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The Application of Clinical Audit to Improve Pain Control following Third Molar Surgery

Abstract: A telephone survey was used to assess adequacy of pain control after third molar removal in a series of three audits. After each audit, factors contributing to failure to control pain adequately and poor patient compliance with our analgesic regimen were identified. Changes in practice were then introduced to remedy areas of weakness and improve outcome. Despite an apparently sound protocol for the prescription of analgesics for patients having third molar surgery, the first audit revealed that 53% of patients experienced moderate to severe pain. After the introduction of written patient instructions to clarify the use of post-operative analgesics, the second audit demonstrated that 86% had their pain managed successfully. After subsequently increasing the post-operative Ibuprofen doses from 400 mg to 600 mg, the third audit showed that 96% of patients had satisfactory pain control. The use of clinical audit with an evidence-based analgesic regimen and clear, written patient instruction has improved post-operative pain control.

Clinical Relevance: This paper demonstrates the usefulness of clinical audit for the monitoring and improvement of pain control and analgesic prescribing regimens following oral surgery, which in turn may improve patient experience and outcome.

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The surgical removal of mandibular third molars is known to cause post-operative pain.[1] The predictability of pain after third molar surgery has resulted in this surgical procedure being used in analgesic studies as a model of acute inflammatory pain.[2,3] For a patient undergoing this frequently performed procedure, a satisfactory outcome should include acceptable pain control – the prevention or complete relief of pain, although challenging, is the goal of responsible clinicians.

It is known that patients suffering from acute dental pain self-medicate with a variety of analgesics[4] which may be inappropriate for some. Excessive consumption has also been reported.[5,6] Wishing to avoid similar problems in post-operative patients following third molar removal, the Department of Oral Surgery of King's College Hospital Foundation Trust introduced a protocol which determined that all patients undergoing the surgical removal of teeth would be prescribed pre-operative *and* post-operative analgesics. Senior clinicians believed this to represent sound clinical practice in a busy department staffed by many clinicians where wide variation in prescribing might otherwise result. Arrangements were made for appropriate analgesics to be dispensed from locally held stocks.

The drug selected was Ibuprofen, 600 mg to be taken pre-operatively and 400 mg post-operatively four times daily. Despite this regimen, it became apparent that some patients attending post-operatively reported having experienced significant pain.

Clinical audit is one of the essential pillars of clinical governance which is concerned with improving the quality and outcome of healthcare delivery. The 'audit cycle' allows aspects of clinical practice to be examined, modified and then re-examined. In order to assess the reported failures of our analgesic regimen, a programme of clinical audit was introduced.

Method (Figure 1)

Audit A (2004)

An audit was undertaken to examine a number of aspects of outcome following the surgical removal of impacted mandibular third molars under local anaesthesia. An enquiry into the adequacy of pain control, afforded by the non-steroidal anti-inflammatory drug Ibuprofen, was the primary objective and is the subject of this report.

A telephone survey is known to be a reliable method to collect information regarding post-operative pain experience,[7]

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so a questionnaire was designed to be used in a semi-structured telephone interview (Figure 2).

Patients attending for the surgical removal of impacted third molars involving bone removal were invited to take part in this audit and it was established that these individuals would be willing to receive a telephone call 3 (to 5) days post-operatively. It was considered that this timeframe would allow patients to report their pain experience at a time when this had already reached its maximal level, but could still be recalled easily. Patients agreeing to participate were provided with written confirmation of the arrangements and asked to supply a daytime telephone number. The intention was to obtain responses from about 50 patients treated in the department.

When the first audit was conducted the analgesic regimen included a pre-operative dose of 600 mg Ibuprofen and 400 mg four times daily post-operatively. The pre-packed post-operative tablets were in a box labelled with instructions to take the medication regularly. This was reinforced verbally at discharge.

All post-operative telephone interviews were conducted by one clinician (CB) using standardized questions. Clinical records were not available at this time.

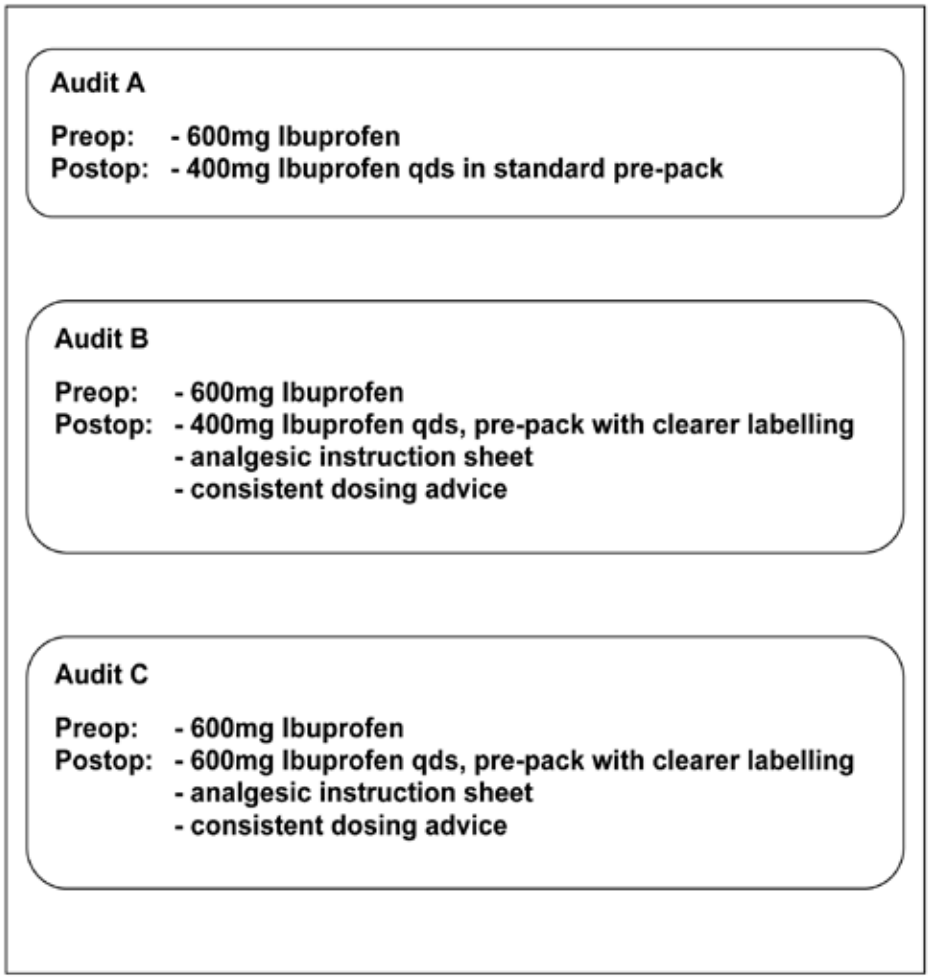


Figure 1. The analgesic regimens used in Audits A, B and C.

Audit B (2006)

In this second audit, the analgesic regimen was not changed, but the pre-packed boxes of Ibuprofen were over-labelled to clarify the instructions to patients and the inner (manufacturer's) information sheet, offering conflicting advice, was removed. To improve compliance further, an instruction sheet was developed (Figure 3) to provide explicit instructions about the timing of analgesic doses and the need to take the analgesics regularly. The verbal reinforcement of this advice when patients were discharged was strengthened through staff training.

The same telephone interview was conducted by the same surgeon as in audit A.

Audit C (2007)

In an attempt to improve the proportion of patients with acceptable levels of pain control after mandibular third molar surgery still further, a change to the analgesic regimen was introduced, with the post-operative Ibuprofen dose being increased to 600 mg four times daily. The written analgesic instruction sheet was amended to reflect this change.

The audit was conducted in the same way as the previous two, with the same telephone enquiries being undertaken by the same surgeon.

Results

The demographics of patients recruited to the three audits are shown in Table 1 and the levels of pain that they experienced in Table 2.

Audit A (2004)

When the 41 patients participating in this audit were contacted post-operatively, one reported not having taken the analgesics prescribed and dispensed to him/her because no pain was experienced. The 40 others confirmed that they had taken the medication provided as they understood it had been prescribed.

Only 16 (39%) patients reported being free from pain in the immediate (first 3 days) post-operative period. Three patients had experienced mild pain, which was considered acceptable. Overall, therefore, 19 patients of the 41 (47%) had satisfactory management of their pain. Twenty two patients, however, suffered moderate to severe pain over the same post-operative period, which was considered to represent unacceptable control of their pain.

Five patients reported being confused by instructions on the manufacturer's information sheet to take Ibuprofen 400 mg no more than three times daily, which conflicted

ORAL SURGERY CLINICAL OUTCOME AND PAIN CONTROL SURVEY FOLLOWING LOWER THIRD MOLAR REMOVAL

TO BE COMPLETED AT TIME OF SURGERY

Patient Name: ..... Age:..... Male / female*

DH Number: ..... Relevant PMH: .....

Teeth removed: ——|—— Date:..... Paracetamol / Ibuprofen given*

DAYTIME TELEPHONE NUMBER:..... * please delete as necessary

TO BE COMPLETED DURING TELEPHONE INTERVIEW

Have you telephoned or returned to the Dental Institute since the time of surgery? No / Yes
If Yes, when & why? .....

Have you consulted another clinician regarding your symptoms postoperatively? No / Yes
If Yes, when & why? .....

Did you take the prescribed painkillers as directed? No / Yes
If No, why? .....

Whilst taking the prescribed painkillers, was the extraction site still painful? No / Yes
If Yes, was this pain: mild moderate severe?

Did you take additional painkillers? No / Yes
If Yes, what & when? .....

Did you experience troublesome bleeding after leaving the hospital? No / Yes
If Yes, -when? .....
-how was this controlled?.....

Do you have any persistent alteration in the sensation of the lower lip or tongue? No / Yes
If Yes, please give details.....

Advised review on OSPDC clinic on .....

Is there anything else that you think we should know?
If Yes, please give details.....

Did you receive an advice sheet with instructions on how to take your pain killers? No / Yes

Completed by ..... Date.....Number of days post-op:.....

Figure 2. Questionnaire used during semi-structured telephone interview.

with advice given verbally and on the pre-pack pharmacy label to take it four times a day. All five patients had noted this contradiction but decided to take Ibuprofen at the higher frequency after finding that 400 mg Ibuprofen three times daily was insufficient to control their pain. Until this decision was made, these patients were not in fact taking their analgesic as the prescriber intended.

Twelve patients (29%) had found it necessary to take analgesics in addition to the Ibuprofen prescribed. The supplemental medication taken included additional Ibuprofen doses (5 patients) co-codamol (3) paracetamol (2) dihydrocodeine (1) and a herbal remedy (1). The need for these patients to self-administer such additional analgesics introduced further doubt about the success of the medication issued at the hospital.

Four patients (10%) had sought professional advice about their pain or for advice on pain control prior to the telephone interview. This was obtained from a general medical practitioner, a general dental practitioner, an emergency dental service and a pharmacist.

When asked for other feedback comments at the end of the telephone interview, one patient commented that he/she felt that more information should have been given about the management of breakthrough pain whilst taking the Ibuprofen prescribed. Another felt strongly that the advice given by a pharmacist to supplement the prescribed Ibuprofen with paracetamol on a 6-hourly basis in order to improve pain control should have been given to him/her by the Oral Surgery department.

Audit B (2006)

Thirty one (72%) of the 43 patients reported being pain free post-operatively, with 6 patients reporting mild pain. Overall therefore, it appeared that 37 of the 43 patients (86%) had acceptable post-operative pain control.

Six patients (14%), however, suffered moderate to severe pain. In other words, attempts to control pain had failed in about 1 in every 7 patients.

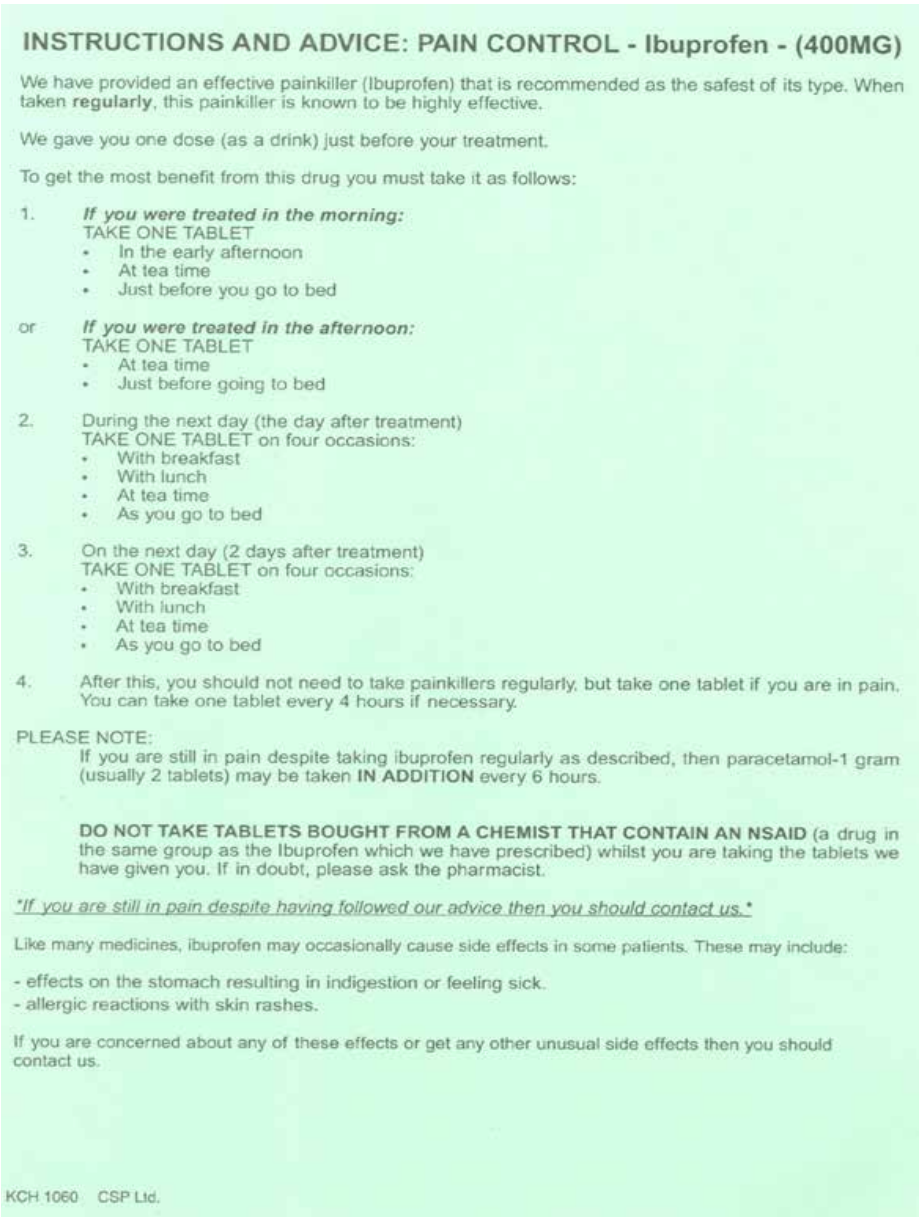
All patients confirmed that they had taken their medication as prescribed, although 5 patients (12%) reported that they had required further analgesics for breakthrough pain. Three of them had taken paracetamol as advised on the instruction sheet provided, a further 2 self-administered co-dydramol which was not specifically prescribed for them.

No patient reported seeking further pain control advice or the need for further clarification about the use of their medication.

Audit C (2007)

Forty-seven patients were interviewed by telephone by the same member of staff within the same post-operative period. The interviews revealed that 41 (87%) patients had no pain, and 4 reported mild pain. Therefore 45 of the 47 patients (96%) had acceptable pain control. Only 2 patients experienced moderate pain but none reported severe pain.

All patients confirmed that they had taken their medication as directed and only 2 (4%) reported that they had required further analgesics for breakthrough pain. Both took



INSTRUCTIONS AND ADVICE: PAIN CONTROL - Ibuprofen - (400MG)

We have provided an effective painkiller (Ibuprofen) that is recommended as the safest of its type. When taken **regularly**, this painkiller is known to be highly effective.

We gave you one dose (as a drink) just before your treatment.

To get the most benefit from this drug you must take it as follows:

1. ***If you were treated in the morning:***
TAKE ONE TABLET
- In the early afternoon
- At tea time
- Just before you go to bed

or ***If you were treated in the afternoon:***
TAKE ONE TABLET
- At tea time
- Just before going to bed

2. During the next day (the day after treatment)
TAKE ONE TABLET on four occasions:
- With breakfast
- With lunch
- At tea time
- As you go to bed

3. On the next day (2 days after treatment)
TAKE ONE TABLET on four occasions:
- With breakfast
- With lunch
- At tea time
- As you go to bed

4. After this, you should not need to take painkillers regularly, but take one tablet if you are in pain. You can take one tablet every 4 hours if necessary.

PLEASE NOTE:
If you are still in pain despite taking ibuprofen regularly as described, then paracetamol-1 gram (usually 2 tablets) may be taken **IN ADDITION** every 6 hours.

DO NOT TAKE TABLETS BOUGHT FROM A CHEMIST THAT CONTAIN AN NSAID (a drug in the same group as the Ibuprofen which we have prescribed) whilst you are taking the tablets we have given you. If in doubt, please ask the pharmacist.

If you are still in pain despite having followed our advice then you should contact us.

Like many medicines, ibuprofen may occasionally cause side effects in some patients. These may include:

- effects on the stomach resulting in indigestion or feeling sick.
- allergic reactions with skin rashes.

If you are concerned about any of these effects or get any other unusual side effects then you should contact us.

KCH 1060 CSP Ltd.

Figure 3. Instruction sheet for Ibuprofen 400 mg.

paracetamol as advised on the instruction sheet provided. No patient reported confusion or the need for further clarification about pain control.

The trend of the increasing proportion of patients with acceptable post-operative pain control from 2004 to 2007 is demonstrated in Figure 4.

Discussion

The surgical removal of impacted mandibular third molars, particularly when bone removal is involved, results in severe post-operative pain.[1] It is recognized that the control of post-operative pain following dental (surgical) procedures is essential if patients are to return to normal function soon after surgery. Prolonged pain is more difficult to manage and is associated with adverse effects and poor outcome.

The challenge of accurately measuring patient satisfaction with the control of post-operative pain is highlighted in studies in which large numbers of patients report moderate or severe pain whilst being 'satisfied' with the analgesics that they were prescribed.[8,9] The low expectation of patients for effective post-operative pain relief was reported in a survey of 75 patients undergoing surgical procedures within a department of oral and maxillofacial surgery. Despite 24% reporting that their pain was worse than they had expected, 74 out of the 75 questioned were 'satisfied' with the pain control that they received.[10] The onus is, therefore, on dental surgeons to utilize the evidence available to develop robust protocols for the management of the predictable, severe pain that their patients undergoing third molar removal will otherwise suffer.

Research has confirmed that the drugs most useful to control the acute inflammatory pain following surgical third molar removal are the non-steroidal anti-inflammatory drugs (NSAIDs).[8] Of these, Ibuprofen has been studied frequently and identified as a very useful agent in the control of pain following oral surgery, where it has been demonstrated to be as effective as other NSAIDs whilst having the lowest side-effect profile.[11,12] A dispersible formulation of 600 mg Ibuprofen as effervescent granules was selected for pre-operative use because its increased rate of absorption, earlier and greater plasma concentrations[13] were considered advantageous for this purpose.

Research studies investigating analgesic effectiveness are predominately single-dose studies and mainly designed to demonstrate 'pain relief', ie patients are allowed to experience moderate to severe post-operative pain and then the agents are administered to evaluate their efficiency to relieve pain. In most studies, performance of the analgesic is compared with a placebo where difference is considered to represent success. Clinical pain control requires more stringent regimens. Complete pain control is desirable (certainly in the third molar example) and the prevention of pain is the gold standard. Since severe pain can be experienced during the first three post-operative days after third molar surgery (but rarely beyond that), effective pain control is required for that time, so drug regimens for that period (not single dose responses) need to be studied.

The first audit (A) undertaken tested the success of a pre-existing analgesic regimen. When the results (Table 2) of this audit were analysed, the extent of the failure to provide adequate pain control became evident. Despite an established analgesic protocol, only 47% of patients experienced

	2004	2006	2007
Total Number of Patients	41	43	47
Male:Female	16:25	13:30	23:24
Mean Age (range)	30 (19–46)	26 (19–45)	29 (17–48)
Teeth Removed (right:left:both)	11:27:3	21:20:2	24:23:0

Table 1. Patient groups audited in 2004, 2006 and 2007.

	No Pain	Mild	Moderate	Severe
2004 n=41	16 = 39%	3 = 8%	10 = 24%	12 = 29%
2006 n=43	31 = 72%	6 = 14%	3 = 7%	3 = 7%
2007 n=47	41 = 87%	4 = 9%	2 = 4%	0

Table 2. Patients' post-operative pain rating in 2004, 2006 and 2007 audits.

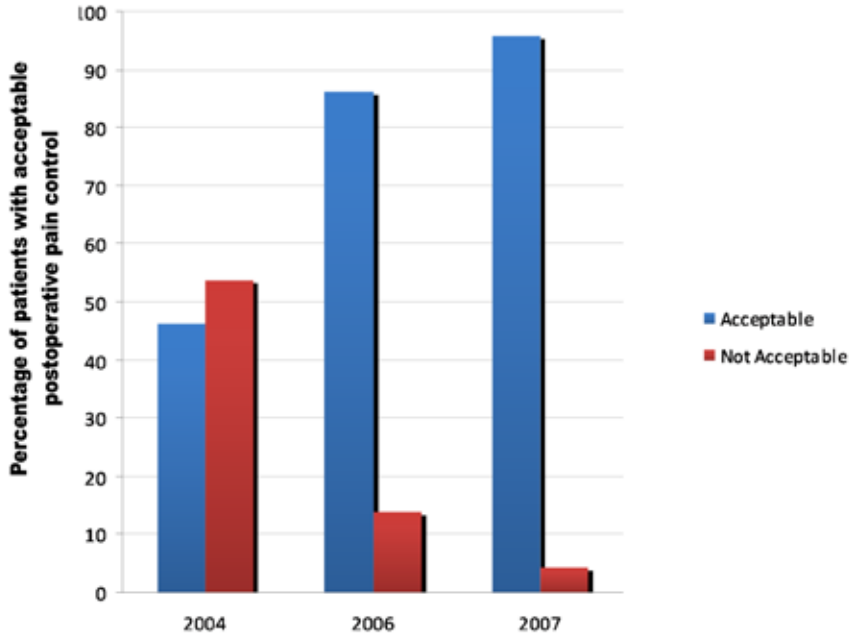


Figure 4. Graph to show the percentage of patients with acceptable post-operative pain control in audits undertaken in 2004, 2006 and 2007.

acceptable control of their pain, with 29% reporting severe pain.

The result of this first audit was considered to reveal a failure in attempts to control post-operative pain in patients undergoing the surgical removal of mandibular third molars. It was believed at this stage that the analgesic prescribing regimen was appropriate and that failure to provide clear post-operative information and consistent advice about pain control were the main contributing factors to this disappointing result.

The results of the second audit (B) demonstrated that post-operative pain control following third molar surgery was considerably improved. It was conducted without changing the drug regimen, but with much greater attention being paid to the instructions given to patients. It has previously been reported that patients fail to remember post-operative instructions given to them verbally prior to oral surgery[14] and that providing patients with clear, written instructions on discharge can improve pain control in post-operative patients.[15] The use of written instructions to encourage patients to take their analgesics as prescribed and therefore reduce the need for them to self-medicate with other unknown (and possibly inappropriate) agents in an attempt to control breakthrough pain has been recommended.[7] McHugh and Thoms investigated the management of pain in a group of patients undergoing day surgery and their findings confirmed that patients valued adequate information about post-operative pain management.[9] The introduction of written information about the analgesic prescribed to patients treated in our department before conducting the second audit resulted in universal compliance and considerably improved outcomes. Thirty seven of the 43 patients (86%) had acceptable control of their pain – almost double the proportion in the first audit. Three patients, however, unfortunately continued to report significant pain.

After Audit B, it was considered that, as problems with compliance had been largely overcome and the adequacy of post-operative pain control had improved, the analgesic regimen should be reviewed in an attempt to identify opportunities to improve pain control after mandibular third molar surgery still further.

For almost 20 years, the Oxford Pain Research Group has undertaken exhaustive systematic reviews of analgesic trials and is recognized internationally for this. The Oxford League Table of Analgesic Efficacy[16] therefore provides an evidence base for the efficacy of analgesics which may be considered for use in patients suffering acute pain after third molar surgery. This league table suggests that there is a dose-response of increasing effectiveness as Ibuprofen dose is increased from 50 mg to 800 mg. Reference to the 2007 Oxford League Table of Analgesic Efficacy confirmed that increasing the post-operative dose of Ibuprofen from 400 mg to 600 mg should improve pain control.[16]

For the third Audit (C), 600 mg Ibuprofen was therefore prescribed pre- and post-operatively. This new regimen produced excellent results with 96% of patients reporting satisfactory pain control.

Conclusion

The use of clinical audit in groups of patients who have undergone third molar surgery in our department has improved clinical outcome. The evidence-based prescription of 600 mg Ibuprofen, pre- and post-operatively, complemented with the use of clear, written instructions for patients, has allowed excellent levels of post-operative pain control to be achieved.

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