

The effects of a media campaign on beliefs and utilization of imaging examinations in Norwegian patients with low back pain

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ABSTRACT

Aims: Several authors have reported an overuse of imaging examinations for unspecific low back pain conditions. In this study, we examined the influence of a media campaign for better understanding and management of back pain in the general population on utilization of imaging examinations. **Methods:** The media campaign *Active Back* ran for three years (2002-2005) in two Norwegian counties and the results were compared to the adjacent control county. Numbers of imaging examinations were collected manually from every radiology department in each of the three counties, while belief measures were collected through a telephone survey before, during and after the campaign. Beliefs of the health care providers were collected through questionnaires. **Results:** We observed a decrease of X-rays by 35% in the intervention counties and by 33% in the control county. The number of CT scans decreased by 51% and 57% respectively. The number of MRI scans increased by 152% in the intervention counties and by 596% in the control. Combining all modalities, the number of imaging examinations increased by 3% in the intervention counties and by 56% in the control county. There was a tendency both in the general public and among the health care providers towards less trust in the usefulness of X-rays in all counties during the study period. The health care providers in the control county seemed to recommend imaging more often than their colleagues in the intervention counties. **Conclusion:** Despite slightly increased scepticism among the general public and health care providers, we observed an overall increase in utilization of imaging modalities. The dramatically increased utilization in the control group was likely explained by an increased capacity for MRI examinations obtained by the opening of a new radiology clinic, and not as an effect of the media campaign.

Low back pain (LBP) is a common disorder with a lifetime prevalence of 70-85% in industrialised countries (1). In a recent Norwegian study the incidence rate of LBP complaints lasting more than 15 days during the past month was found to be 2.8% among men and 2.3% among women (2). Back pain patients constitute 3.5-5% of all consultations at Norwegian general practitioners (3,4). Evaluation of the *Active Back* campaign indicated that 82% of all treatments at chiropractic clinics were for back pain, whereas 27% of visits to physiotherapists and 10% of visits to family doctors were concerning patients with LBP (5).

In most cases of acute and chronic back pain, the pathoanatomical aetiology remains unknown (1,6). 85% of acute LBP is accordingly labelled *non-specific back pain*, while 10-15% is recognised as nerve root pain (radicular pain) and 1-5% serious spinal pathology (7). Despite this high level of uncertainty regarding aetiology, diagnostic imaging is still commonly performed in medical practice. In Norway, referrals for imaging examination may be issued by doctors, chiropractors or manual physical therapists. The expenditures for all imaging examinations (any conditions) in Norway increased by 34% from 2002 to 2006 (8).

Generally, an increase of resources for medical examination and treatment is regarded as beneficial and

should lead to faster recovery. However, researchers have long argued that in patients with LBP imaging examination may not be indicated and even harmful in some cases (9,3,10,11). The Norwegian guidelines on management of LBP recommended that health care providers should not routinely refer for imaging (7). Distribution of the guidelines accompanied the *Active Back* mass media campaign aimed at educating the general public about appropriate management of low back pain (12). The campaign contained specific messages about the limited usefulness of imaging for most cases of low back pain. Given a stable prevalence rate of LBP (12-14), a stable number of patients seeking health care for LBP (15), and widespread distribution of guidelines and mass media messaging recommending fewer referrals for imaging examination, one would expect the number of imaging examinations to decline over time. This was the subject of the current research study.

Previous evaluations of media campaigns have shown conflicting effects on sick listing related to LBP (12,16,17). The Norwegian campaign is the only one to evaluate effect on health behaviour besides sickness absence following a media campaign (12).

In the evaluation of the *Active Back* campaign we collected data on the number of imaging examinations

for LBP conditions from all radiology institutes in three Norwegian counties in 2001, 2003 and 2005, and we also investigated beliefs about LBP held by the general public and health care providers. In this paper we compare these data from the two counties exposed to the campaign to an adjacent unexposed control county.

METHODS

Study design and population

A quasi-experimental before-and-after study. The material of this study is based on the *Active Back* media campaign that ran in two Norwegian counties during 2002-2005 which was aimed at improving beliefs of the general public about LBP. Aust-Agder and Vestfold counties were target counties for the campaign (320 000 inhabitants in total) and formed the intervention group for this study whereas the third, Telemark, served as control (166 000 inhabitants). Although the campaign primarily was addressed towards the general public, it also contained specific interventions aimed at health care providers (specific meetings, written information, posters and guideline distribution). The full description and evaluation of the campaign has been presented elsewhere (12).

Diagnostic imaging measures

Data on imaging examinations related to LBP were provided from all six private and public radiology departments in the three counties before the campaign started for the year 2001, during the campaign in 2003 and after the conclusion of the campaign in 2005. Due to a lack of central registration of radiology activity, all data were extracted manually from each department. The current data relate to the three most frequently used modalities: X-ray, CT scan and MRI. We gathered data on the total number of examinations for each modality for each year. Because some patients may be examined at a radiology department situated in a neighbouring county, all examinations were categorized according to the patients' home county for purposes of this study.

In the fall of 2002, a new private radiology institution opened in Telemark and 2003 was the first year with full service at this institution. The number of examinations for 2003 and 2005 in this county includes all three radiology institutions of Telemark, whereas the numbers for 2001 are collected from the two hospitals' radiology departments only. Data for the two counties exposed to the media campaign (Aust-Agder and Vestfold) have been combined for comparison to the control county.

Belief measures

Public beliefs: A telephone survey of LBP beliefs in the general public was performed before the *Active Back* campaign started in 2002, during the campaign in 2004 and at the conclusion of the campaign in 2005.

500 randomly selected people from each of the three counties were asked to rate their level of agreement on 11 statements based on the myths about LBP presented by Rick Deyo in 1998 (18). In this study we present the two statements related to imaging examinations. The answers were registered on a 5-point Likert scale; totally agree, agree, unsure, disagree, totally disagree. Consistent with the information on imaging examinations we will compare results between the intervention and control groups.

Beliefs of health care providers: A questionnaire was sent to all 1105 doctors, physiotherapists and chiropractors in primary health care in the three counties. Surveys were distributed at the same intervals as the general public beliefs measures. In addition to statements regarding beliefs about LBP, the providers were also asked to rate their likelihood for recommending diagnostic imaging for patients with non-specific LBP. The response rates were 45.5% (2002), 53.6% (2004) and 54.8% (2005) in the intervention counties and 36.7% (2002), 45.5% (2004) and 50.2% (2005) in the control county.

SPSS software (version 11.5, SPSS, Inc., Chicago, IL) for Windows (Microsoft Corp., Redmond, WA) was used for the statistical analyses. All data were calculated combined for the intervention counties and separately for the control county. Differences in beliefs were tested with Chi square tests between the counties. The data for imaging were collected as absolute numbers of examinations for each modality at each institution. The numbers are presented calculated per 1000 inhabitants, but percentage differences are for statistical purposes calculated from absolute number of examinations.

RESULTS

Diagnostic imaging results

The numbers of imaging examinations in each group are presented in table 1. A decrease of 35% in the use of X-rays was observed in the intervention counties from 2001 to 2005 compared to a decrease of 33% in the control county. Similarly, the number of CT scans decreased by 51% in the intervention group and by 57% in the control. The number of MRI scans increased by 152% in the intervention group during these years whereas the increase was 596% in the control county. Combining all modalities, the number of imaging examinations increased by 3% in the intervention counties and by 56% in the control county.

Beliefs about diagnostic imaging

Table 2 presents the degree of agreement with two statements about LBP in the general public. There was a tendency in all counties towards larger scepticism towards whether someone with back pain should have a spine X-ray. Among health care providers (Table 3) a tendency was observed towards less trust in the

Table 1. Number of imaging examinations for LBP per 1000 inhabitants in intervention counties (AA/VF) and control county (Telemark) before (2001), during (2003) and after (2005) the Active Back campaign.

	2001		2003		2005	
	AA / VF	Telemark	AA / VF	Telemark	AA / VF	Telemark
X-rays	19	24	21	33	12	16
CT scans	8	4	6	4	4	2
MRI	7	5	16	19	18	33
Total of all modalities	34	33	42	56	33	51

A-A: Aust-Agder county; VF: Vestfold county
 The total of all modalities are summarised from the absolute numbers.

Table 2. Beliefs about the usefulness of imaging examinations for LBP held by the general public before (2002), during (2004) and after (2005) the *Active Back* media campaign in Telemark (control) and Aust-Agder and Vestfold (intervention group), in percent of all respondents.

		Totally disagree		Disagree		Unsure		Agree		Totally agree		p value*
		Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	
Modern X-rays will usually find the cause of the back pain	2002	8	8	17	23	21	24	36	31	18	14	0.025
	2004	6	10	15	21	26	25	35	30	14	15	0.010
	2005	5	11	17	21	26	28	38	30	15	10	<0.001
Everyone with back pain should have a spine X-ray	2002	8	8	20	23	16	18	34	31	23	20	0.362
	2004	8	12	25	27	21	21	29	25	18	15	0.049
	2005	6	11	23	30	20	20	35	26	16	14	<0.001

A-A: Aust-Agder county; VF: Vestfold county
 * P values refer to differences between groups across responses for each year of the survey.

Table 3. Beliefs about the usefulness of imaging examinations for LBP held by the health care providers before (2002), during (2004) and after (2005) the *Active Back* media campaign in Telemark (control) and Aust-Agder and Vestfold (intervention group), in percent of all respondents.

		Totally disagree		Disagree		Unsure		Agree		Totally agree		p value*
		Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	Telemark	AA/VF	
X-rays and newer imaging tests can always find the cause of pain	2002	0	0	6	14	46	53	37	27	11	6	0.228
	2004	0	2	10	13	54	62	31	20	5	3	0.102
	2005	1	1	12	30	56	54	27	15	4	1	<0.001

A-A: Aust-Agder county; VF: Vestfold county
 * P values are related to differences between groups across responses for each year of the survey.

usefulness of X-rays in all counties. The results were statistically significant in the intervention group ($p < 0.001$), but not in the control ($p = 0.124$).

Providers’ recommendations for diagnostic imaging

Although there was a clear tendency towards less referrals for X-ray in all counties in 2005 than in 2002, the health care providers of the control county seem to recommend this examination more often than their colleagues in the intervention counties (Table 4). An increased scepticism for CT scan was seen equally in all counties. Recommendations for MRI were stable in the intervention counties from 2002 to 2005, but the health care providers in the control county seemed to increase their recommendations for MRI. In the control group the number of providers recommending MRI “sometimes” increased by 35%, and those recommending “almost never” decreased by 24%.

DISCUSSION

The usefulness of imaging examinations for non-specific LBP patients has been questioned and recent European guidelines do not recommend routine examinations unless clinicians hold a strong clinical suspicion of a specific cause of the pain (1,6). Norwegian LBP guidelines recommend MRI if no sign of recovery is seen in 4-6 weeks after onset of the pain (7). Despite widespread distribution of these guidelines and a mass media campaign aimed at minimizing use of imaging studies, our results demonstrate a slight increase (3%) in all imaging examinations in the intervention group between 2002 and 2005. This increase was not as dramatic as in the control group that saw an overall increase of 56%. These increases are greater than the overall increase in population size in the counties, which was 0.3% in the control county and

Table 4. Health care providers being asked “how often would you recommend these imaging examinations for a patient with non-specific back pain”, distribution of responses in percent for the years 2002, 2004 and 2005 in Telemark and the neighbouring counties.

		Always		Often		Sometimes		Almost never		p value*
		Telemark	A-A/VF	Telemark	A-A/VF	Telemark	A-A/VF	Telemark	A-A/VF	
X-ray	2002	5	4	23	9	43	50	30	37	<0.001
	2004	3	1	11	7	64	56	23	39	0.217
	2005	0	0	7	3	66	48	27	48	0.125
CT	2002	0	3	14	12	50	52	36	33	0.766
	2004	0	0	0	3	52	46	48	51	0.281
	2005	0	1	0	1	36	34	65	65	0.835
MRI	2002	0	1	9	5	44	47	47	47	0.769
	2004	0	0	8	5	54	47	38	49	0.014
	2005	0	0	5	5	59	48	36	48	0.020

* P values are related to differences between groups across responses for each year of the survey.

1.5% in the intervention counties during the study period. The larger increase in imaging examinations in the control county appears to be largely due to increased capacity for MRI in Telemark arising from the opening of a new radiology institution in the fall of 2002. MRI scans increased by nearly 600% in Telemark, which was substantially higher than the ~150% increase in the intervention counties. Generally a trend was observed away from X-ray and CT scans towards MRI.

Despite an increase in use of imaging examinations, health care providers seemed to report overall lower trust in the usefulness of imaging in 2005 than in 2002. However, we did see an increased proportion of providers in the control group recommending MRI corresponding with the increased MRI utilization. This was not observed in the intervention counties, and this effect is likely due to the opening of the new radiology department as opposed to mass media campaign messaging. Public beliefs about the utility of imaging seemed to decline slightly throughout the period in both intervention and control counties. We therefore cannot be confident that the *Active Back* mass media campaign messaging was responsible for altered beliefs about diagnostic imaging.

The increased scepticism about imaging as a useful examination among both public and providers despite increased utilization is interesting. Several studies have indicated that patients' expectations are a major determinant of doctors' decisions regarding referral for imaging (19,20). The findings of this study do not support the notion that doctors' referrals follow patients' expectations. Both the general public and health care providers studied expressed less trust in imaging examinations in 2005 than in 2002. Potentially a referral for imaging is a procedure that health care providers view as providing reassurance that no serious pathology exists and justification for providing advice to staying active through the period of pain. In a study on

patients' expectations and satisfaction, the unenviable position of the health care providers was underlined: on the one hand guidelines recommend refraining from imaging examination on nonspecific LBP while patients often have expectations about finding an exact cause of the pain (21).

The findings of this study illustrate the impact of increased capacity that seems to go far beyond the impact of recommendations and medical utility. The limited benefit from imaging examinations on unspecific back pain (23) is a good example on how increased resources to medical care does not necessarily improve the overall health of a society. A report from 2003 demonstrates how supplier induced demands in the USA have led to great geographic variations in quality of care that does not follow the variations in Medicare spending (24). Additionally, another US study reported a 65% increase in health care expenditures for people suffering from spine conditions from 1997 to 2005, and yet no corresponding improvement was seen in self-assessed health status (25). The extremely great challenge for our health policy makers is to establish health care structures that ensure access to beneficial health care without overuse of expensive examinations. More is not always better.

During the last two decades there has been a tremendous shift in the view of non-specific low back pain, from a focus on specific disorder of anatomic structure(s) towards a biopsychosocial understanding of the pain (13). This is supported by the lack of consistency between clinical signs and imaging findings (22). For example, a multicenter study with 782 participants with back pain did not find that early use of imaging influenced treatment decisions or outcomes (23). In recent years, MRI findings of the so-called Modic changes have been reported as associated with clinical symptoms and prognosis (26,27). These findings are at present still controversial (28), but may in the future change our view of the usefulness of MRI

examinations for patients with LBP.

Some limitations exist for the current study. The *Active Back* study was designed for evaluation of a media campaign aimed at the general public where sickness absence, imaging examinations and surgery were important outcomes of interest (12). The opening of an additional radiology department in the control county of Telemark during the campaign appeared to be an important confounder. The increased use of MRI in this county despite no corresponding increase in general public trust regarding the modality is likely explained by the increased capacity obtained with the new clinic. Other limitations include the use of self-report surveys to measure public beliefs and clinician opinions regarding diagnostic imaging (29). To avoid the use of medical jargon, statements in the general public survey used the terms “modern X-rays” and “spine X-ray”. We therefore cannot distinguish belief about specific imaging modalities. However, laypersons likely do not distinguish clearly between the modalities and our results likely represent such a belief about imaging in general. Regarding the validity of clinician self-report measures, authors of a review of doctors’ self-reported adherence to guidelines found an

over-estimation of adherence of 27% (29). However, we observed an increase in number of providers recommending imaging examinations in Telemark corresponding with increased MRI use in that county.

CONCLUSION

Despite slightly increased scepticism among the general public and health care providers regarding the usefulness of diagnostic imaging examination for low back pain after a mass media education campaign, we observed an overall increase in utilization of imaging modalities. A trend was observed away from use of X-ray and CT scans towards use of MRI (152% increase in MRI in intervention counties, 596% increase in control). The dramatically increased utilization in the control group was likely explained by an increased capacity for MRI examinations obtained by the opening of a new radiology clinic. As changes in beliefs and behaviour were comparable in both intervention and control groups, we cannot be confident that the *Active Back* mass media campaign was responsible for effects observed.

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