (+12.6% for medicinal methods and +11.7% for non-medicinal methods). (Supplementary file VI)

Of all the items answered by the students, the most notable changes after the intervention were turning off the tv for managing the headache or going for a walk for abdominal pain. Concerning medication methods for managing pain, we observed a marked increase after the intervention in the number of people aware of the indications for paracetamol and non-indications of antidiarrheals in cases of abdominal pain. (Supplementary file VII)

We also noted that the greatest increase in knowledge about drugs over the whole questionnaire was for paracetamol, and the smallest increase was for anti-inflammatory drugs. (Supplementary file VIII)

4.2. Secondary outcomes

We observed that basal knowledge was not so different between the 2 groups according to gender, age, or school. (Supplementary file III)

The impact of the intervention was greater for girls than boys when looking at the questionnaire as a whole (+17.0% for girls vs +5.5% for boys), (Table VI) although differences were noticeable on specific questions. For instance, knowledge on medication methods for managing abdominal pain (question 12) increased way more among girls (+34.6% for girls vs +6.2% for boys). Similar results were found concerning question 9 on non-medicinal methods of managing menstrual pain, where boy's knowledge was initially much lower, a result that did not show improvement following the intervention. (Supplementary file IV) We also noticed that the increase of knowledge after the intervention was greater in 9th graders than 8th graders but was approximately the same between J. Lurçat students and B. Delessert students. (Table VI)

Table VI : Evolution of the groups according to gender, classes, and schools.

The evolution corresponds to the difference in correct answers between the 1st questionnaire and the 2nd questionnaire for the whole questionnaire.

4th grade in France is equivalent of 8th grade in the USA, and 3rd grade to 9th grade.

	Evolution intervention group	Evolution control group
Girls	17.0%	3.9%
Boys	5.5%	-7.0%
8th	7.2%	-5.8%
9th	15.6%	3.7%
J. Lurçat	12.5%	-6.7%
B. Delessert	11.1%	2.5%

DISCUSSION AND CONCLUSION

177 students in 8th and 9th grade in 2 middle schools in Maine-et-Loire, France, were included in this study. 92 students attended our intervention on pain management methods.

An improvement in knowledge was observed among the students who benefited from the intervention, with an overall improvement in correct answers of 12.1% in contrast to the controlled group (-1.8%). Significant differences were observed for medicinal and non-medicinal methods of managing headache and abdominal pain, as well as for non-medicinal methods of managing back pain.

This improvement in knowledge was comparable for medicinal and non-medicinal pain management methods. However, we observed that girls had a better basal knowledge of pain management methods than boys, particularly in non-medicinal methods for menstrual pain. Moreover, the increase in knowledge following the intervention was also more marked for girls than boys.

Our study confirmed the fact that most students turn to an adult in case of pain (46.9% in the intervention group and 51.9% in the control group) as the Papagiorgiou study showed. (1)

Our results also indicate that our intervention improved student's knowledge of pain management, without encouraging adolescents to take medication, as raised by Maldonado JC in 2007. (8) Indeed, our intervention fosters adolescent's knowledge of prioritizing non-medicinal methods of managing pain, such as rest or breathing techniques, rather than waiting for the pain to go away or turning onto medication.

These results are even more encouraging given that the second questionnaires were completed three months after the intervention, which shows that the responses do not simply reflect an immediate restitution of the knowledge imparted, but rather a medium-term

retention of that knowledge. In fact, the restitution of knowledge over several weeks or months corresponds to semantic memory, which is a medium-term memory. (17)

It is important to note that the two middle schools participating in our study had low social position indices (SPI). Collège J. Lurçat, in particular, has the lowest SPI in the county of Maine-et-Loire. (18) A high SPI is associated with a family environment conducive to learning. (18)

Due to a lack of data, we were unable to compare the results according to the socio-professional categories of the student's parents. Consequently, we cannot extrapolate the results of a similar intervention in schools with a higher SPI, but we hypothesize that our results may have been underestimated, due to the low SPI profile of the two schools participating in our study. It would be relevant to explore this issue in future research in order to better understand the impact of the socio-professional position of the student's parents on the effectiveness of these educational interventions. However, despite these unfavorable conditions, our intervention proved effective and fulfilled one of the main missions of the Health Promoting School System: to carry out preventive and health promotion actions with a view to reducing social inequalities in health. (10)

Several factors may have contributed to the positive results of this intervention.

On one hand, the format of the PowerPoint presentation was based on known literature suggesting that pictorial data are more adapted to ensure optimum comprehension and memorization of the information conveyed. (17)

On the other hand, intervention was performed face to face that has better impact as demonstrated by Poulsen M and al. (7)

Furthermore, the interest shown by the teenagers during the presentation, and the spontaneous positive feedback received from the students, teachers, and school nurses,

suggest that there was a real commitment to the subject. This increased interest probably contributed to better attention during the presentation and, consequently, more effective assimilation of the knowledge imparted.

This study does present some limitations due to the small number of students in our sample and the small number of participating schools, leading to a lack of power for our statistical analysis which may explain why, despite the observation of a difference in knowledge improvement for all questions between the two groups after the intervention, this difference was not statistically significant for each question.

Although we were aiming for a sample of at least 300 students, only 2 of the 8 middle schools contacted agreed to take part in the study. This low participation rate of the institutions contrasts with the student's obvious interest in the subject. We recognize that the organization required for this type of intervention can be restrictive. However, we are considering the possibility of providing additional information to sensitize school educational teams to acute pain in adolescents. Drawing on the results of our study, we could demonstrate the effectiveness of such an approach in improving teenager's knowledge on a subject that is crucial to their current and future health. This could lead to greater adherence on the part of institutions.

Another limitation is the over-representation of girls in the intervention group. This may represent a potential bias, as we observed that girls showed a better increase in knowledge after the intervention than boys, bias that may overestimate the results of our intervention. According to the study by Keith and al. on latent cognitive differences between genders in children and adolescents aged 5 to 17, girls show an advantage in processing speed and memory tasks, particularly short-term memory, while boys show an advantage in visuo-spatial

abilities. (19) This observation could provide a path to explain the differences in results observed in our study between girls and boys.

We noticed that the question on medications used to manage menstrual pain was the one where basal knowledge was the weakest, and where there was almost no evolution in knowledge as a result of our intervention. We note that this was the only question where anti-inflammatory drugs were among the correct answers. We therefore used statistics to compare increases in knowledge about drugs and found that our intervention had no real impact on teenager's knowledge of the indications for anti-inflammatories. (Supplementary file VIII) This limitation can be explained by several factors. Firstly, the concept of anti-inflammatory drugs may be perceived as complex for adolescents of this age. Secondly, responses to the questionnaires may have been influenced by the emphasis in our presentation on the need to always consult an adult or doctor before taking anti-inflammatory drugs. And thirdly, we believe that the question may have been asked incorrectly. We therefore question the inclusion of anti-inflammatory drugs in our presentation or, if the intervention is repeated, this question will have to be asked differently.

Even if our intervention appeared effective, there is still room for improvement. Some interventions were carried out under less-than-optimal conditions : for example, two classes were grouped together in a single session, other interventions took place during the lunch break, or even in the absence of a teacher. These factors could have altered the effectiveness of the intervention. We therefore question whether it could be made more effective by conducting it under more favorable conditions, such as during a dedicated lesson time, with only one class at a time and with the systematic presence of a teacher, (20) in order to

maximize student's attention, although we recognize that this may pose organizational challenges within the school.

The presence of an external facilitator in school-based initiatives is a dynamic factor that encourages interactivity. (20) According to Curonici's study, the presence of a well-established professional facilitates encounters and encourages attentive, respectful listening. The study also points out that it's easier for parents to trust professionals who exude an impression of competence in relation to the subject of the intervention. (21)

In our case, we believe that the status of medical student or resident, could offer this type of adapted professional positioning, following the example of school nurses. In this way, we envisage that these professionals, both internal and external to the school, could carry out complementary actions on acute pain in middle schools, enabling wider territorial coverage.

We also question the format of the intervention. According to Roscoät study, a more interactive approach, including more images, videos, practical exercises, or role-playing could potentially improve comprehension and memorization. (20) This concept is supported by Lieury's work where numerous experiments have demonstrated that pictorial information is superior to verbal information in terms of memory, and that when it comes to memorizing actions, representing the stages of the action with films or several photos further improves recall. (17) We therefore believe that a more interactive presentation, especially for non-medical methods of pain management, such as the use of videos or practical exercises to distinguish between muscle strengthening and back stretching, or breathing exercises, could improve the effectiveness of the intervention, especially in boys, who have an advantage in visual-spatial skills. (19)

Our study illustrated the student's lack of knowledge about pain management, as we observed that only 36.5% of the responses to the first questionnaire distributed were correct.

Because of this lack of knowledge on such subject with tremendous impact on their daily lives as demonstrated by Lagerløv study, (3) it seems crucial to develop strategies for increasing their understanding and capacity of managing pain. Although educational interventions have proved effective in preventing drug use among adolescents, as demonstrated in the study by Poulsen et al. (7), we found no organized initiative specifically targeting acute pain in this population. Our study suggests that such an approach could, indeed, be an effective method of achieving the goal of improving their knowledge of acute pain and thus their ability to manage it, since we observed an increase of over 12% in correct responses in the post-intervention questionnaire.

It would be interesting to see whether our results could be improved by a one-year survey. According to the JC Moldano study, it would be possible to increase long-term knowledge by repeating the intervention over time. (8) Indeed, medium-term memory can store information over long periods of time, but to do this, it is necessary to consolidate what has been learned in order to retain it for as long as possible. (17)

This continuous reinforcement of knowledge brought about by our intervention could be made possible by including the subject of acute pain in health prevention programs, whether through the Health Promoting School System or by school's educational teams on an annual basis. We therefore propose a large-scale experimental study, in collaboration with the Department of National Education, prior to a possible nationwide roll-out in France.

This ongoing reinforcement could be the key to empowering adolescents to manage their pain both now and in adulthood, for themselves and for those around them.

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ANNEXES

QUESTIONNAIRE

Presentation:

1. Gender :
2. Age :
3. School :
4. Class (circle your class) :
4° A 4° B 4° C 3° A 3° B 3° C°
5. Profession of parent(s) :
-
-
6. Did you take part in the 1st questionnaire ?
Yes No
7. Did you take part in our presentation on pain?
Yes No

- **Question 1:** When you feel pain, what is the first thing you do? :

Choose one answer only

- A) I'm waiting for the pain to pass
- B) I'm taking a medicine
- C) I try to reduce the pain by resting, calming down or doing breathing exercises.
- D) I go to see a health professional (pharmacist, doctor, school nurse, etc.)
- E) I call the fire department (18) or SAMU (15)
- F) Other (please specify) :

- **Question 2:** If a friend tells you he is in pain somewhere and wants to take painkillers, what would you advise him to do first?

Choose one answer only

- A) Call your doctor
- B) Go to the pharmacy to ask the pharmacist for advice
- C) Ask your parents for their opinion
- D) Call the fire department (18) or SAMU (15)
- E) To take it by himself

- **Question 3:** You're playing with your 8-year-old brother when he falls and twists his ankle. He manages to get up and walk, but he's limping and tells you that his ankle hurts. **Your parents have left for 1 hour and can't be reached. What do you do?**

Several possible answers:

- A) You tell him to keep walking
- B) **You tell him to stop walking**
- C) **Put a cold pack on his ankle**
- D) Put heat on his ankle
- E) **Put cushions under his leg for support**

- **Question 4:** Your parents have gone home, but your little brother is still in pain and is asking for painkillers.

What type of medicine do you think your parents would give him first?

Choose one answer only

- A) Ibuprofen-type analgesic/anti-inflammatory (examples: nurofen, spifen, advil)
- B) **Paracetamol-type analgesic/antipyretic (examples: doliprane, dafalgan, efferalgan)**
- C) Phloroglucinol-type antispasmodic (e.g. spasfon)
- D) Amoxicillin-type antibiotic (examples: clamoxyl, augmentin)

- **Question 5:** You're on a family holiday and the adults are preparing dinner. Your cousin is watching TV and tells you he has a headache.

What would you advise him to do while he waits for you to fetch an adult?

Several answers possible

- A) **Turn off the TV**
- B) **Lie down in a quiet room with no light**
- C) To put your head upside down
- D) To take a piece of sugar
- E) Doing sport

- **Question 6:** He comes back and thanks you because he feels much better after following your advice. He tells you that usually, when he has a headache, his parents give him some medicine, but he can't remember which medicine it is.

What do you think this medicine is?

Choose one answer only

- A) Amoxicillin-type antibiotic (examples: clamoxyl, augmentin)
- B) Phloroglucinol-type antispasmodic (e.g. spasfon)
- C) **Paracetamol-type analgesic/antipyretic (examples: doliprane, dafalgan, efferalgan)**
- D) Ibuprofen-type analgesic/anti-inflammatory (examples: nurofen, spifen, advil)

- **Question 7:** You're in PE class and your teacher has planned a basketball session. Your classmate tells you that his back has been hurting since he got up this morning and that he doesn't think he can play. You tell him to go tell the teacher.

What advice would your teacher give him or her?

Several answers possible

- A) He shows him stretches that could relieve his pain
- B) He told her to do some body-building exercises to strengthen her back
- C) He told her to stand still
- D) He told her to run around the gymnasium
- E) He tells her to walk around the gymnasium

- **Question 8:** Your PE teacher tells your classmate to go to the infirmary.

Your classmate comes back and tells you that the school nurse has given him some medicine.

What do you think the drug is?

Choose one answer only

- A) Paracetamol-type analgesic/antipyretic (examples: doliprane, dafalgan, efferalgan)
- B) Amoxicillin-type antibiotic (examples: clamoxyl, augmentin)
- C) Ibuprofen-type analgesic/anti-inflammatory (examples: nurofen, spifen, advil)
- D) Phloroglucinol-type antispasmodic (e.g. spasfon)

- **Question 9:** A friend complains that her stomach hurts because she's having her period.

What do you advise her to do?

Several answers possible

- A) Drinking Coca-Cola
- B) Put warmth on her stomach
- C) Apply cold on her stomach
- D) Take a piece of sugar
- E) Lie down in a quiet place and do some breathing or relaxation exercises

- **Question 10:** What medicines do you think could reduce period pains?

Several answers possible

- A) Paracetamol-type analgesic/antipyretic (examples: doliprane, dafalgan, efferalgan)
- B) Ibuprofen-type analgesic/anti-inflammatory (examples: nurofen, spifen, advil)
- C) Antidiarrhoeal such as diosmectite (e.g. smecta) or racecadotril (e.g. tiorfan)
- D) Phloroglucinol-type antispasmodic (e.g. spasfon)
- E) Amoxicillin-type antibiotic (e.g. clamoxyl, augmentin)

- **Question 11:** You've been to a fast-food restaurant (McDonald's, KFC, Burger King). After the meal, your little brother complains that his tummy hurts.

What do you advise him to do?

Several answers possible

- A) Gently massage his stomach
- B) To take a piece of sugar
- C) Drinking coca cola
- D) Do breathing exercises
- E) Going for a walk

- **Question 12:** He always has a tummy ache. One of your parents decides to give him 2 medicines.

In your opinion, what are the 2 medicines that could reduce abdominal pain?

Several answers possible

- A) Paracetamol-type analgesic/antipyretic (examples: doliprane, dafalgan, efferalgan)
- B) Ibuprofen-type analgesic/anti-inflammatory (examples: nurofen, spifen, advil)
- C) Antidiarrhoeal such as diosmectite (e.g. smecta) or racecadotril (e.g. tiorfan)
- D) Phloroglucinol-type antispasmodic (e.g. spasfon)
- E) Amoxicillin-type antibiotic (examples: clamoxyl, augmentin)

Supplementary file I : Questionnaire of the study.

Correct answers are in green and bold.

How do you manage acute pain?

Advice and medication

Thesis by HALLAKOUN Laura and PIPET Anaë



1

The most common pains in adolescents :

- Sprain or shock
- Headache
- Stomach ache
- Back pain

2

What can I do about the pain?

- 1. NOTIFY AN ADULT:** parent/guardian, school nurse, teacher, doctor, pharmacist, etc.
- 2. APPLY THE ADVICE** we are about to give you
- 3. TAKE A MEDICINE?**
→ Only with the agreement/advice of an adult!

3



Ankle sprains or shocks

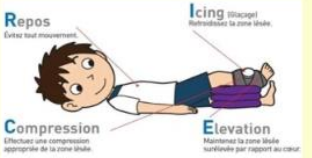
4



Advice:

RICE protocol (Rest, Ice, Compression, Elevation) :

- **REST:** the joint is placed at complete rest or with support authorised, depending on the pain.
- **ICE:** several times a day
- **COMPRESSION:** either with an elastic bandage or a splint with inflatable compartments
- **ELEVATION:** of the painful limb



5

Medicines



Paracetamol-type analgesics
Can be taken without medical advice but with **adult supervision**

6

When should I see my doctor?



If, at the time of the trauma or accident :

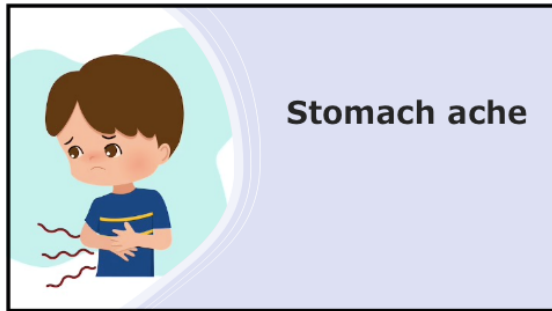
- You felt such intense pain that you could have lost consciousness
- You heard a crack
- You have a swelling that forms immediately and spreads over the whole instep, turning blue
- You can't put your foot down or take a few steps without feeling a great deal of pain.

7

SUMMARY: Sprain or shock

- Informing an adult
- Advice: I rest my leg, I keep it cold, I compress it with a bandage, I put my leg up high.
- Medication : Paracetamol-type painkillers
- I consult a doctor if necessary

8



9



General councils :

- Trying to relax
- Breathe calmly
- Resting
- Eat in small quantities depending on the pain
- Drinking water

CAUTION: SODAS such as Coca Cola and sugars are **INEFFECTIVE**.

10

Stomach ache after eating = digestion problems

Advice :

- Gently massage your stomach
- Breathe calmly
- Going for a walk
- Drink small sips of water



11

Menstrual pain

Advice :

- Try to relax
- Breathe calmly
- Resting
- Apply warmth to the stomach (e.g. hot water bag, bath...)
- Put yourself in a position that provides relief



12

Medicines



- Paracetamol-type painkillers
- Phloroglucinol-type antispasmodic (anti-cramp)

with **the consent of an adult**

PLEASE NOTE:

- Ibuprofen-type analgesic

ONLY FOR MENSTRUAL PAIN ON THE ADVICE OF AN ADULT, IF PARACETAMOL IS INEFFECTIVE AND THERE IS NO FEVER

13

When should I see my doctor?



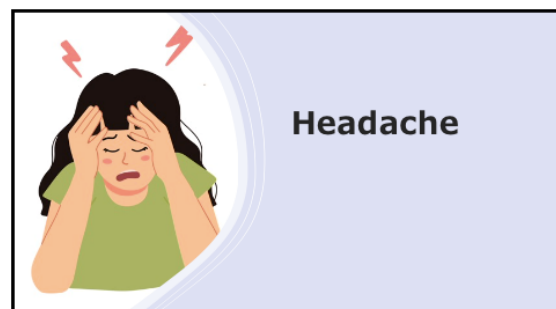
- Medicines don't work
- Stomach ache prevents me from carrying on with my usual activities
- I have a high fever
- I have additional symptoms: nausea, vomiting, difficulty going to the toilet, etc.
- My periods are unusually late

14

SUMMARY: Stomach ache

- Informing an adult
- Advice: Relax, breathe calmly, rest, drink small amounts of water.
- If period pains:** Apply heat
- Medication : Paracetamol-type painkiller
- Phloroglucinol-type antispasmodic
- If menstrual pain:** Analgesic/anti-inflammatory such as Ibuprofen
- I consult a doctor if necessary

15



16



Advice:

- Putting yourself in a quiet room
- Lying down
- Turning off the lights, getting into a dark mood
- Don't look at screens
- Drinking water
- Put a fresh cloth over your forehead
- Do relaxation exercises

17

Medicines



Paracetamol-type analgesics
with **the agreement of an adult**

18

When should I see my doctor?



- My headache won't go away despite medication
- My headache comes back regularly
- My headache is new, or more intense, or more violent
- I have additional symptoms: fever, vomiting, muscle pain, fatigue, memory problems, reduced vision, etc.

19

SUMMARY: Headache

- Informing an adult
- Advice: Get some peace and quiet, lie down in the dark without a screen, drink plenty of fluids and relax.
- Medication : Paracetamol-type painkillers
- I consult a doctor if necessary

20



Back pain

21



Advice:

- Don't stand still, walk
- Do not lift heavy objects
- Apply warmth
- Pay attention to your posture

22

Medicines



Paracetamol-type analgesics
with **the agreement of an adult**

23

When should I see my doctor?



- Pain following a fall, a blow to the back or an injury
- It does not improve over time
- I have a fever
- I have additional symptoms: pain, weakness, numbness and tingling in one or both legs.

24

SUMMARY: Back pain

- Informing an adult
- Advice: walk, don't lift heavy things, Apply heat, good posture
- Medication : Paracetamol-type painkillers
- I consult a doctor if necessary

25

WHAT TO REMEMBER IF IT HURTS

26

1. TELL AN ADULT:

- Parent/guardian
- School nurse
- Professor
- Doctor
- Pharmacist, etc...

27



2. APPLY THE ADVICE GIVEN TODAY

- Shock, trauma: Rest, cold, compress, lift leg
- Stomachache linked to digestion: Massage, breathe calmly, drink small sips of water and go for a walk.
- Stomach ache linked to menstruation: Relax, breathe calmly, warm, comfortable position
- Headache: lie down in the dark, in a quiet place, no screens, drink something.
- Back pain: walking, warmth, good posture

28

3. FOR DRUGS: I ask an adult to



- Antibiotics Amoxicillin-type
 - Antidiarrhoeals such as Diosmectite or Racécadotril
- **NEVER on your own**, always **seek medical advice**.

29

3. FOR DRUGS: I ask an adult to



- Ibuprofen-type analgesic/anti-inflammatory : For **menstrual pain** on the **advice of an adult**.
For **other pains**, only on **medical advice**
- Phloroglucinol-type antispasmodic: for stomach aches.
On the **advice of an adult**
- Paracetamol-type analgesic/antipyretic :
The only medicine indicated **for** pain in **first line**.
On the advice of an adult

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PARACETAMOL, how is it taken?

- Maximum dose per dose :
 - If I weigh more than 50kg: 1g per dose maximum
 - If I weigh less than 50kg: 500mg per dose maximum
- Interval between doses: at least 4 to 6 hours
- Maximum daily dose :
 - If I weigh more than 50kg: 4g maximum per day (4 x 1g packets)
 - If I weigh less than 50kg: 2g maximum per day (4 x 500mg packets)

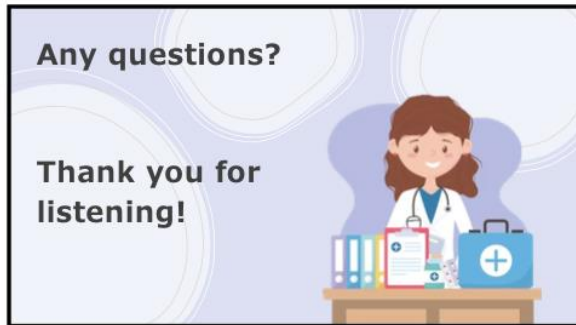
31

4. If I think I need to SEE A DOCTOR :



- If I'm not alone: I ask an adult to take me to the doctor
- If I'm alone, I call :
 - Médical advice / Doctor on call: **116 117**
(only at night and weekends in the Maine and Loire County in France)
 - SAMU: **15** medical emergency
 - Abuse: **119**

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Supplementary file II : PowerPoint of the educational intervention.

Supplementary file III : Basal knowledge in both groups.

Percentage corresponds to correct answers to all items for each question. 4th grade in France is equivalent of 8th grade in the USA, and 3rd grade to 9th grade

		Intervention group pre-intervention	Control group 1 st questionnaire
Overall	Q3 : Traumatic pain, non-medicinal	28.1%	24.7%
	Q4 : Traumatic pain, medicinal	56.3%	61.7%
	Q5 : Headache, non-medicinal	43.8%	45.7%
	Q6 : Headache, medicinal	87.5%	88.9%
	Q7 : Back pain, non-medicinal	29.2%	21.0%
	Q8 : Back pain, medicinal	47.9%	54.3%
	Q9 : Menstrual pain, non-medicinal	42.7%	34.6%
	Q10 : Menstrual pain, medicinal	0.0%	1.2%
	Q11 : Abdominal pain, non-medicinal	12.5%	9.9%
	Q12 : Abdominal pain, medicinal	21.9%	17.3%
	Mean	37.0%	35.9%
Girls	Mean	39.0%	40.8%
Boys	Mean	33.2%	32.9%
8th	Mean	40.9%	37.1%
9th	Mean	33.4%	35.5%
J. Lurçat	Mean	35.0%	38.5%
B. Delessert	Mean	39.0%	34.1%

Supplementary file IV : Details results of the groups according to gender.

Percentage corresponds to correct answers to all items for each question

	Intervention group pre-intervention		Control group 1 st questionnaire		Evolution intervention group		Evolution control group	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Q3 : Traumatic pain, non-medicinal	37.1%	11.8%	31.6%	19.0%	2.9%	13.9%	5.9%	-2.0%
Q4 : Traumatic pain, medicinal	51.6%	64.7%	66.0%	69.2%	8.9%	-2.8%	-0.4%	-13.1%
Q5 : Headache, non-medicinal	43.5%	44.1%	52.6%	40.5%	26.5%	7.2%	0.5%	-8.8%
Q6 : Headache, medicinal	88.7%	85.3%	86.8%	90.5%	5.3%	1.9%	0.7%	-22.2%
Q7 : Back pain, non-medicinal	30.6%	26.5%	23.7%	19.0%	21.4%	6.9%	4.4%	-4.4%
Q8 : Back pain, medicinal	48.4%	47.1%	52.6%	54.8%	27.6%	24.7%	9.9%	-6.0%
Q9 : Menstrual pain, non-medicinal	53.2%	23.5%	55.3%	16.7%	18.8%	-0.5%	13.5%	-4.5%
Q10 : Menstrual pain, medicinal	0.0%	0.0%	2.6%	0.0%	2.0%	0.0%	0.5%	0.0%
Q11 : Abdominal pain, non-medicinal	9.7%	17.6%	10.5%	9.5%	22.3%	-2.3%	8.2%	-9.5%
Q12 : Abdominal pain, medicinal	27.4%	11.8%	26.3%	9.5%	34.6%	6.2%	-4.4%	0.2%
Mean of all questions	39.0%	33.2%	40.8%	32.9%	17.0%	5.5%	3.9%	-7.0%

Supplementary file V : P value between the two groups for the first questionnaire before intervention.

	Intervention group (n = 96)	Control group (n = 81)	p value
Q3 : Traumatic pain, non-medicinal	28.1%	24.7%	0.733
Q4 : Traumatic pain, medicinal	56.3%	61.7%	0.54
Q5 : Headache, non-medicinal	43.8%	45.7%	0.88
Q6 : Headache, medicinal	87.5%	88.9%	0.82
Q7 : Back pain, non-medicinal	29.2%	21.0%	0.223
Q8 : Back pain, medicinal	47.9%	54.3%	0.775
Q9 : Menstrual pain, non-medicinal	42.7%	34.6%	0.283
Q10 : Menstrual pain, medicinal	0.0%	1.2%	0.458
Q11 : Abdominal pain, non-medicinal	12.5%	9.9%	0.64
Q12 : Abdominal pain, medicinal	21.9%	17.3%	0.75

Supplementary file VI : Evolution between the groups concerning medicinal and non-medicinal methods. *Percentage corresponds to correct answers to all items for each question.*

	Evolution intervention group	Evolution control group
Medicinal question	12.6%	-3.0%
Non-medicinal question	11.7%	-0.6%

Supplementary file VII : Details of the results of each item, for all the 12 questions.

Percentage corresponds to the correct answers for each item.

Question 1 = What do you do first when you have pain ?						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Wait for the pain to pass	47.9%	31.5%	-16.5%	40.7%	37.0%	-3.8%
Taking a medicine	26.0%	15.7%	-10.3%	28.4%	24.7%	-3.7%
Try to reduce the pain with non-medical methods	15.6%	47.2%	31.6%	23.5%	27.4%	3.9%
Going to see a health professional	6.3%	5.6%	-0.6%	6.2%	4.1%	-2.1%
Calling medical services such as 15 or 18	1.0%	0.0%	-1.0%	0.0%	1.4%	1.4%
Other	3.1%	1.1%	-2.0%	0.0%	4.1%	4.1%

Question 2 = When someone wants to take a medication, what you tell him to do first ?						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Call your doctor	24.0%	23.6%	-0.4%	16.0%	23.3%	7.2%
Ask the pharmacist for advice	13.5%	15.7%	2.2%	17.3%	19.2%	1.9%
Ask your parents for their opinion	46.9%	58.4%	11.6%	51.9%	45.2%	-6.6%
Calling medical services such 15 or 18	1.0%	1.1%	0.1%	0.0%	4.1%	4.1%
To take it by himself	14.6%	1.1%	-13.5%	13.6%	8.2%	-5.4%

Question 3 = Traumatic pain / non-medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	28.1%	33.7%	5.6%	24.7%	26.0%	1.3%
Keep walking	93.8%	95.5%	1.8%	96.3%	89.0%	-7.3%
Stop walking	62.5%	67.4%	4.9%	60.5%	50.7%	-9.8%
Put cold	77.1%	84.3%	7.2%	75.3%	78.1%	2.8%
Put hot	96.9%	92.1%	-4.7%	95.1%	93.2%	-1.9%
Raise the leg	51.0%	61.8%	10.8%	45.7%	53.4%	7.7%

Question 4 = Traumatic pain / medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	56.3%	67.4%	11.2%	61.7%	60.3%	-1.5%
Anti-inflammatory	67.7%	70.8%	3.1%	74.1%	76.7%	2.6%
Paracetamol	56.3%	67.4%	11.2%	61.7%	60.3%	-1.5%
Antispasmodic	89.6%	96.6%	7.0%	91.4%	90.4%	-0.9%
Antibiotic	99.0%	100.0%	1.0%	96.3%	93.2%	-3.1%

Question 5 = Headache / non-medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	43.8%	61.8%	18.0%	45.7%	41.1%	-4.6%
Turn off the TV	70.8%	89.9%	19.1%	75.3%	74.0%	-1.3%
Lie down in a quiet room, in darkness	78.1%	87.6%	9.5%	81.5%	79.5%	-2.0%
Put the head down	95.8%	97.8%	1.9%	97.5%	100.0%	2.5%
Take a piece of sugar	79.2%	82.0%	2.9%	79.0%	72.6%	-6.4%
Doing sport	97.9%	97.8%	-0.2%	96.3%	98.6%	2.3%

Question 6 = Headache / medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	87.5%	91.0%	3.5%	88.9%	76.7%	-12.2%
Antibiotic	96.9%	98.9%	2.0%	95.1%	90.4%	-4.7%
Antispasmodic	94.8%	93.3%	-1.5%	97.5%	91.8%	-5.8%
Paracetamol	87.5%	91.0%	3.5%	88.9%	76.7%	-12.2%
Anti-inflammatory	95.8%	98.9%	3.0%	96.3%	94.5%	-1.8%

Question 7 = Back pain / non-medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	29.2%	43.8%	14.7%	21.0%	20.5%	-0.4%
Do stretches	80.2%	91.0%	10.8%	77.8%	76.7%	-1.1%
Do bodybuilding exercises	87.5%	76.4%	-11.1%	77.8%	69.9%	-7.9%
Not moving at all	71.9%	77.5%	5.7%	65.4%	71.2%	5.8%
Runing	97.9%	96.6%	-1.3%	96.3%	95.9%	-0.4%
Walking	39.6%	56.2%	16.6%	29.6%	42.5%	12.8%

Question 8 = Back pain / medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	47.9%	74.2%	26.2%	54.3%	54.8%	0.5%
Paracetamol	47.9%	74.2%	26.2%	54.3%	54.8%	0.5%
Antibiotic	94.8%	97.8%	3.0%	88.9%	90.4%	1.5%
Anti-inflammatory	78.1%	88.8%	10.6%	79.0%	75.3%	-3.7%
Antispasmodic	75.0%	87.6%	12.6%	86.4%	89.0%	2.6%

Question 9 = Menstrual pain / non-medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	42.7%	50.6%	7.9%	34.6%	37.0%	2.4%
Drink Coca-Cola	88.5%	79.8%	-8.8%	84.0%	74.0%	-10.0%
Put hot on the stomach	77.1%	78.7%	1.6%	63.0%	56.2%	-6.8%
Put cold on the stomach	92.7%	93.3%	-0.6%	95.1%	90.4%	4.7%
Take a piece of sugar	88.5%	85.4%	3.1%	87.7%	86.3%	1.4%
Lie down in a calm piece and relax	61.5%	75.3%	13.8%	65.4%	65.8%	0.3%

Question 10 = Menstrual pain / medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	0.0%	1.1%	1.1%	1.2%	1.4%	0.1%
Paracetamol	61.5%	75.3%	13.8%	64.2%	67.1%	2.9%
Anti-inflammatory	13.5%	15.7%	2.2%	19.8%	21.9%	2.2%
Antidiarrheal	94.8%	92.1%	-2.7%	91.4%	89.0%	-2.3%
Antispasmodic	51.0%	52.8%	1.8%	42.0%	46.6%	4.6%
Antibiotic	91.7%	92.1%	0.5%	90.1%	94.5%	4.4%

Question 11 = Abdominal pain / non-medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	12.5%	24.7%	12.2%	9.9%	8.2%	-1.7%
Massage the belly	67.7%	78.7%	10.9%	51.9%	67.1%	15.3%
Take a piece of sugar	93.8%	96.6%	2.9%	95.1%	86.3%	-8.8%
Drink Coca-Cola	83.3%	88.8%	5.4%	79.0%	80.8%	1.8%
Do breathe excercices	31.3%	46.1%	14.8%	37.0%	37.0%	-0.1%
Going for a walk	54.2%	70.8%	16.6%	64.2%	53.4%	-10.8%

Question 12 = Abdominal pain / medicinal						
	Intervention group pre-intervention	Intervention group post-intervention	Evolution before/after intervention group	Control group 1 st questions	Control group 2 nd questions	Evolution before/after control group
Good answer at all the items	21.9%	42.7%	20.8%	17.3%	15.1%	-2.2%
Paracetamol	65.6%	83.1%	17.5%	71.6%	61.6%	-10.0%
Anti-inflammatory	86.5%	84.3%	-2.2%	81.5%	83.6%	2.1%
Antidiarrheal	64.6%	85.4%	20.8%	70.4%	64.4%	-6.0%
Antispasmodic	38.5%	58.4%	19.9%	40.7%	43.8%	3.1%
Antibiotic	70.8%	93.3%	22.4%	69.1%	87.7%	18.5%

Supplementary file VIII : Details of evolution between the groups concerning medication methods.

Percentage corresponds to correct answers to all items for each medical methods question.

	Evolution intervention group	Evolution control group
Paracetamol	14.5%	-4.0%
Anti-inflammatory	3.4%	0.3%
Antidiarrheal	9.1%	-4.2%
Antispasmodic	8.0%	0.7%
Antibiotic	5.8%	3.3%

Impact des interventions éducatives dans les collèges sur les connaissances des adolescents en matière de méthodes de gestion de la douleur aiguë

RÉSUMÉ

Objectif : Cette étude vise à évaluer l'impact d'une intervention éducative sur les connaissances des collégiens en matière de méthodes médicamenteuses et non médicamenteuses de prise en charge des douleurs aiguës les plus communes chez les adolescents.

Méthode : Un essai contrôlé randomisé a été mené dans deux collèges du Maine-et-Loire. Les élèves ont été randomisés par classe, un groupe bénéficiant d'une intervention éducative sur la prise en charge de la douleur par des internes en médecine. Un questionnaire anonyme a été distribué à toutes les classes avant l'intervention, puis trois mois plus tard. Le critère de jugement principal est l'amélioration des connaissances dans le groupe intervention par rapport au groupe contrôle. Les critères de jugement secondaires sont les connaissances de base et l'évolution de celles-ci en fonction du genre, de l'âge et du collège.

Résultats : Au total, 177 élèves (4ème et 3ème) de 11 classes ont participé, dont 92 ont bénéficié de l'intervention. Le groupe intervention a montré une augmentation globale de 13,9 % du nombre de réponses correctes par rapport au groupe contrôle. Nous avons noté une augmentation des connaissances du groupe intervention par rapport au groupe contrôle dans chaque question du questionnaire et de manière significative en ce qui concerne les méthodes non médicamenteuses et médicamenteuses de gestion des céphalées et des douleurs abdominales ainsi que sur les méthodes non médicamenteuses de gestion du mal de dos. L'intervention a également encouragé l'utilisation de méthodes non-médicamenteuses telles que le repos et les exercices de respiration, et a augmenté le pourcentage d'élèves prêts à consulter un adulte en cas de douleur. Les filles ont démontré de meilleures connaissances de base et une plus grande amélioration de leurs connaissances que les garçons (+17,0 % contre +5,5 %) après l'intervention.

Conclusion : L'étude montre qu'une intervention éducative peut améliorer les connaissances des adolescents en matière de gestion de la douleur aiguë. Compte tenu de la prévalence de la douleur aiguë et de ses conséquences, nous recommandons d'intégrer ce sujet dans les programmes d'éducation à la santé des adolescents afin d'améliorer leur capacité à gérer leur douleur aujourd'hui et à l'âge adulte.

Mots-clés : Douleur aiguë, Adolescents, Interventions éducatives, Collèges

Effect of educational interventions in middle school on adolescent's knowledge of acute pain management methods

ABSTRACT

Aim: This study aims to assess the impact of an educational intervention on middle school student's knowledge of medicinal and non-medicinal methods for managing most common acute pain in teenagers.

Method : Randomized controlled trial was conducted in two middle schools in Maine-et-Loire, France. Students were randomized by class, with one group receiving an educational intervention by medical residents on pain management. An anonymous questionnaire was administered before the intervention in all the classes and again three months later. The primary endpoint was the improvement in knowledge in the intervention group compared to the control group. The secondary endpoints were basal knowledge and its evolution according to gender, age, and school.

Results : A total of 177 students (8th and 9th grade) from 11 classes participated, with 92 receiving the intervention. The intervention group showed a 13.9% overall increase in correct answers compared to the control group. We noted an increase in the knowledge of the intervention group compared to the control group in every question of the questionnaire, and significantly in non-medicinal and medicinal methods of managing headache and abdominal pain, as well as in non-medicinal methods of managing back pain. The intervention also encouraged the use of non-medicinal methods such as rest and breathing exercises and increased the percentage of students willing to consult an adult for pain. Girls demonstrated better baseline knowledge and greater improvement in knowledge than boys (+17.0% vs. +5.5%).

Conclusion : The study shows that an educational intervention can improve adolescent's knowledge of acute pain management. Given the prevalence of acute pain and its effects, we recommend integrating this topic into adolescent health education programs to enhance their ability to manage pain now and in adulthood.

Keywords : Acute pain, Adolescents, Educational interventions, Middle schools