Prevalence of maternal psychological disorders after immediate postpartum haemorrhage: a repeated cross-sectional survey in a cohort study

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Abstract

Objective To assess depression at 2(M2), 6(M6), and 12(M12) postpartum months among women with postpartum haemorrhage (PPH) compared with women with no PPH and, to describe anxiety and post-traumatic stress disorder (PTSD). Design Repeated cross-sectional study within a prospective cohort of women in the immediate postpartum period. Setting Single-centre study at a French level 3 maternity unit. Population Women who gave birth at [?]22 weeks of gestation were eligible. The exposed group comprised the women who had had a primary PPH ([?]500 mL in the 24 hours after delivery) and the unexposed group, which did not. Methods 1298 included women (528 with and 770 without PPH) completed self-administered questionnaires. Main Outcome Measures The prevalence of depression and its mean scores, at M2, M6, and M12 and secondary, the prevalence of anxiety and of PTSD and its mean scores, measured at the same times. Results At M2, the prevalence of depression and PTSD was higher among the women with PPH (24.4% vs 18.2%, p=0.03, and 12.8% vs 7.6%, p=0.02). The prevalence of anxiety at inclusion and M2 was higher in the PPH group (18.1% vs 10.3%, p=0.01, and 20.0% vs 13.3%, p=0.01). At M6, and M12, only the mean adjusted PTSD score was higher in the PPH group (7.6, 95%CI, 6.3-9.1 vs 5.8%, 95%CI, 4.9-6.8, p=0.02). Conclusions Professionals must know these high rates and screen for psychological disorders during the long postpartum period. Funding Grant from the Clermont-Ferrand University Hospital AOI2015. Keywords Postpartum haemorrhage; depression; anxiety; post-traumatic stress disorder, psychological disorder

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Abstract

Objective

To assess depression at 2(M2), 6(M6), and 12(M12) postpartum months among women with postpartum haemorrhage (PPH) compared with women with no PPH and, to describe anxiety and post-traumatic stress disorder (PTSD).

Design

Repeated cross-sectional study within a prospective cohort of women in the immediate postpartum period.

Setting

Single-centre study at a French level 3 maternity unit.

Population

Women who gave birth at [?]22 weeks of gestation were eligible. The exposed group comprised the women who had had a primary PPH ([?]500 mL in the 24 hours after delivery) and the unexposed group, which did not.

Methods

1298 included women (528 with and 770 without PPH) completed self-administered questionnaires.

Main Outcome Measures

The prevalence of depression and its mean scores, at M2, M6, and M12 and secondary, the prevalence of anxiety and of PTSD and its mean scores, measured at the same times.

Results

At M2, the prevalence of depression and PTSD was higher among the women with PPH (24.4% vs 18.2%, p=0.03, and 12.8% vs 7.6%, p=0.02). The prevalence of anxiety at inclusion and M2 was higher in the PPH group (18.1% vs 10.3%, p=0.01, and 20.0% vs 13.3%, p=0.01). At M6, and M12, only the mean adjusted PTSD score was higher in the PPH group (7.6, 95%CI, 6.3-9.1 vs 5.8%, 95%CI, 4.9-6.8, p=0.02).

Conclusions

Professionals must know these high rates and screen for psychological disorders during the long postpartum period.

Funding

Grant from the Clermont-Ferrand University Hospital AOI 2015.

Trial Registration

The study was registered at ClinicalTrials.gov (NCT 03120208).

Keywords

Postpartum haemorrhage; depression; anxiety; post-traumatic stress disorder, psychological disorders

Funding

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Introduction

The prevalence of postpartum depression is estimated between 10% and 20%.[1,2] Studies measuring postpartum post-traumatic stress disorder (PTSD) observe prevalences of 0.3% to 4.0%, but higher among women with notable medical or obstetric histories (18.5%, 95%CI, 10.6-30.38).[3,4] The prevalence of postpartum anxiety ranges from 8.5% to 18%.[4,5] Studies have shown that risks of postpartum depression, PTSD, and anxiety are higher among women with obstetric complications than with uneventful pregnancies.[3,6] Caesarean and operative vaginal deliveries also increase the risk of depression and PTSD.[7,8] Immediate postpartum haemorrhage (PPH) concerned around 3.4% of vaginal deliveries (>500 mL) and 2.8% of caesareans (>1000 mL) in France.[9] PPH is one of the leading causes of maternal death.[10] The 2014 French guidelines updated the definition of PPH: blood loss [?]500 mL in the first 24 hours after birth, regardless of mode of delivery.[11] Management of severe PPH can require medical or surgical procedures.[11]Postpartum anaemia after PPH can cause fatigue, infections, cardiovascular diseases, and compromise the mother-child bond.[12–14] All of these potential consequences can produce higher rates of psychological disorders in these women.[1,15] Few published studies have examined the psychological impact of immediate PPH,[16–21] and only two included control groups of women without PPH.[22,23]Neither Eckerdal et al. nor Ricbourg et al. found any difference between the 2 groups for the prevalence of depression or PTSD.[22,23] One study interviewed women by telephone,[17] and others sent them self-administered questionnaires by email from 1 month to 1 year postpartum.[16,18–20,22] These studies presented methodological problems including unvalidated questionnaires,[17,18] retrospective designs,[17] large losses to follow-up,[17,22] information bias (interview at different intervals after delivery),[17] recall bias,[17] small sample size,[17,20] and failure to adjust for antenatal risk factors known to affect postpartum depression, PTSD, or anxiety.[16–18] These articles have studied only severe PPH.[16–20] Most authors have assessed postpartum psychological disorders only for short periods ([?] 4 months),[16–20] although it is recommended that these assessments be performed up to one year.[23]

Our research hypothesis is that women with PPH have a higher rate of postpartum psychiatric disorders than controls.

Our principal objective was to assess if the prevalence, mean score and risk of depression (assessed as described in the outcome section below) at each postpartum study period (2, 6, and 12 months) was higher among women with, compared to without, immediate PPH ([?]500 mL). Secondary objectives were to describe at the same intervals the prevalence, mean score, and risk of anxiety and PTSD.

Methods

Study design and participants

The PSYCHE study was a single-centre repeated cross-sectional study within a prospective cohort of women who gave birth at a French level 3 maternity unit.

Women who gave birth at or after 22 weeks of gestation in our hospital, were affiliated with a French health insurance fund, and consented to participate were eligible for this study. Women younger than 18 years, those who did not speak French, and those who refused to participate were excluded.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human subjects/patients were approved by The French regional ethics review committee (South East VI) in February 2017 (IRB AU1243).

Procedures

Inclusion took place in the immediate postpartum period from April 27, 2017, to April 2, 2019. The volume of bleeding was quantified for vaginal deliveries by using a graduated/marked collection bag and for caesarean

deliveries, by aspiration and weighing the blood loss. PPH prevention and management followed the French clinical practice guidelines.[11]

The exposed group comprised the women who had had a primary PPH ([?]500 mL in the 24 hours after delivery) and the unexposed group, which did not. For each woman with PPH, we planned to recruit 2 women without it: the ones immediately before and after the delivery of the woman with PPH.[14] The investigator provided women with a written information sheet and obtained their written consent before their discharge.[14]

The study was registered at ClinicalTrials.gov (NCT 03120208).

Outcomes

The principal outcome was the prevalence of depression, measured by the Edinburgh postnatal depression scale (EPDS), with a discrimination threshold set at 11 and above.[24]

Our secondary outcomes were the mean EPDS score and the risk of postpartum depression and, on the other hand, the prevalence, mean scores, and risk of other psychological disorders: anxiety, measured by Spielberger's State-Trait Anxiety Inventory (STAI) form Y-A with a discrimination threshold [?]46,[25] generalised anxiety disorders, measured by the Generalised Anxiety Disorder (GAD-7) with a discrimination threshold >7,[26] and post-traumatic stress disorder (PTDS), by the Revised Impact of Event Scale (IES-R) with a discrimination threshold [?]30.[27]

Data source

The computerised medical file allowed us to collect the social, demographic, medical, and obstetric data of the women and their children. To optimise exhaustiveness, this database was crossed with those of the hospital's blood bank, radiology department, and discharge data programme (PMSI).

Self-administered questionnaires specific to the study were completed by the women immediately postpartum (on paper) and at 2, 6, and 12 months (on line). These questionnaires asked about medication consumption/use and consultations with psychologists and/or psychiatrists. They also included questionnaires described above, validated in French, to assess the 3 psychological disorders under study. To assess these women's preexisting depressive and anxious characteristics, version 5 of the Mini International Neuropsychiatric Interview MINI[28]was completed at inclusion, M6, and M12, as well as the STAI form Y-B,[25] with a discrimination threshold [?]48, only at inclusion (Figure 1).

Statistical analysis

Based on the study by Thompson who found depression in 10% of the unexposed and 16% of the exposed women at 4 months postpartum,[16] and including 2 women in the group without PPH for every woman with it, we required 1542 women, including 514 exposed and 1028 unexposed, to have a power of 90%, with a bilateral alpha equal to 5%.

We conducted a descriptive analysis of both groups — exposed and unexposed — for the social, demographic, medical, and perinatal data. Categorical variables were compared by chi-square (χ^2) tests (or Fisher's exact test, as appropriate) and continuous variables by Student's t-test (or a Mann-Whitney test).

Prevalence rates and their 95%CIs for depression, anxiety, and PTSD were calculated at 2, 6, and 12 months by χ^2 tests (or Fisher's exact test, as appropriate).

The scores of each questionnaire were transformed in log form to obtain a normal distribution. The results are presented as geometric means. The geometric means were compared between the groups at each study time point with Student's t-test (or a Mann-Whitney test). A multivariate analysis by a manual backward stepwise generalized linear model was performed to study the association between exposure and the scores obtained on each questionnaire. The adjusted geometric means were compared between the groups. The results are also presented as crude and adjusted odds ratios (ORs) with their 95%CIs.

Statistical significance was set at p<0.05. All statistical analyses were performed with SAS software version 9, 2002-2010 (SAS Institute Inc.).

Results

During the study period, our maternity department had 7274 births, including 887 PPH. The study finally included 1298 participants. Among the women who had a PPH, 819 were eligible and 64.4% agreed to participate (528 women) (Figure 2).

The descriptive socio-economic, medical, and obstetric date are available in Tables S1 to S5. Several variables differed between the groups of women with and without PPH: geographic origin, obstetric history, pregnancy by medically assisted reproduction, multiple pregnancy, disease during pregnancy, induction of labour, surgical delivery, and perineal lesions.

The mean blood loss was 922.0 ±520 mL in the PPH group and 182.3±110.4 mL in the other (p<0.0001). A second-line surgical procedure (defined as a B-Lynch suture, Cho suture, hypogastric arterial ligation, other vessel ligation, cervical suture, hysterectomy, repair of uterine wound closure, other surgery), and/or a vascular arterial embolization were performed for respectively 0.6% (n=3) and 0.2% (n=1) of the women with PPH. The packed red blood cell transfusion rate was 6.8% in women with PPH.

The newborns in the PPH group more often had a low (<2500 g) or high (>4000 g) (p<0.0001) birth weight as well as a 5-min Apgar < 7 (7.0% *vs* 1.7%, p<0.0001). They were also transferred more often to a neonatology units (18.3% *vs* 3.5%, p<0.0001) (Table S4).

The MINI questionnaire results scores were, among the women with PPH, compared with the control group, at M0, M6 and M12, respectively, 12.6%*vs* 16.3% (p=0.07), 19.3% *vs* 18.6% (p=0.85), and 16.5%*vs* 20.6% (p=0.26). At inclusion, the mean STAI Y-B score was 41.9% in the PPH group *vs* 48.2% in the control group (p=0.04). The percentage of women with anxiety (STAI Y-A >46) who sought some psychiatric and/or psychological at M2, M6 and M12 did not differ statistically differ between the 2 groups (Table S5).

The percentages of women receiving psychological and/or psychiatric treatment in the groups with and without PPH at M2, M6, and M12 were respectively 6.4% *vs* 2.9% (p=0.01); 5.8% *vs* 3.9% (p=0.29), and 7.1% *vs* 3.8% (p=0.11). Psychiatric treatment in the groups with and without PPH at M2, M6, and M12 was reported for, respectively, 5.1% *vs* 1.8% (p=0.008), 5.0% *vs* 1.5% (p=0.02), and 4.6% *vs* 3.1% (p=0.47).

At 2 months after giving birth, the women who had had a PPH had higher prevalence rates of both postpartum depression and PTSD than the women without PPH (24.4% *vs* 18.2%, p=0.03, and 12.8% *vs*7.6%, p=0.02) (table1). The prevalence of generalised anxiety disorders at 2 months did not differ between the groups, nor did the prevalence of the 3 disorders studied at 6 months or at one year (table 1). The prevalence of anxiety measured by the STAI Y-A was higher in the PPH group than in the control group at inclusion (18.1% *vs* 10.3%, p=0.01) and at M2 (20.0% *vs* 13.3%, p=0.01) but did not differ at either M6 or M12 (respectively, 16.8% *vs* 14.5%, p=0.46 and 11.7% *vs* 14.5%, p=0.39) (Table S6).

At one year, the group of women with PPH had an adjusted mean for the PTSD higher than the other group (7.6 [6.3-9.1] *vs* . 5.8 [4.9-6.8], p=0.02). The comparison of the least square means at the 3 study points after inclusion found that postpartum depression was more frequent among women without PPH at M12 (p=0.04) and PTSD more common in women with PPH at M2 (p=0.02) (table 1). The adjustment factors are described in Table S7. After adjustment, the only significant difference between the groups was a higher prevalence of PTSD in the PPH group at one year (7.6, 95%CI, 6.3-9.1 *vs* 5.8, 95%CI, 4.9-6.8, p=0.02) (table 1). The adjusted risks of depression, anxiety, and PTSD at 2, 6, and 12 months postpartum did not differ between the 2 groups (Table S8).

Discussion

Main Findings

Our main results are that the prevalence of postpartum depression and of PTSD were higher at 2 months

among women with PPH than among women in the control group. Another result of this study is the high prevalence of the different disorders studied, regardless of exposure to PPH, even a year after giving birth.

Interpretation

The temporal proximity of the traumatic event appears to increase the risk of the onset of depression and of PTSD at 2 months and thus suggests a response to the acute event (here the PPH).

The prevalence of postpartum depression at 2 months after delivery was 24.4% among the women with PPH, a prevalence higher than those reported by Ricbourg et al. (15% and 23.5% at 1 and 3 months)[20], Eckerdal et al. (13.8% at 6 weeks)[19], and Thompson et al. (11% and 13% at 2 and 4 months).[16] The different thresholds used for the EPDS may explain these differences. A threshold [?]11 is recommended for the French version, while the other studies used higher thresholds: Thompson et al. >12 and Eckerdal et al. [?]12.[16,19] The definition for PPH also varies with the study.[16,17,19,20,29]

The prevalence of PTSD was 12.8% (IES-R[?]30) among women with PPH at M2, compared with the 45% at 1 month and 23.5% at 3 months reported by Ricbourg et al., and the 5% at 2 months reported by Thompson et al.[16,20] These differences in prevalence may be explained by the choice of questionnaire used. Thompson et al. used the 17-item PTSD Checklist (PCL).[16] Ricbourg et al. used the same scale and the same endpoint as we did: IES-R[?] 30.[20] Again, the definitions of PPH differed between studies[16,20] and the number of individuals was sometimes low.[20]

At 2 months after delivery, the prevalence of generalised anxiety disorder was 15.9% (GAD-7>7) among women with PPH and 11.7% in the control ground. As no study has used the GAD-7 to evaluate generalised anxiety disorder among women who had a PPH, comparison was difficult. The meta-analysis by Goodman et al. found an overall mean prevalence of GAD in a population of women during the postpartum period was 3.59% (95%CI, 1.85-6.66), lower than our results.[6] Our results for anxiety were close to those of Thompson et al., who used a 6-item short form of the Spielberger scale.[16] At 2 months, the women in Thompson's PPH group had a median score of 10 [IQR, 9-11], indicative of low anxiety (median <12); the mean score in our study was 33.0 (95%CI, 31.9-34.1) on Spielberger's STAI Y-A scale — very low anxiety (score<35).[16]

As expected, our 2 groups differed for the known risk factors for PPH, that is, mode of delivery (more women with PPH had either an instrumental vaginal or caesarean delivery), geographical origin and smoking, etc. We therefore adjusted the analyses for these factors. We did not observe any statistically significant differences at M2 or M6 for any of the disorders studied (table 1). At M12, the women with PPH had higher adjusted mean scores for PTSD than the control group: 7.6, 95%CI, 6.3-9.1 *vs* 5.8%, 95%CI, 4.9-6.8, p=0.02. Sentilhes et al.[22] found that women with vaginal deliveries only had an unadjusted median score for PTSD less than 5 (95%CI, 0-11) at one year, via the unrevised version of the IES; we used the revised IES.[22] We did not find a statistically significant difference in the risk of any one of these psychological disorders at any assessment point between women with and without PPH (Table S8). This lack of association could be linked not only to the exposure studied but also to other potential confounding factors or clinical prognostic factors might modify this risk (wanted or unplanned pregnancy, the women's investment in the pregnancy, etc). The only others to measure this risk were Eckerdal et al., who found that PPH did not increase the risk of postpartum depression (OR=1.81, 95%CI, 0.91-3.57) (unadjusted/crude).[19]

Our work focused on 2 current major public health issues. Among maternal deaths up to one year after giving birth, suicide is the second leading cause in France and PPH the fifth leading cause.[10] Few publications have considered the psychological impact of immediate PPH, and as discussed in the introduction, all have them have methodological problems.[16–20] Most of these studies are limited to postpartum depression.[17,19,20]

Strengths and Limitations

Strengths of our study include its prospective design, its control group, a full year of follow-up after birth, and the largest sample size so far published (n=1298 including 528 with PPH). Our participation rate was higher than that of the other studies (22% and 65%).[19,20] The self-administered questionnaires were

analysed continuously, by workers masked to the study group. Finally, the exhaustiveness of the obstetric files' descriptive data was verified by crossing them with 3 other databases.

Our study's first limitation is its single-centre design. Nonetheless, our hospital is the only level 3 in the Auvergne region and receives most of the pregnant women at known risk of PPH. The second limitation is that recruitment of the women in the unexposed group was difficult, and loss to follow-up over time notable (37.4% at M2, 56.6% at M6, and 63.5% at M12). For this reason, the protocol planned to recruit 2 unexposed women for every woman with PPH. The third limitation was the use of questionnaires rather than a psychiatric interview to assess the psychological outcomes. The questionnaires nonetheless have been validated in French. The last limitation of our study is that, for ethical reasons, women identified as at risk were offered an interview with a psychologist or a psychiatrist; this might have reduced the prevalence at M6 and M12. Accordingly, the questionnaires at 2, 6, and 12 months asked women if they had seen a psychiatrist or a psychologist and what medication they might be taking.

Conclusion/Implications

The prevalence rates of both postpartum depression and PTSD were statistically higher at 2 months after delivery among women who had had a PPH (respectively 24.4% and 12.8%) compared with the control group (respectively 18.2% and 7.6%).

After adjustment, the mean scores for PTSD remained significantly higher at one year among women with PPH (7.6, 95%CI, 6.3-9.1 *vs* 5.8%, 95%CI, 4.9-6.8, p=0.02). Moreover, the prevalence of psychological disorders was quite high, including in the control group, and even long after delivery. Perinatal professionals must bear these high rates in mind and systematically screen for psychological disorders during the long postpartum period. Further studies are needed to determine, among all young mothers, which parts of the care process are critical, and to assess what type of structured additional support might be appropriate and effective. Elsewhere, further studies should assess the impact of a national screening programme using validated instruments conducted by perinatal health-care providers.

Contributors

MP, FV and AL had full access to all of the data in the study and MP took responsibility for the integrity of the data and the accuracy of the data analysis. MP and FV designed the study, wrote the study protocol and obtained the funding for the study. MP is the coordinator-investigator and FV the methodologist and supervisor. MP and FV were responsible for acquisition of data. MP, FV and AL were responsible for the verification of the underlying data, the analysis and the interpretation of data. AL was responsible for statistical analysis. MP and FV wrote the draft manuscript. MP, AL, IDC, DG, PML, and FV revised the manuscript and approved the final version before submission. MP was responsible for study supervision and was the guarantor for the study. All listed authors meet authorship criteria. All authors confirm that they had full access to all data in the study and accept responsibility for publication.

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Disclosure of interests

We declare no competing interests.

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Table 1: Prevalence and mean scores of depression, anxiety, and post-traumatic stress disorder at 2, 6, and 12 months postpartum

	Prevalence[a]	Prevalence[a]	Prevalence[a]	Least square means[b]	Least square means[b]	Least square means[b]	Least square means[b]	Adjusted mean scores[b]	Adjusted mean scores[b]
	PPH N = 528 % (n)	**No PPH N = 770 % (n)**	**p**	**PPH N = 528 [95%CI]**	**No PPH N = 770 [95%CI]**	**No PPH N = 770 [95%CI]**	**p**	**PPH N = 528 [95%CI]**	**No PPH N = 770 [95%CI]**
Depression									
M2	24.4 (324) [	18.2 (489)	0.03	5.6 [5.1-6.1]	5.3 [4.9-5.7]	5.3 [4.9-5.7]	0.42	5.5 [5-6.1][c]	6 [5.5-6.6][c]
M6	14.2 (239)	14.8 (324)	0.84	5 [4.5-5.6]	4.5 [4.1-4.9]	4.5 [4.1-4.9]	0.14	5.6 [4.9-6.3][d]	5.2 [4.6-5.9][d]
M12	9.8 (193)	15.5 (284)	0.07	4 [3.5-4.5]	4.7 [4.3-5.2]	4.7 [4.3-5.2]	0.04	4.6 [4-5.2][e]	5.1 [4.5-5.6][e]
GAD									
M2	15.9 (321)	11.7 (479)	0.09	3.9 [3.6-4.3]	3.5 [3.2-3.8]	3.5 [3.2-3.8]	0.05	3.7 [3.4-4][f]	3.7 [3.5-4][f]
M6	13.1 (237)	11.6 (319)	0.6	3.6 [3.2-4]	3.7 [3.4-4.2]	3.7 [3.4-4.2]	0.54	3.5 [3.2-3.9][g]	3.7 [3.4-4][g]
M12	11.6 (190)	11.0 (282)	0.88	3 [2.6-3.5]	3.4 [3-3.8]	3.4 [3-3.8]	0.21	3.5 [3.1-3.9][f]	3.7 [3.3-4.1][f]
PTSD									
M2	12.8 (296)	7.6 (459)	0.02	8.5 [7.4-9.9]	6.8 [6-7.7]	6.8 [6-7.7]	0.02	9.4 [8-11][h]	8 [6.9-9.2][h]
M6	8.7 (218)	5.9 (304)	0.22	6.9 [5.7-8.3]	6 [5-7.1]	6 [5-7.1]	0.25	10 [7.7-12.8][i]	10.1 [7.8-12.9][i]
M12	3.9 (178)	4.1 (270)	1	7 [5.8-8.6]	6 [5-7.2]	6 [5-7.2]	0.24	7.6 [6.3-9.1][j]	5.8 [4.9-6.8][j]

[a]Prevalences are defined by an EPDS score [?] 11 for depression, a GAD 7 score > 7 for generalised anxiety disorder, and an IES-R score [?] 30 for post-traumatic stress disorder.

[b]Depression was measured by an EPDS score ranging from 0 to 30, generalised anxiety disorder by a GAD-7 score from 0 to 21, and PTSD by an IES-R score from 0 to 88.

[c]Adjusted for the GAD-7 and IES-R scores and foreign geographic origin.

[d]Adjusted for the GAD-7 and IES-R scores, foreign geographic origin, and a previous delivery.

[e]Adjusted for the GAD-7 scare and foreign geographic origin.

[f]Adjusted for a positive MINI assessment, the EPDS and IES-R scores.

[g]Adjusted for the EPDS, IES-R, and STAI Y-B scores.

[h]Adjusted for the EPDS and GAD-7 scores, smoking, a previous delivery, and BMI > 25.

[i]Adjusted for a positive MINI assessment, the EPDS score, an instrumental delivery, and smoking.

[j]Adjusted for the EPDS and GAD-7 scores

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