

Systematic review: the prevalence of suicidal behaviour in patients with chronic abdominal pain and irritable bowel syndrome

B. SPIEGEL^{*,†,‡,**}, P. SCHOENFELDS,[¶] & B. NALIBOFF^{*,†,**}

^{*}Division of Gastroenterology and Hepatology, VA Greater Los Angeles Healthcare System, CA, USA;

[†]Division of Digestive Diseases, David Geffen School of Medicine at UCLA, CA, USA; [‡]UCLA/VA Center for Outcomes Research and Education (CORE), CA, USA;

[§]Division of Gastroenterology, University of Michigan Medical Center, MI, USA; [¶]VA Center for Excellence in Health Sciences Research, Ann Arbor, MI, USA;

^{**}Center for Neurovisceral Sciences and Women's Health, CA, USA

Correspondence to:

Dr. P. Schoenfeld, VAMC 111-D, 2215 Fuller Road, Ann Arbor, MI 48105, USA.

E-mail: pschoenf@med.umich.edu

Publication data

Submitted 27 March 2007

First decision 1 April 2007

Resubmitted 23 April 2007

Accepted 23 April 2007

SUMMARY

Background

Chronic abdominal pain syndromes may increase the risk of suicidal behaviour – a feature well described in non-visceral pain syndromes.

Aim

To perform a systematic review to summarize and interpret published data linking chronic abdominal pain syndromes and suicidal behaviour.

Methods

We performed a structured search to identify studies pertaining to the following questions: (i) What is the prevalence of suicidal behaviour in patients with chronic abdominal pain syndromes, including bowel syndrome (IBS)? (ii) Is the prevalence of suicidal behaviour in chronic abdominal pain syndromes higher than in matched controls? And (iii) is suicidal behaviour in abdominal pain syndromes simply due to psychiatric co-morbidities?

Results

Thirty-two relevant titles were identified, of which six manuscripts, describing eight studies, met inclusion criteria. Patients with non-IBS syndromes were 3–11 times more likely to demonstrate suicidal behaviour vs. controls, while patients with IBS were two to four times more likely to have suicidal behaviour. Chronic abdominal pain was an independent predictor of suicidal behaviour after adjusting for co-morbid psychiatric conditions.

Conclusions

Chronic abdominal pain syndromes increase the risk for suicidal behaviours. This relationship may exist independently of co-morbid depression, although additional research is needed to better understand this link. These data indicate that clinicians should survey for suicidal behaviour in chronic abdominal pain patients.

Aliment Pharmacol Ther 26, 183–193

INTRODUCTION

Syndromes marked by chronic abdominal pain or discomfort, such as irritable bowel syndrome (IBS), functional abdominal pain syndrome (FAPS), or otherwise unclassified chronic abdominal pain or discomfort, are frequently considered minor, non-life-threatening illnesses. Although most non-consulting patients can satisfactorily cope with their symptoms, patients seeking care for chronic abdominal pain syndromes are often marked by a poor quality of life,^{1, 2} work productivity decrements,³ and severe visceral pain or discomfort. Coupled with concurrent anxiety, depression, hopelessness, inadequate treatment options and inadequate coping mechanisms,⁴ chronic abdominal pain syndromes can potentially increase the risk of suicidal behaviour – a feature well described and acknowledged in non-visceral chronic pain syndromes.⁵ This hypothesis is supported by recent data indicating that patients with chronic abdominal pain syndromes are at higher risk of demonstrating suicidal behaviour (i.e. completed suicide, attempted suicide, self-harm and suicidal ideation) compared with healthy controls.⁶

However, it remains unclear why patients with chronic abdominal pain syndromes might carry an increased risk of suicidal behaviour. There are several potential explanations, including: (i) Chronic abdominal pain or discomfort *itself* may lead to suicidal behaviour, independent of other factors; (ii) Patients with chronic abdominal pain syndromes often harbour concurrent psychiatric disorders, such as major depression and generalized anxiety disorder,⁴ which are independent risk factors for suicidal behaviour;⁷ (iii) Patients with chronic abdominal pain syndromes often have maladaptive coping styles^{8, 9} which, when pushed to the extreme by unremitting or poorly controlled symptoms, can lead to extreme behavioural remedies; (iv) Patients with these syndromes often have underlying somatization disorder with associated hypervigilance and pain amplification⁴ – both for visceral and somatic symptoms – which could lead to suicidal behaviour if left unchecked; (v) Patients with chronic abdominal pain may receive a wide variety of centrally acting medications. While few of these have been associated with increased suicide risk, it is possible that in some cases these medications may play a role in altering thresholds for suicidality and (vi) Patients with chronic abdominal pain syndromes visit physicians more frequently than matched controls^{3, 10, 11} and may complain of some types of sui-

dal behaviour (e.g. suicidal ideation or self-harm behaviours) more often than controls solely because they are asked more often by their physicians.

Understanding the relationship between chronic abdominal pain syndromes and suicidal behaviour is important due to the multiple clinical implications. First, raising awareness about this relationship may improve case finding in patients who harbour suicidal ideations but have never been asked. Second, early identification of forerunners of attempted suicide, including ongoing self-injurious behaviour or suicidal ideations, could lead to timely referral and treatment. And third, understanding the mechanism linking chronic abdominal pain syndromes and suicidal behaviour could alter or expand treatment approaches for individual patients.

In light of this background, we performed a systematic review to identify published data about the association between chronic abdominal pain syndromes and suicidal behaviour. We specifically sought information pertaining to the following questions: (i) What is the prevalence of suicidal behaviour in patients with chronic abdominal pain? (ii) What is the prevalence of suicidal behaviour in patients with IBS? (iii) Is the prevalence of suicidal behaviour in chronic abdominal pain or IBS higher than in matched controls? And (iv) is suicidal behaviour in abdominal pain syndromes simply due to psychiatric co-morbidities? Our objectives were to describe, methodologically rate, and interpret these data in an effort to define limitations of the current literature and suggest avenues for further investigation.

METHODS

Search strategy and inclusion criteria

We conducted a structured search of MEDLINE and EMBASE to identify relevant English-language studies from January 1966 to February 2007. We targeted studies that contained information linking chronic abdominal pain or discomfort (or a related syndrome) to one or more forms of suicidal behaviour. We adopted the Columbia Classification System of suicidality to guide our search strategy.¹² Specifically, this system describes suicidal behaviours according to the following taxonomy, in descending order of seriousness: (i) completed suicide, (ii) attempted suicide, (iii) preparatory acts towards imminent suicidal behaviour, (iv) self-injurious behaviour (intent unknown), (v) suicidal

ideation and (vi) self-injurious behaviour (no suicide attempt).

Table 1 lists the keywords and search strings used to perform the systematic review, which was conducted with Reference Manager Software v11 (Adept Scientific, Norwich, Norfolk, UK) in tandem by two investigators (BS and PS). Each generated title was assessed for relevancy and was only rejected if it fulfilled one of the following explicit exclusion criteria: (i) not written in English, (ii) not concerning a clinical question regarding human subjects, (iii) not related to either a suicidal behaviour or a chronic abdominal complaint or related syndrome (e.g. IBS, FAPS, dyspepsia, etc.) and (iv) solely related to a non-visceral pain syndrome. The reviewers then individually assessed the relevancy of all abstracts corresponding with the remaining titles, and excluded abstracts for the following reasons: (i) fulfilled one or more of the title exclusion criteria and (ii) did not provide original data (or was solely a review article). The reviewers then independently assessed the relevancy of all manuscripts corresponding with the remaining abstracts, and included manuscripts if they had data linking one or more suicidal behaviours, as defined by the Columbia Classification, and one or more chronic abdominal pain syndromes. We also performed manual reviews of the reference lists from review articles identified by the search to identify additional original studies that may

have been overlooked by the computer-assisted searches. The two reviewers conducted this search independently, and we then measured inter-rater agreement between reviewers with a κ statistic. We adopted a threshold of ≥ 0.8 as the definition for acceptable agreement for the final set of accepted manuscripts.¹³ We resolved disagreements in study selection by consensus, with oversight from a third party not involved in the manuscript selection phase (BN).

Qualitative assessment

In order to assist with summarization and interpretation, we abstracted key information from each accepted manuscript, including: (i) study design (e.g. case series from referral population, retrospective database analysis and prospective population-based study); (ii) size of study population; (iii) case ascertainment methodology (e.g. face-to-face interviews and mailed questionnaires); (iv) diagnostic criteria for identification of chronic abdominal pain and IBS (e.g. use of Rome criteria); (v) prevalence of suicidal behaviours, including subgroup analysis about the prevalence of completed suicide, attempted suicide, suicidal ideation and self-harm; and (vi) use of multivariate analysis to determine if abdominal pain was an independent predictor of suicidal behaviour. We

Table 1. Systematic review search strategy

Group	Search terms	Significance of grouping
1	MEDLINE and EMBASE	Targeted bibliographic database
2	(Abdominal Pain [MeSH] OR Colonic Diseases, Functional [MeSH] OR Irritable Bowel Syndrome [MeSH] OR Colitis, Mucous OR Colitides, Mucous OR Mucous Colitidies OR Mucous Colitis OR Colon, Irritable OR Irritable Colon OR Functional Abdominal Pain Syndrome OR Indigestion OR Dyspepsia [MeSH])	Abdominal pain syndrome keywords
3	(Suicide [MeSH] OR Suicide, Attempted [MeSH] OR Self Injurious Behaviour [MeSH] OR Columbia Classification OR Behaviour, Self-Injurious OR Self Injurious Behaviour OR Deliberate Self-Harm OR Deliberate Self Harm OR Self-Harm, Deliberate OR Parasuicide OR Self-Destructive Behaviour OR Behaviour, Self-Destructive OR Self Destructive Behaviour OR Suicidal Ideation OR Suicidality OR Suicidal Behaviour)	Suicidal behaviour Keywords
4	(TG = Animal OR Letter [pt] OR Editorial [pt] OR Review [pt] OR News [pt])	Excluded study types and content

The four search groups were combined as follows: (1 AND 2 AND 3 NOT 4).

then compiled this information into evidence tables to summarize these data.

RESULTS

Manuscript selection

The search strategy identified 32 titles (Figure 1). Of these, 18 were selected for abstract review, of which 10 were retained for consideration. Independent review of these remaining manuscript yielded eight that met our explicit inclusion criteria. Inter-rater agreement for the final manuscript selection was high ($\kappa = 0.91$). The included studies are described in Table 2.

Suicidality in patients with chronic abdominal pain

We identified four manuscripts, describing six studies that report data linking suicidality-related adverse events with non-IBS chronic abdominal pain.^{14–17}

Smith *et al.* performed a cross-sectional analysis of 153 patients referred to a chronic pain management clinic.¹⁴ The authors sought to identify independent predictors of both passive and active suicidal ideation in a heterogeneous patient population with varying aetiologies for chronic pain. Thus,

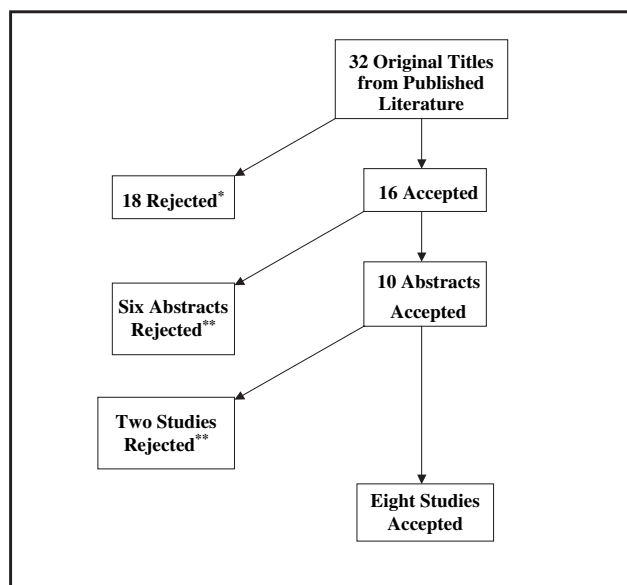


Figure 1. Results of Literature Search. *Reasons for rejection: four not written in English, 14 not related to either a suicidal behaviour or a chronic abdominal complaint or related syndrome (e.g. IBS, FAPS, dyspepsia, etc.). **All rejected for lack of original data.

the study was not limited to patients with chronic abdominal pain, although 9% of the cohort suffered from abdominal pain as their primary complaint. In a multivariate logistic regression analysis adjusting for pain severity (using the Pain Rating Index), depression severity (using the Beck Depression Inventory), personal history of suicidal behaviour, demographic characteristics and location and type of primary pain, the author found that patients with predominant abdominal pain were 5.5 times more likely to have passive suicidal ideations (OR = 5.5; 95% CI = 1.0–30.3) and 4.2 times more likely to have active suicidal ideations (OR = 4.2; CI = 0.8–23.4) compared with patients with pain that was not abdominal in origin. The authors concluded that their findings emphasize the need to routinely evaluate and monitor for suicidality in patients with chronic abdominal pain. However, the data are limited for several reasons, including: (i) the sample size of patients with abdominal pain was extremely low ($n = 14$); (ii) the OR linking abdominal pain to active suicidal ideations was not statistically significant; (iii) the study measured relationships between over 20 variables and suicidality, thereby raising the concern of multiple comparisons and overmatching given the relatively small overall sample size of the overall study ($n = 153$); (iv) the authors did not specify the nature and duration of abdominal pain; (v) the analysis did not adjust for other co-morbid conditions or traits linked to abdominal pain (and possibly mediating the link between abdominal pain and suicidality), such as somatization, sexual abuse history or generalized anxiety disorder. As the authors point out, childhood sexual abuse history, in particular, is associated with both suicidality and abdominal pain.^{18–20} However, this relationship between abdominal pain and sexual abuse history is more prevalent in patients with functional than non-functional gastrointestinal (GI) disorders,^{21–23} and the paper provides inadequate information to determine how many, if any, of the abdominal pain patients had a functional GI disorder (e.g. IBS, FAPS, functional dyspepsia, etc.). Despite these notable limitations, the study raises the hypothesis that abdominal pain, independent of other factors, may increase the risk of suicidal behaviour.

The Hispanic Health and Nutrition Examination Survey sought to explore the relationship between suicidal behaviour, depression and chronic abdominal pain.¹⁵ The authors collected data between 1980 and 1984 in over 4900 Hispanic individuals as part of a wider epidemiological study. The study analysed rates

Table 2. Evidence table of studies measuring the relationship between suicidal behaviour in patients and chronic abdominal pain syndromes

Author, Year	Country	Study Design	Population Studied	Definition of abdominal pain/discomfort	Definition of suicidal behaviour	Findings
Smith, 2004	US	Retrospective Logistic Regression Analysis	153 patients with chronic pain evaluated in pain referral clinic. 9% ($n = 14$) of cohort had abdominal pain predominance	Not specified	Passive and active suicidal ideation, as measured by the SCISH-CP, a 42-item structured interview to assess suicidal behaviour in chronic pain.	Patients with predominant abdominal pain were 5.5 times more likely to have passive suicidal ideations (adjusted OR = 5.5; 95% CI = 1.0–30.3), and 4.2 times more likely to have active suicidal ideations (adjusted OR = 4.2; CI = 0.8–23.4) compared with patients with pain that was not abdominal.
Magni, 1998	US	Retrospective Logistic Regression Analysis	4964 Hispanic adults identified in a National population-based epidemiological study, 'The Hispanic Health and Nutrition Examination Survey'.	'Abdominal or lower chest pain' for at least 30 days in the 12 months preceding the study.	Suicidal ideation, as measured by validated items from the Diagnosis Interview Schedule, and self-reported attempted suicide.	Patients with predominant abdominal pain were 2.6 times more likely to have attempted suicide and 2–3 times more likely to have suicidal ideations compared with patients without abdominal pain.
Rao, 1971	India	Case Series	198 'suicide attempters'	Abdominal pain of 'varying duration'	Not specified beyond 'suicide attempters'	17% suffered from abdominal pain of 'varying duration'. The pain was attributed to duodenal ulcers in 3 cases, dysmenorrhoea in 12 cases and 'functional' abdominal pain in 20 cases.
Rao, 1989	India	Case Series	'Suicide attempters' (number not specified)	Not specified	Not specified beyond 'suicide attempters'	15% of suicide attempters had a history of concurrent chronic abdominal pain. Positive correlation between completed suicide and pre-existing 'unclassifiable' abdominal pain.

Table 2. (Continued)

Author, Year	Country	Study Design	Population Studied	Definition of abdominal pain/discomfort	Definition of suicidal behaviour	Findings
Rao, 1988	India	Case Series	'Suicide attempters' (number not specified)	'Appendicular pain'	Not specified	Patients who had a 'normal' appendix at the time of laparotomy had a significantly higher rate of admissions for suicidality both before and after surgery compared with group found to have documented acute appendicitis.
Viskum, 1975	Denmark	Case-Control Study	2619 patients suffering from 'duodenal ulcer, gastric ulcer and gastric dyspepsia'	Not specified	'Attempted suicide' and completed suicide	6% of the cohort attempted suicide and 3% completed suicide. The rate of attempted suicide was 4–11 times higher than historical age- and sex-matched controls in Denmark. The rate of completed suicide was statistically higher than matched controls, although the relative risk was not specified.
Miller, 2004	UK	Comparative Cohort Study	300 IBS patients, including 100 each from primary, secondary and tertiary care, along with 100 IBD controls.	Irritable Bowel Syndrome – unspecified definition	Whether patient 'very seriously contemplated suicide or attempted suicide specifically because of their gastrointestinal illness'.	Unadjusted analysis revealed a 'dose response' relationship between level of IBS care and suicidality, as 4%, 16% and 38% of primary, secondary and tertiary IBS patients endorsed suicidal ideations because of their gastrointestinal problem (vs. 15% of IBD patients).
Guthrie, 2003	UK	Cohort with Cluster Analysis	107 patients with IBS	Rome-I positive Irritable Bowel Syndrome	'Suicidal ideations'	20% of the 'distressed high utilizer' group reported suicidal ideations and 27% of this group endorsed one or more episodes of 'self-harm'.

of suicidal ideation (as measured by validated items from the Diagnosis Interview Schedule) and attempted suicide, and measured the adjusted relationship between these outcomes and abdominal pain, as defined by 'abdominal or lower chest pain' for at least 30 days in the 12 months preceding the study. In a multivariate logistic regression analysis adjusting for depression severity (using the Center for Epidemiologic Studies Depression Scale) and demographic characteristics, the authors found that patients with predominant abdominal pain were 2.6 times more likely to have attempted suicide (OR = 2.6; 95% CI = 1.48–4.61), and roughly two to three times more likely to have suicidal ideations (OR with CIs not provided) compared with patients without abdominal pain. The study is potentially limited because the analysis did not adjust for severity or duration of pain (they need only have 30 days of pain at a minimum to be included as 'abdominal pain' patients), somatization, personal history of suicidality or sexual abuse history, among other key covariates. Nonetheless, the study is notable for its large sample size, attempt to describe the nature and duration of the abdominal pain and use of validated definitions of suicidality.

A series of small studies published by a psychiatrist in India, A. Venkoba Rao, in the 1970–80s (all summarized in one publication¹⁶) also sought to quantify the prevalence of chronic abdominal discomfort among patients who attempt suicide. The methodologic quality of these studies is poorly described, and the data appear to arise from uncontrolled series. In a series of 198 suicide attempters, Rao found that 17% suffered from abdominal pain of 'varying duration'. The pain was attributed to duodenal ulcers in three cases, dysmenorrhoea in 12 cases and 'functional' abdominal pain in 20 cases. This suggests that most of the patients with abdominal pain had a functional GI disorder, although there are no case-finding definitions provided. In a second series from 1965 to 1989, Rao found that 15% of suicide attempters had a history of concurrent chronic abdominal pain. The author also reported that his retrospective data revealed a correlation between completed suicide and pre-existing 'unclassifiable' abdominal pain. Finally, Rao performed an additional study in 1988 linking 'appendicular pain' to suicide attempts in a series of young women admitted for presumed appendicitis. The author reports that patients who had a 'normal' appendix at the time of laparotomy had a significantly higher rate of admissions for suicidality both before

and after surgery compared with the group of women found to have documented acute appendicitis. The author concluded that non-organic appendicular pain can 'result in suicide'.

Viskum reported a large series of over 2500 patients in Denmark with chronic ulcer-related abdominal pain, in which the author measured both attempted suicide and completed suicide.¹⁷ The paper does not report how the patients were identified and does not provide data regarding the period of cohort observation. Nonetheless, the author reports that 6% of patients with ulcer pain attempted suicide and 3% completed suicide. The ulcer-pain cohort had an attempted suicide rate that was 4–11 times higher than age- and sex-matched controls in Copenhagen. Similarly, the abdominal pain cohort was significantly more like to complete suicide compared with controls ($P < 0.01$; relative risk not stated).

Suicidality in patients with irritable bowel syndrome

Although there were several studies measuring the relationship between abdominal pain and suicidality, our review found only two studies linking IBS to suicidality.^{6, 24}

The best available data linking suicidality to IBS comes from the study by Miller *et al.*,⁶ which measured and compared the prevalence of suicidal ideations in four groups: (i) 100 primary care IBS patients (pIBS); (ii) 100 secondary care IBS patients (sIBS); (iii) 100 tertiary care IBS patients (tIBS); and (iv) 100 patients with active inflammatory bowel disease, which served as the control group. The authors collected extensive data on all participants, including demographic information, symptom characteristics and severity, symptom impact on life functioning, adequacy of treatment, anxiety and depression scores (measured by Hospital Anxiety and Depression scale), and whether they had 'very seriously contemplated suicide or attempted suicide specifically because of their GI illness as opposed to any other reason'. Unadjusted analysis revealed a 'dose response' relationship between level of IBS care and suicidality, as 4%, 16% and 38% of primary, secondary and tertiary IBS patients endorsed suicidal ideations because of their GI problem. The difference between these groups was significant (tIBS vs. sIBS $P = 0.002$ and sIBS vs. pIBS $P < 0.001$). The prevalence of GI-related suicidal ideation was higher in the tIBS group compared with the inflammatory bowel disease (IBD) group (38% vs. 15%; $P < 0.001$). In addition, the attempted

suicide rate was numerically higher in the tIBS group than the IBD group (5% vs. 1%), although this difference was not statistically significant. In a multivariate logistical regression analysis adjusting for symptom severity, anxiety, depression, age and sex, the authors found that having IBS remained a statistically significant independent predictor of suicidal ideation. This indicates that IBS increases the risk of suicidality even after adjusting for differences in key covariates between IBS and IBD patients. This relationship is especially strong in tertiary care IBS patients. Study limitations include: (i) failure to measure other potential confounders and mediators, such as sexual abuse history, somatization, hopelessness, coping ability and substance or alcohol use, among others and (ii) the authors did not specify how IBS was defined.

Guthrie *et al.* performed an analysis of 107 patients with severe Rome I positive IBS symptoms unresponsive to medical therapy that were evaluated in tertiary care.²⁴ The authors performed a cluster analysis to identify patient subgroups based on a combination of symptoms, physiological parameters (e.g. rectal distension perception threshold) and psychosocial co-morbidities. The study revealed three different and statistically distinct groups, including: (i) 'distressed high utilizers', marked by high rates of psychiatric co-morbidity, high levels of physician consultations, a history of sexual abuse and low pain thresholds to rectal balloon distension; (ii) 'distressed low utilizers', marked by high psychiatric co-morbidity, low physician consultations, low frequency of sexual abuse and low pain threshold scores; and (iii) 'tolerant low utilizers', marked by low co-morbidities, low consultations and high pain thresholds. The authors reported that 20% of the 'distressed high utilizer' group reported suicidal ideations and 27% of this group endorsed one or more episodes of 'self-harm'. These values were significantly higher than the rates reported in the 'distressed low utilizer' and 'tolerant low utilizer' groups. The data suggest that suicidal ideations and episodes of self-harm may be relatively common in patients with high levels of consultation and multiple psychosocial co-morbidities, suggesting that clinicians should particularly focus their suicidality screening efforts in this subgroup. Study limitations include: (i) no comparison of the prevalence of suicidal behaviour in the IBS cohorts and a non-IBS control group; (ii) no attempt to identify independent predictors of suicidal behaviour in the IBS cohorts; and (iii) all study patients had severe, unremitting and previously

untreatable symptoms, which limits the generalizability of these data to the average IBS patient.

DISCUSSION

The aim of this review was to examine the empirical literature on suicidal behaviour in chronic abdominal pain and IBS. Although there are limited data addressing these issues, several preliminary conclusions can be drawn based on the consistency of findings across diverse populations and methods. First, the literature supports a significant association of suicidal behaviour, including suicidal ideation and suicide, with chronic abdominal pain. The rates of these behaviours in patients with abdominal pain are not only higher than the general population, but also somewhat higher than that associated with other chronic pain groups. Second, the increase in suicidal behaviours in patients with chronic abdominal pain is at least partially independent of depression – the most common risk factor for suicidal behaviour. In other words, one cannot account for the increased suicidal behaviour in this population simply by increased rates of depression. It is likely that some other aspects of the pain experience are also directly tied to increased suicidal behaviours. Third, the limited available data suggest that IBS patients have levels of suicidal behaviour comparable to other groups identified more generally as having chronic abdominal pain. These three conclusions and their implications for abdominal pain treatment are briefly discussed below.

Increased suicidal behaviour in chronic abdominal pain

Consistent with the literature on chronic pain,⁵ the reviewed studies consistently show higher rates of all suicidal behaviours in patients with chronic abdominal pain compared with healthy controls. In the studies that directly compared abdominal and non-abdominal pain, the results suggest that abdominal pain is associated with a higher rate of both passive and active suicidal ideation.¹⁴ Pain location has been previously identified as an important moderator of suicidal behaviours in patients with pain. For example, patients with chronic back pain have higher relative rates of suicidal behaviour compared with other pain syndromes, whereas patients with neuropathic pain have lower rates of suicidal behaviour.²⁵ The studies included in this review support the general findings that not all pain syndromes are 'created equal', and that

both pain magnitude and *location* must be considered in order to fully understand disease impact and relationship with suicidal behaviours.

Given the small number and heterogeneity of the abdominal pain studies included in this review, it is not surprising that there is a wide variation in relative risk for individual suicidal behaviours. For example, Smith *et al.* report an odds ratio of 4.2 of suicidal ideation with abdominal pain vs. non-abdominal pain syndromes.¹⁴ In contrast, Magi *et al.* found a smaller odds ratio (2.6) of suicidal ideation with abdominal pain vs. no pain.¹⁵ This suggests that key differences exist between the studies, including the population characteristics, attempt to adjust for confounders and definitions of suicidal behaviour and abdominal pain.

Increased suicidal behaviour in IBS

The studies examining suicidal behaviour in IBS indicate that IBS patients seen in the tertiary care setting or those who highly utilize health care services have an increased risk of suicidal ideation compared with patients with IBD or IBS recruited from the community or primary care. Although these studies do not include healthy controls, the rates of suicidal ideation and self-reported suicidal attempts appear to be comparable to those of other chronic abdominal pain groups. The logistical regression results from Miller *et al.*⁶ indicate that the increase in suicidal ideation in IBS (over IBD) was not fully accounted for by depression, anxiety or symptom intensity, suggesting that some 'IBS specific' variables such as coping or psychosocial impact may be playing an important role as they do in other chronic pain conditions. Tertiary care IBS patients, in particular, have previously been identified as having greater psychosocial disruption, psychological and medical co-morbidities and poor illness coping.⁴ These findings, coupled with the observation that tertiary care IBS patients are at higher risk of suicidal behaviour compared with primary or secondary care patients, indicate that tertiary care and high resource using IBS patients should be explicitly assessed for possible suicidal behaviour and offered timely and aggressive interventions should any concern of suicidality be detected.

Is increased suicidal behaviour in abdominal pain/IBS due to psychiatric co-morbidity?

Chronic pain, chronic abdominal pain and IBS are all associated with an increase in psychiatric co-morbid-

ity.^{4, 25, 26} In chronic pain populations, there is a significant increased risk of depression and anxiety regardless of pain location.^{27, 28, 29} In terms of IBS, there are over 20 studies measuring the overlap between IBS and psychiatric disorders. These studies were summarized and critically appraised in a systematic review by Whitehead *et al.*⁴ The authors concluded that roughly one-half of community-based IBS patients meet criteria for one or more psychiatric disorders and that this is higher than matched controls without IBS. Moreover, the prevalence of co-morbid psychiatric disorders is highest among patient seeking care at tertiary care hospitals, where up to 90% suffer from psychiatric disorders. The data indicate that no single psychiatric disorder is uniquely associated with IBS, but that the most common co-morbid conditions are major depression, followed by generalized anxiety disorder. In short, the review by Whitehead *et al.* demonstrated that IBS is marked by a high burden of psychiatric co-morbidity, that this co-morbidity is higher than matched controls without IBS and that these findings are consistent between multiple studies in varying populations.

Several of the reviewed studies found that suicide behaviour rates in chronic abdominal pain were increased even after controlling for psychiatric co-morbidity.^{14, 15} This implies that pain-specific psychological or psychosocial issues beyond depression and anxiety may play an important role in suicidal behaviour. Depression is perhaps the single most powerful predictor of suicidal behaviour across a variety of populations, including groups with chronic pain,⁷ however, it is not the only significant psychosocial predictor. Poor illness coping manifested as catastrophizing has been identified as one potential pain-specific predictor of suicidal ideation independent of depression and anxiety.²⁸ Other risk factors that also may be particularly relevant for abdominal pain patients independent of depression include substance abuse, insomnia, chronicity of illness and current symptom severity.²⁵ Chronic abdominal pain and IBS are known to significantly impact a wide range of quality of life variables, including extraintestinal symptoms of chronic stress and 'vital exhaustion',^{1, 2} so it is likely that this too is linked to the increase in suicidal behaviour.

Implications for treatment

A recent systematic review of interventions to prevent suicidal behaviours has suggested that physician educa-

tion in depression recognition and treatment as well as efforts to restrict access to lethal methods in identified patients (especially children and adolescents) can reduce suicide rates.³⁰ Psychotherapy can also be effective for decreasing suicidal ideation and further suicide attempts after a first attempt.³⁰ Antidepressant treatment has not been demonstrated to be specifically effective for suicidal behaviours.³¹ Most of the reviewed studies focused on suicidal ideation or self-report of suicide attempts. Although there are only limited data connecting the various forms of suicide behaviours, it does appear that suicidal ideation and suicide attempts indicate an increased risk of suicide completion and severe suicide attempts share most of their risk factors with completed suicides.³² Therefore, the data indicating increased risk of suicidal ideation and attempts suggests that a significant effort to both assess and treat suicidal behaviour in abdominal pain patients (especially those in tertiary settings) should be made. Hirshfeld and Russel³³ have presented a useful algorithm for assessing suicidality risk that includes demographic factors, current stressors, screening for depression, anxiety and agitation, substance abuse and specific suicidal behaviours. According to this approach, a positive response to the initial screening question 'Have you had thoughts about death or about killing yourself?' is followed by specific questions regarding plans, intent, means and impulses. As it may be that illness specific factors are important in suicidality in chronic abdominal pain patients, a suicide assessment for these patients should also include examination of beliefs about the illness, coping (e.g. catastrophizing vs. active coping skills) and illness-specific interpersonal stressors (e.g. social withdrawal). Training for assessment and intervention for suicidality of specialists in abdominal pain such as gastroenterologists as well as primary providers is clearly needed. If suicidality is identified in the course of a visit, then the provider should discuss the need for and make a timely referral for the patient to a psychiatrist, psychologist or accessible mental health agency.

Limitations and future research

Future research should aim to overcome some of the methodological limitations of the studies included in this review. The quality of existing studies is generally quite variable and several of the studies included are review are in fact of poor quality. The studies are also variable in terms of study design, patient populations

and definitions. These qualitative variations limit our ability to fully generalize the findings or neatly summarize the data across studies. We are further limited because we focused our review on the English-language literature, and thus cannot comment on non-English speaking cultures. Future epidemiological studies should attempt to improve upon the current state of the literature. Specifically, additional efforts should adjust for all key biopsychosocial covariates, such as psychological co-morbidities (not just depression, but also generalized anxiety and somatization), concurrent health-related quality of life, sexual abuse history, pain intensity and severity and visceral sensitivity (as measured by instruments such as the Visceral Sensitivity Index).³⁴ In addition, future research should collect data on completed suicide (where possible), and gather more robust information for functional GI disorders such as IBS, functional dyspepsia, and FAPS, among others. With a more robust and complete set of data, clinicians will be in a more informed position to identify reliable predictors of suicidal behaviour in chronic abdominal pain syndromes, understand the mechanism linking abdominal pain to suicidal ideations and initiate timely and effective interventions to avoid the often devastating consequences of suicidal behaviour.

ACKNOWLEDGEMENTS

Declaration of personal interests: B. Spiegel has served as a speaker for Novartis Pharmaceuticals Corporation; and a consultant for GlaxoSmithKline, AZ, TAP, Novartis and Johnson & Johnson/Ethicon; and has received grant support from AstraZeneca, TAP, Amgen, Proctor & Gamble, Novartis Pharmaceuticals Corporation and Johnson & Johnson/Ethicon. P. Schoenfeld has served as a speaker for Novartis Pharmaceuticals Corporation and Takeda Pharmaceuticals North America; and as a consultant for Novartis Pharmaceuticals Corporation, Takeda Pharmaceuticals North America, AGI Therapeutics, Johnson & Johnson Pharmaceuticals and PartnerMD Evidence, LLC. B. Naliboff has served as a consultant for GlaxoSmithKline. *Declaration of funding interests:* This study was funded in full by Novartis Pharmaceuticals Corporation. Drs B. Spiegel and B. Naliboff are supported by NIH Center Grant 1 R24 AT002681-NCCAM. All data retrieval, data analysis, additional research, and writing of this paper was performed by the authors without any assistance from outside organizations or from the funding organization.

REFERENCES

- 1 Spiegel BMR, Gralnek IM, Mayer EB, *et al.* Clinical determinants of health-related quality of life in patients with irritable bowel syndrome. *Arch Intern Med* 2004; 164: 1773–80.
- 2 El-Serag HB, Olden K, Bjorkman D. Health-related quality of life among persons with irritable bowel syndrome: a systematic review. *Aliment Pharmacol Ther* 2002; 16: 1171–85.
- 3 Pare P, Gray J, Lam S, *et al.* Health-related quality of life, work productivity, and health care resource utilization of subjects with irritable bowel syndrome: baseline results from LOGIC (Longitudinal Outcomes Study of Gastrointestinal Symptoms in Canada), a naturalistic study. *Clin Ther* 2006; 28: 1726–35.
- 4 Whitehead WE, Palsson O, Jones KR. Systematic review of the comorbidity of irritable bowel syndrome with other disorders: what are the causes and implications? *Gastroenterology* 2002; 122: 1140–56.
- 5 Tang NKY, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors and psychological links. *Psychol Med* 2006; 36: 575–86.
- 6 Miller V, Hopkins L, Whorwell P. Suicidal ideation in patients with irritable bowel syndrome. *Clin Gastroenterol Hepatol* 2004; 2: 1064–8.
- 7 Cavanagh JT, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med* 2003; 33: 395–405.
- 8 Jones MP, Wessinger S, Crowell MD. Coping strategies and interpersonal support in patients with irritable bowel syndrome and inflammatory bowel disease. *Clin Gastroenterol Hepatol* 2006; 4: 474–81.
- 9 Lackner JM, Quigley BM, Blanchard EB. Depression and abdominal pain in IBS patients: the mediating role of catastrophizing. *Psychosom Med* 2004; 66: 435–41.
- 10 Longstreth GF, Wilson A, Knight K, *et al.* Irritable bowel syndrome, health care use, and costs: a U.S. managed care perspective. *Am J Gastroenterol* 2003; 98: 600–7.
- 11 Talley NJ, Gabriel SE, Harmsen WS, *et al.* Medical costs in community subjects with irritable bowel syndrome. *Gastroenterology* 1995; 109: 1736–41.
- 12 Posner K, Oquendo M, Gould M, Stanley B. Suicidality Classification Project. FDA psychopharmacologic drugs advisory committee and the pediatric advisory committee. Available at <http://www.fda.gov/ohrms/dockets/ac/OA/slides/2004-4065.htm>
- 13 Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33: 159–74.
- 14 Smith MT, Edwards RR, Robinson RC, Dworkin RH. Suicidal ideation, plans, and attempts in chronic pain patients: factors associated with increased risk. *Pain* 2004; 111: 201–8.
- 15 Magni G, Rigatti-Luchini S, Fracca F, Merskey H. Suicidality in chronic abdominal pain: an analysis of the Hispanic Health and Nutrition Examination Survey (HHANES). *Pain* 1998; 76: 137–44.
- 16 Rao AV. Physical illness, pain, and suicidal behavior. *Crisis* 1990; 2: 48–56.
- 17 Viskum K. Ulcer, attempted suicide, and suicide. *Acta Psychiatr Scand* 1975; 51: 221–7.
- 18 Fergusson DM, Lynskey MT, Horwood LJ. Childhood sexual abuse and psychiatric disorder in young adulthood: I. Prevalence of sexual abuse and factors associated with sexual abuse. *J Am Acad Child Adolesc Psychiatry* 1996; 35: 1355–64.
- 19 Fergusson DM, Lynskey MT, Horwood LJ. Childhood sexual abuse and psychiatric disorder in young adulthood: II. Psychiatric outcomes of childhood sexual abuse. *J Am Acad Child Adolesc Psychiatry* 1996; 35: 1365–74.
- 20 Berkowitz CD. Medical consequences of child sexual abuse. *Child Abuse Negl* 1998; 22: 541–50.
- 21 Drossman DA. Irritable bowel syndrome and sexual/physical abuse history. *Eur J Gastroenterol Hepatol* 1997; 9: 327–30.
- 22 Ross CA. Childhood sexual abuse and psychosomatic symptoms in irritable bowel syndrome. *J Child Sex Abuse* 2005; 14: 27–38.
- 23 Creed F, Guthrie E, Ratcliffe J, *et al.* Reported sexual abuse predicts impaired functioning but a good response to psychological treatments in patients with severe irritable bowel syndrome. *Psychosom Med* 2005; 67: 490–9.
- 24 Guthrie E, Creed F, Fernandes L, *et al.* Cluster analysis of symptoms and health seeking behavior differentiates subgroups of patients with severe irritable bowel syndrome. *Gut* 2003; 52: 1616–22.
- 25 Demyttenaere K, Bruffaerts R, Lee S, *et al.* Mental disorders among persons with chronic back or neck pain: results from the world mental health surveys. *Pain* 2007. (Epub ahead of print)
- 26 Nakao M, Yano E. Somatic symptoms for predicting depression: one-year follow-up study in annual health examinations. *Psychiatry Clin Neurosci* 2006; 60: 219–25.
- 27 Fishbain DA, Cutler R, Rosomoff HL, *et al.* Chronic pain-associated depression: antecedent or consequence of chronic pain? A review *Clin J Pain* 1997; 13: 116–37.
- 28 McWilliams LA, Cox BJ, Enns MW. Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain* 2003; 106: 127–33.
- 29 Edwards RR, Smith MT, Kudel I, Haythornthwaite J. Pain-related catastrophizing as a risk factor for suicidal ideation in chronic pain. *Pain* 2006; 126: 272–9.
- 30 Mann JJ, Apter A, Bertolote J, *et al.* Suicide prevention strategies: a systematic review. *JAMA* 2005; 294: 2064–74.
- 31 Khan A, Khan S, Kolts R, Brown WA. Suicide rates in clinical trials of SSRIs, other antidepressants, and placebo: analysis of FDA reports. *Am J Psychiatry* 2003; 160: 790–2.
- 32 Beautrais AL. Suicides and serious suicide attempts: two populations or one? *Psychol Med* 2001; 31: 837–45.
- 33 Hirschfeld RM, Russell JM. Assessment and treatment of suicidal patients. *N Engl J Med* 1997; 337: 910–5.
- 34 Labus JS, Mayer EA, Chang L, Bolus R, Naliboff BD. The central role of gastrointestinal-specific anxiety in irritable bowel syndrome: further validation of the visceral sensitivity index. *Psychosom Med* 2007; 69: 89–98.