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Mindfulness Improves Otolaryngology Residents' Performance in a Simulated Bad-News Consultation: A Pilot Study

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1 **Mindfulness improves otolaryngology residents' performance in a**
2 **simulated bad-news consultation: a pilot study**

3

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35

36 **Abstract**

37 **Introduction:** Delivering bad news is a stressful moment for both patient and clinician.
38 As poor bad-news consultation quality may lead to misunderstandings, lack of treatment
39 adherence, acute or even post-traumatic stress in patients, training interventions to
40 improve communication skills and stress-management are necessary. Mindfulness is a
41 recognised stress-management strategy that has shown its efficacy in reducing stress in
42 both health professionals and students. We then supposed that a short mindfulness
43 meditation session performed just before a simulated breaking bad-news consultation to
44 patients with laryngeal cancer may help ear, nose and throat (ENT) residents to master
45 their stress and improve their management of this consultation. This study aims at
46 showing how a short mindfulness meditation performed before a simulated bad-news
47 consultation may improve performance in its realisation by ENT residents.

48 **Materials & Methods:** We enrolled 53 ENT residents, randomised in 2 groups. The
49 first group completed a 5-minute mindfulness session while the other group listened to a
50 control track. Thereafter, every resident completed an 8-minute simulated bad-news
51 consultation with a standardised patient. Two blinded expert assessors evaluated their
52 performance on a 25-point grid (BNC-OSAS). Residents self-assessed their stress
53 before and after the intervention and simulated patients rated their perception of
54 physician's empathy.

55 **Results:** The performance was significantly better in the mindfulness group than in the
56 control group ($m=19.8$, $sd=3.2$ and $m=17.4$, $sd=3.7$ respectively, $F(1,45)=5.27$, $p=0.026$,
57 $d=0.67$), especially in the communication and knowledge subdomains. There was no
58 significant difference in perceived stress between the 2 groups. Empathy perceived by
59 simulated patients was positively correlated to residents' performance.

60 **Conclusion:** A short mindfulness meditation is effective for improving ENT residents'
61 performance in a simulated bad-news consultation. These results encourage further
62 assessments of this method with objective measures of physiological stress. More
63 research is required concerning the feasibility and efficacy of mindfulness before daily
64 clinical activities such as stressing bad-news consultation.

65

66 **Keywords:** mindfulness, breaking bad news consultation, stress, cancer, healthcare
67 simulation, communication skills.

68

69

70 **1. Introduction**

71 Breaking bad-news (BBN) consultations are stressful moments both for patients and
72 healthcare professionals¹. Ear, nose and throat (ENT) specialists are among the
73 practitioners who are regularly required to conduct BBN consultations, particularly to
74 disclose cancer. These moments were regularly found to increase both physiological
75 (heart rate, blood pressure or skin conductance) and psychological (self-measures of
76 stress and anxiety) stress-responses². Ptacek et al. found that until 42% of practitioners
77 indicated that “stress they experienced [after a BBN consultation] lasted several hours
78 to more than 3 days”³. Actually, skilfully delivering bad news is of high importance
79 since this is a key moment in the history of the patient’s illness, with short and long-
80 term consequences: this disclosure may result for patients in acute distress such as loss
81 of control or devastation⁴, poor treatment adherence⁵, or lead to more serious
82 psychiatric conditions such as post-traumatic stress disorder^{6,7}.

83 Poor BBN consultations quality is related to lack of experience, stress, and poor
84 communication skills⁸. Therefore, training interventions to improve communication
85 skills and stress-management are necessary to improve BBN consultations. These
86 programs were shown to be effective on observer-rated news delivery skills and self-
87 confidence, with one study reporting effects on patient-reported depression/anxiety⁹.
88 These interventions may include several hours of stress-management courses, as it is the
89 case in Bragard et al.’s method¹⁰. However, these programs do not explore the
90 immediate efficacy of stress-management practice on subsequent clinical practice.

91 Simulation training is an ideal condition to explore the impact of stress on clinical
92 situations before implementing them in clinical practice. As stress has a potential
93 negative impact on clinical performance¹¹, various stress-management programs were
94 tested in simulation training. Most of them were conducted by surgeons and included
95 mental practice, mental rehearsal, relaxation or coping techniques¹²⁻¹⁴. To our
96 knowledge, no study investigated the impact of a mindfulness-based intervention on a
97 simulated practice.

98 Mindfulness meditation was conceived and developed by Jon Kabat-Zinn in the early
99 90s. He defines it as “paying attention on a particular way: on purpose, in the present
100 moment, and nonjudgmentally”¹⁵. More generally, the term meditation “refers to a
101 family of self-regulation practices that focus on training awareness and attention to [...]”
102 foster general mental well-being and development and/or specific capacities such as
103 calm, clarity and concentration¹⁶”. Most studies on the use of mindfulness in healthcare

104 were conducted using Mindfulness-Based Stress Reduction program (MBSR), which is
105 known to reduce physiological stress, blood pressure and heart rate¹⁷. Mindfulness-
106 based interventions also reduced stress among healthcare professionals and students^{18,19}.
107 Unfortunately, the interventions studied until then require a specific training (i.e. time)
108 and are then difficult to adjust to the busy schedule of a healthcare professional.
109 Actually, a recent review highlighted the need of healthcare professionals for shorter
110 and tailored mindfulness interventions to adapt them to their daily clinical practice²⁰.
111 Few studies adapted these interventions to clinical context but none in the context of
112 BBN consultations. Gockel et al., in social work students, selected exercises from the
113 MBSR program to offer 10-minute periods of mindfulness training with 5-minute
114 periods of discussion before clinical interviewing classes, resulting in improvement in
115 counselling self-efficacy and further engagement in mindfulness practice²¹. No
116 objective assessment of clinical practice skills was undertaken. In this context, our study
117 aims at exploring the impact of a short mindfulness practice on performance to a
118 subsequent simulated BBN consultation in ENT residents.

119

120 **2. Methods**

121

122 *2.1. Study participants*

123 The study was conducted in ENT residents. Inclusion criteria were: being an ENT
124 resident from one of the five medical colleges of the East of France (Reims, Nancy,
125 Strasbourg, Dijon, Besançon) and participating in a training day organised for ENT
126 residents coming from these universities on the 27th of September 2018. Fifty-three
127 ENT residents took part to this training day and all of them were included, stratified
128 according to their year of residency and randomised in 2 groups. Their age and gender,
129 the number of BBN consultations they had performed (either supervised or alone) or
130 attended were registered. Six residents were not included in the analysis because they
131 either missed the mindfulness task or the simulated BBN consultation. In total, the
132 results were analysed for 47 participants. The study took place at the European Unit of
133 Healthcare Simulation (*UNIté Européenne de SIMulation en Santé, UNISIMES*) of the
134 University of Strasbourg, France.

135 *2.2. Procedure*

136 All residents were first offered a 45-minute lecture on BBN consultation based on
137 SPIKES recommendations²². We chose SPIKES recommendations for their
138 international approval and large use in teaching BBN consultations⁹, their intelligibility
139 and clinical realism, then adaptable to a pedagogical context. This lecture was made on
140 a GGIM format²³ (Group Guided Integration Method, a pedagogical strategy consisting
141 in 20 minutes of lecture, 10 minutes of individual filling of a lecture's framework, 10
142 minutes of mutual completion of this plan in small groups and 5 minutes of conclusion).
143 After this lecture, they completed the State-Trait Anxiety Inventory-State form (STAI-
144 State [STAI-S] and STAI-Trait [STAI-T]: each from 20 to 80 points)^{24,25}, the Mindful
145 Attention Awareness Scale (MAAS, from 15 to 90 points)^{26,27}, the Fear of Negative
146 Evaluation scale (FNE, from 0 to 30 points)²⁸. Then, the participants attended their
147 program of cranial and neck anatomy and technical skills in simulation. During these
148 lessons, each resident had a personal schedule indicating when he or she could go to
149 bad-news consultation training. This intensive planning with other simulated activities
150 created the conditions of a stressful clinical day, close to professional reality.

151 The bad news consultation training session included three consecutive phases
152 (preparation, simulated consultation, post-simulation), for each resident individually.

153 The preparation phase was divided in three steps. First, residents performed two Visual
154 Analogue Scales assessing Stress (VAS-S) and Self-Confidence (VAS-SC)²⁹, both
155 subsequently converted to a 0 (not at all) to 100 (fully) numerical scale. Secondly, half
156 of them completed a 5-minute guided mindfulness meditation session and the other half
157 listened to a 5-minute control track. The meditation track was adapted from a text of
158 Christophe André (MD), originally inspired by Williams et al.^{30,31} (see Supplementary
159 material S1). The main investigator (ACM) recited this meditation (listen to
160 Supplementary audio material Track 1 - Mindfulness). The control track consisted on
161 the definition of an atom also read by ACM (listen to Supplementary audio material
162 Track 2 - Control)³². The investigator read this track with the same voice and the same
163 tone than the meditation track to create a control task where participants were also
164 focused on an audio material. The aim was to ascertain that the effectiveness of
165 meditation was linked to its specific content and not just the result of a few moments of
166 concentration. Thirdly, all residents performed the VAS-S and VAS-SC and a VAS for
167 attention (VAS-A), assessing to which extent they were attentive to the content they
168 listened to (see Supplementary material S2).

169 In the consultation phase, each resident completed an 8-minute simulated bad-news
170 consultation (disclosure of a laryngeal cancer) to a standardised patient. The scenario
171 was adapted to the specific psycho-social and medical background of patients with
172 laryngeal cancers (for the objectives and the scenario, see Supplementary material S3).
173 The performance evaluation was completed by 2 blinded and independent assessors, a
174 psychiatrist and an ENT specialist (a total of 5 assessors took part to the study, 3
175 psychiatrists and 2 ENT specialists). Evaluators were located in a separated room, using
176 an audio-video transmission device and rated the participants with our newly developed
177 bad-news consultation rating scale (BNC-OSAS, Bad-News Consultation Objective and
178 Structured Assessment Scale, see Supplementary material S3). The BNC-OSAS was
179 created on the model of a global rating scale for Electro-Convulsive Therapy (ECT-
180 OSATS)³³. This scale was chosen as OSATS model was widely experienced as a
181 reliable tool for assessment in simulation training^{34,35} and that SPIKES
182 recommendations were easy to insert into this model. We adapted these
183 recommendations to the 5 domains included in our scale (Respect, Efficacy,
184 Knowledge, Communication and Overall impression of performance) and included
185 clear indications for raters to increase interrater correlation. Each domain was rated on a
186 5-point scale (1-5) and a global rating score was calculated (5-25). Interrater correlation
187 for total scores of the BNC-OSAS was measured using Intraclass correlation
188 (ICC=0.64, $p<0.0001$). A final “pass or fail” outcome was then completed, indicating
189 whether the examiner feels that the resident would be safe enough to perform bad-news
190 consultation independently (on the next live patient) or not.

191 In the post-simulation phase, each student performed the VAS-SC and the VAS-S once
192 again and the VAS-Empathy (VAS-E) where they assessed the empathy they felt for the
193 patient. Standardised patients assessed perceived empathy by completing the Jefferson
194 Scale of Patient Perceptions of Physician Empathy (JSPPPE)³⁶.

195 *2.3. Statistical analyses*

196 Regarding socio-demographic data, our samples were compared using either *t* test when
197 data followed a normal distribution (scores at MAAS, STAI-T, STAI-S and FNE scales)
198 or a Mann-Whitney test when not (year of residency). A Fisher’s exact test was
199 performed for age (divided in 4 age categories), number of previous bad-news
200 consultation (divided in 5 categories [0 ; 1-2 ; 2-5 ; 5-10 ; >10]) and gender. The

201 primary outcome was the score of both raters on the BNC-OSAS and was compared
202 using an ANOVA with the group (mindfulness vs control) as a fixed factor. Secondary
203 outcomes were the subscores on the 5 different domains of the BNC-OSAS, the “pass
204 or fail” outcome, the stress-reduction estimated by residents and the score on the
205 JSPPPE. BNC-OSAS subscores, JSPPPE score, VAS-A and VAS-E scores were
206 measured using separate ANOVAs, while “pass or fail” was measured by an exact
207 binomial test. Regarding VAS-S and VAS-SC scores, separate mixed ANOVAs for
208 repeated measures were used with group as a between-subjects factor and time (before
209 vs. after) as a within-subjects factor. We calculated Pearson’s r (when distributions were
210 normal) or Spearman’s ρ (when at least one distribution was not normal) correlation
211 coefficients between performance on the one side and socio-demographic data, VAS
212 scores and assessment of empathy on the other.

213 Our power analysis was based on an expected average of 15 at the BNC-OSAS score in
214 the first group and an average of 20 in the second group, with a common standard
215 deviation of 5. The alpha risk and power were set at 5% and 80%, respectively. With
216 these hypotheses, the number of subjects to include was 46. A 10% addendum was
217 applied due to possible subjects lost to follow-up. The number of subjects required was
218 therefore 50 (i.e. 25 per group).

219 **3. Results**

220 *Socio-demographic characteristics.* There were no significant differences between
221 mindfulness and control groups in terms of age, gender, training level or previous
222 experience with bad-news consultations (see Table 1).

223 PLEASE INSERT TABLE 1 ABOUT HERE

224 *Performance at the simulated bad-news consultation.* Participants in the mindfulness
225 group had significantly higher total scores at the BNC-OSAS than did the control group
226 ($m=19.8$, $sd=3.2$ and $m=17.4$, $sd=3.7$ respectively, $F(1,45)=5.27$, $p=0.026$, Cohen’s
227 $d=0.67$) (see Figure 1). Regarding BNC-OSAS subscales, Knowledge and
228 Communication scores were significantly higher in the mindfulness than in the control
229 group ($ps<0.049$) whereas Respect, Efficiency and Overall impression of performance
230 scores did not differ significantly between groups ($ps>0.065$) (see Table 2).

231 PLEASE INSERT FIGURE 1 ABOUT HERE

232 *Percentage of pass.* The percentage of pass was higher in the mindfulness than in the
233 control group but the difference was not statistically significant (percentage of pass of
234 75% and 58.7% respectively, $\chi^2=0.09$). However, significantly fewer residents were
235 rated “fail” by both assessors in the mindfulness group than in the control group (4.3%
236 vs 30.4% respectively, $p=0.04$).

237 PLEASE INSERT TABLE 2 ABOUT HERE

238 *VAS of stress, confidence, attention.* Stress scores did not differ significantly between
239 mindfulness and control group ($F(1,44)=1.06$, $p=0.302$) but decreased significantly
240 between before and after intervention ($F(1,44)=4.95$, $p=0.031$). Confidence scores were
241 higher in the mindfulness than in the control group ($F(1,44)=7.65$, $p=0.008$) but did not
242 differ between before and after intervention ($F(1,44)=2.35$, $p=0.133$). For both stress
243 and confidence scores, the interaction between group and time was not significant
244 ($F_s(1,44)<1.01$, $p_s>0.32$). Attention to the audio content was significantly higher in the
245 mindfulness than in the control group ($F(1,44)=16.15$, $p<0.001$).

246 *Empathy.* There was no significant group difference neither in empathy perceived by
247 standardised patients nor as self-assessed by residents ($F(1,41)=0.17$, $p=0.685$ and
248 $F(1,44)=0.36$, $p=0.552$).

249 *Correlation analyses.* Performance (BNC-OSAS) was significantly correlated with
250 perceived stress and confidence before intervention ($r=-0.426$, $p=0.004$ and $r=0.450$,
251 $p=0.002$ respectively), with perceived confidence after intervention ($r=0.326$, $p=0.029$),
252 with self-assessment of empathy ($\rho=0.448$, $p=0.002$), and with empathy perceived by
253 simulated patients ($r=0.541$, $p<0.001$).

254 *Secondary analysis.* As performance was correlated to confidence after intervention and
255 given that participants in the mindfulness group had higher confidence score after
256 intervention, we entered self-confidence after intervention as a covariate in an
257 ANCOVA comparing BNC-OSAS score between groups. The group effect was still
258 marginally significant ($F(1,42)=3.89$, $p=0.055$) whereas the effect of self-confidence
259 was not ($F(1,42)=0.12$, $p=0.117$).

260 **Discussion**

261 Our results show that a short mindfulness meditation session performed just
262 before a simulated bad-news consultation can improve performance in its fulfilment by
263 ENT residents rated on the BNC-OSAS scale. Moreover, the number of residents who
264 were considered as not sufficiently autonomous to achieve bad-news consultations on
265 their own (rated “fail”) by both assessors was significantly lower in the mindfulness
266 group. These results are encouraging since such a guided mindfulness practice is easy to
267 learn and perform. Indeed, contrary to previous studies that mostly examined the impact
268 of mindfulness’ programs (mostly MBSR) on health professionals well-being or
269 competencies^{18,37}, our study fits to daily clinical reality and residents needs²⁰, promoting
270 a short 5-minute mindfulness tool and observing its immediate effect on subsequent
271 clinical practice. Plus, teaching mindfulness in the context of simulation practice could
272 foster its transferability and use in clinical practice as learning context is authentic and
273 close to reality³⁸. Indeed, Gockel et al. showed that students further engaged themselves
274 in mindfulness practice when they learnt it before clinical lessons²¹.

275 The BNC-OSAS sub-score for communication was significantly higher in the
276 mindfulness group than in the control group. This secondary outcome was expected
277 because mindfulness could allow residents to calm down and communicate more
278 effectively. Mindfulness meditation can also generate compassion and lead to more
279 empathetic communication³⁷. Indeed, while empathy perceived by standardised patients
280 was not higher in the mindfulness group, a secondary analysis showed that the sub-
281 score for communication was well correlated with perceived empathy ($r=0.533$,
282 $p<0.001$). The improvement of residents’ communication skills is particularly
283 interesting because effective physician’s communication is linked to a better
284 psychological response from the patient who is diagnosed with cancer³⁹. The knowledge
285 sub-score was also better in the mindfulness group. This result was less predictable
286 since the two groups were comparable in terms of experience (year of residency and
287 consultations carried out). However, their previous knowledge might have been
288 different, a data that our study did not specifically explore. Finally, one may wonder
289 whether the meditation session had enabled the residents to better manage their stress
290 and therefore have better access to their knowledge.

291 Our study showed no influence of mindfulness on perceived stress and stress-
292 reduction which rather contradicts our predictions. However, these subjective measures
293 of stress are not always correlated with physiological measures⁸. Further studies on

294 mindfulness in simulated bad-news consultations would gain in including objective
295 measures of stress (i.e. using heart-rate variability and/or electrodermal conductance) in
296 order to bypass this limitation. Other paradigms of perceived psychological stress could
297 also bring a more consistent measurement. Indeed, Rudland et al. recently highlighted
298 how *eustress* - considered as a good stress, in comparison to *distress* - may foster
299 learning⁴⁰. According to this model, the stress/performance relationship describes an
300 inverted "U" curve, challenging the relevance of linear scales for measuring stress in a
301 pedagogical frame. For instance, scales based on the theory of cognitive evaluation
302 (measuring the ratio between self-evaluated available resources for the simulated
303 scenario to come and necessary resources for the simulated scenario to come) may offer
304 a greater consistency with simulation.

305 Residents in the mindfulness group showed a significantly higher self-
306 confidence both before and after audio listening than in the control group, which may
307 have contributed to their better performance in the simulated bad-news consultation.
308 Indeed, self-rated confidence was correlated with performance in simulated
309 consultation. Firstly, this result contrasts with previous ones on self-confidence and
310 performance in simulation training. Actually, 3 studies showed no correlation between
311 self-reported confidence and simulation performance. However, only one of these
312 studies included a self-assessment of self-confidence prior to the simulated
313 consultation⁴¹⁻⁴³, while in our study self-reported confidence after simulated practice
314 was also not correlated with performance. These observations invite researchers to
315 monitor students' self-confidence levels in future studies of stress regulation methods in
316 simulation training. Indeed, although we controlled the level of constitutional and
317 instantaneous stress by using several scales (STAI-T, STAI-S, FNE, VAS-S), they did
318 not show any difference between the 2 groups, although they did not approach
319 simulation training with a similar state of mind since they differed in terms of self-
320 confidence. This higher self-confidence in the mindfulness group before consultation
321 raises the issue of whether a simple baseline group difference could explain our results.
322 Secondary analyses taking into account self-assessed confidence before the simulated
323 consultation, showed in fact that the group effect was still marginally significant, but the
324 effect size remained medium ($d=0.61$), this arguing in favour of an effect of meditation
325 *per se* and softening the possible influence of baseline self-confidence.

326 Empathy perceived by simulated patients was not higher in the mindfulness
327 group, though this measure was correlated with residents' performance. Data
328 concerning assessment of empathy by simulated patients are contrasting. On the one
329 hand, a study found that empathy assessed by simulated patients on a 5-point Likert
330 scale was positively correlated with performance in Objective and Structured Clinical
331 Evaluations (OSCEs) while another found a high interrater reliability between empathy
332 assessed by standardised patients and expert assessors in a psychiatry OSCE^{44,45}. On the
333 other hand, a study found that simulated patients assessed empathy higher than expert
334 assessors in family medicine students with the Consultation And Relational Empathy
335 (CARE) scale⁴⁶. An interesting point is that the estimation of empathy by the simulated
336 patients (as well as by the residents themselves) was correlated with all BNC-OSAS
337 subscores except knowledge, providing an argument that the attitude of the physician
338 has a much greater impact on the patients' feelings than his or her knowledge. This
339 underlines how knowledge and interpersonal skills are two essential dimensions of care.

340 Some limitations of our study must be acknowledged. First, our evaluation was
341 conducted at a single 8-minute OSCE station, while the current recommendations offer
342 a minimum of 8 stations to obtain a reliable final score⁴⁷. However, the feasibility of
343 such a number of stations in our study was null. Secondly, this was the first use of the
344 BBN consultation skills assessment scale (BNC-OSAS) that we created for this study.
345 Nevertheless, we decided to create this grid as to our knowledge no validated grid to
346 assess bad-news consultations existed. Plus, it has been based on international
347 recommendations for BBN consultations and on a previous objective scale based on
348 areas of expertise recognised by the CanMeds. Though our study should not be
349 considered as a validation process of BNC-OSAS, this grid showed good interrater
350 reliability during our study.

351 **4. Conclusion**

352 Our results indicate that a short mindfulness session improves performance of ENT
353 residents in a subsequent simulated bad-news consultation, which seems of clinical
354 relevance considering it may lessen psychological disturbances (depression, cancer-
355 related PTSD)⁶, foster treatment adherence⁵ and improve health professionals fulfilment
356 and well-being at work. Future research may confirm these results in similar and
357 different settings (type of mindfulness practice, time between mindfulness and
358 consultation, etc.) in simulation training and in daily clinical practice to study its effect

359 on real breaking bad-news consultations. A qualitative study could investigate the
360 methods spontaneously used by practitioners to prepare themselves to these
361 consultations and relieve their stress. Such a survey would allow us to explore the needs
362 of physicians and thus the feasibility and transferability of a mindfulness meditation
363 practice into their daily clinical practice. As a whole, our research is also in line with the
364 idea that health professionals' well-being at work may directly impact patients' health.

365 **5. Abbreviations**

366 BBN: Breaking Bad-News

367 BNC-OSAS: Bad-News Consultation - Objective Structured Assessment Scale

368 CARE: Consultation And Relational Empathy

369 ECT-OSATS: Electro-Convulsive Therapy - Objective Structured Assessment of
370 Technical Skills

371 ENT: Ear, Nose and Throat

372 FNE: Fear of Negative Evaluation

373 GGIM: Group Guided Integration Method

374 JSPPPE: Jefferson Scale of Patient Perceptions of Physician Empathy

375 MAAS: Mindful Attention Awareness Scale

376 MD: Medical Doctor

377 OSCE: Objective and Structured Clinical Evaluation

378 PTSD: Post-Traumatic Stress Disorder

379 STAI: State-Trait Anxiety Inventory

380 STAI-S: State-Trait Anxiety Inventory - State

381 STAI-T: State-Trait Anxiety Inventory - Trait

382 VAS: Visual Analogue Scale

383 VAS-A: Visual Analogue Scale – Attention

384 VAS-E : Visual Analogue Scale - Empathy

385 VAS-S: Visual Analogue Scale - Stress

386 VAS-SC: Visual Analogue Scale - Self-confidence

387 **6. Acknowledgments**

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392 ; the improvisation theatre actors from the LOLITA association as simulated patients
393 and the ENT residents from the Grand Est region for their participation.

394

395 **7. Conflict of interest**

396 None.

397 **8. Authors contributions**

398 ACM and CK conceived the study protocol. ACM drafted the first and subsequent
399 drafts. ACM, NT and FB performed the final statistical analysis. JPC carried out the
400 randomisation. AC and JPC drew up the study planning. AC, ML and PV contributed to
401 the critical revision of the paper. All authors approved the final manuscript for
402 submission and have agreed to be accountable for all aspects of the work.

403 **9. Ethical approval**

404 This study was approved by the local ethic committee of the Hôpitaux Universitaires de
405 Strasbourg (CE-2018-81). The investigation was carried out in accordance with the
406 latest version of the Declaration of Helsinki⁴⁸. All participants received appropriate
407 written information, signed and informed consent form before enrolment in the study.
408 After completion of the study, a debriefing was proposed to the participants.

409

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413

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Figure 1. Total score at the Bad News Consultation – Objective and Standardized Assessment Scale (BNC-OSAS) for participants in the mindfulness and control groups.

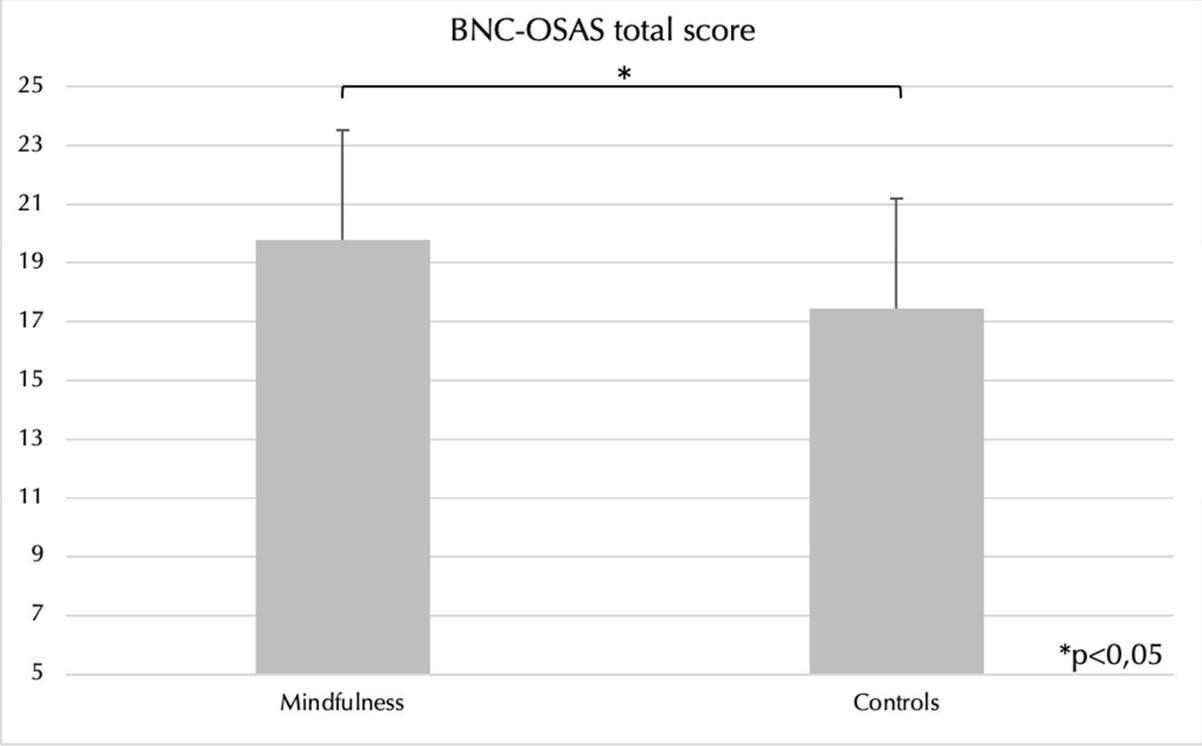


Table 1. Sociodemographic characteristics

		Mindfulness group (n=24)	Control group (n=23)	<i>p</i>
		<i>n</i>	<i>n</i>	
Age	25-27	8	6	0.37
	28-30	16	14	
	31-33	0	0	
	34-36	0	1	
Sex	female	12	11	0.99
	male	11	10	
Previous bad-news consultations				
	0	2	1	0.371
	1-2	2	7	
	2-5	9	3	
	5-10	9	4	
	> 10	2	6	
		<i>mean (sd)</i>	<i>mean (sd)</i>	
Year of residency		3.2 (1.3)	3.5 (1.3)	0.52
MAAS		58.1 (10.0)	61.5 (11.6)	0.29
STAI-T		49.6 (3.2)	50.6 (5.0)	0.45
STAI-S		49.7 (3.4)	49.8 (4.1)	0.95
FNE		15.5 (4.1)	15.5 (6.6)	0.99

Table 2. Subscores at BNC-OSAS

	Mindfulness group (n=24)	Control group (n=23)	<i>F</i>	<i>p</i>
	<i>m (sd)</i>	<i>m (sd)</i>		
<i>BNC-OSAS subscores</i>				
Respect (1-5)	4.1 (0.9)	3.5 (1.1)	3.57	0.065
Efficiency (1-5)	4.0 (0.9)	3.0 (1.0)	3.42	0.071
Knowledge (1-5)	4.3 (0.8)	3.8 (0.8)	5.42	0.024*
Communication (1-5)	4.0 (0.9)	3.0 (1.0)	4.09	0.049*
Overall performance impression (1-5)	4.0 (1.1)	3.0 (1.2)	2.96	0.093
Total (5-25)	19.8 (3.9)	17.4 (4.4)	5.27	0.026*
<i>Pass or fail</i>				
	<i>n (%)</i>	<i>n (%)</i>		
Fail/fail	1 (4.2)	7 (30.4)		0.040*
Pass/fail	10 (41.7)	5 (52.2)		0.301
Pass/pass	13 (54.2)	11 (47.8)		0.839