

Predicting violence in psychiatric inpatients: a prospective study with the HCR-20 violence risk assessment scheme

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(Received 23 September 2009; final version received 4 October 2010)

This prospective longitudinal study explores the predictive validity of the HCR-20 and the Psychopathy Checklist: Screening Version (PCL:SV) in a mentally disordered high-risk population. Files of 78 inpatients were coded and patients were followed up while in hospital for 12 months by nursing staff who recorded violent incidents using the Modified Overt Aggression Scale. Receiver operating characteristic analyses yielded moderate to strong associations between HCR-20 and violence (AUCs = .69–.77). PCL:SV AUCs were lower and more unstable (.61–.70). Regression analyses revealed that both tools were good violence predictors in the short-term, but only HCR-20 and particularly the clinical subscale contributed to prediction beyond this period. Patients scoring above the HCR-20 mean were 2.1–2.5 times more likely to be violent than those scoring below the mean. The results suggest that the HCR-20's Spanish adaptation is a useful tool for predicting the likelihood of inpatient violence in civil psychiatric wards. Implications for risk assessment research are discussed.

Keywords: HCR-20; institutional aggression; mental disorder; risk assessment; prospective

Introduction

Aggression and violence are common in general inpatient psychiatric settings (McDermott, Edens, Quanbeck, Busse, & Scott, 2008) and affect the safety and well-being of psychiatric patients and their caregivers. Furthermore, inpatient aggression represents a complex workplace problem, which has severe consequences in nearly 60% of cases (Owen, Tarantello,

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Jones, & Tennant, 1998). Although many of the violent acts committed by people with mental disorders are viewed by public opinion as unavoidable, especially when they are associated with chronic pathologies, the probability of new violent incidents can be reduced by means of an individualized preventive approach derived from effective management of risk factors (Arbach-Lucioni & Andrés-Pueyo, 2006).

Due to the role that mental health professionals play in the identification of *dangerousness*, it is vital to incorporate empirically based violence risk assessments and risk management strategies into daily clinical practice (Maden, 2007; Webster, Douglas, Eaves, & Hart, 1997). The prediction of future violence is clearly important not only to clinicians but also to society in general (Gray et al., 2003), and to patients in particular, since they are the main recipients of preventive measures.

In clinical practice, assessments of the risk of violence are usually based solely on *unaided clinical judgement*, a method that has not proved consistently accurate (Grove, Zald, Lebow, Snitz, & Nelson, 2000). Clinicians have traditionally used the case formulation approach to determine an individual's dangerousness. Until recently, however, research tended to focus on the accuracy of risk predictions based on the actuarial method. This procedure is based mainly on empirically established relationships between a limited number of variables and the criterion (Borum, 1996), and uses mechanical (formal, statistical) data-combination techniques (Grove et al., 2000). Among these divergent models an alternative method for violence risk assessment called *structured clinical judgement* has emerged, which allows clinicians not only gather, weight, and combine the information according to their own judgment but also provides them with a set of guidelines that usually contain the same set of empirically validated risk factors for each individual they assess.

In agreement with the structured professional model, clinicians can incorporate violence risk assessment schemes into their daily tasks: (a) to structure the assessments they are asked to supply, (b) to base the assessment on factors which have demonstrated an empirical link to violence, (c) to communicate clear and pertinent conclusions, and finally, (d) to guide decision-making process (Douglas, Ogloff, & Hart, 2003). Structured clinical instruments such as the ones described below promote systematic data collection based on sound scientific knowledge, yet allow flexibility in the assessment process (Hart, 1998).

The HCR-20 (Webster et al., 1997) is a rationally developed guide for violence risk assessment in mental patients and violent prisoners. It is designed to structure professional decisions on violence risk by considering 20 items empirically related to violence. HCR-20 has the advantage of including dynamic risk factors which are subject to change, either spontaneously or through interventions, and are therefore the most promising targets for risk reduction and the main focus in the formulation

of risk management plans (Belfrage, Fransson, & Strand, 2000; Douglas & Skeem, 2005; Douglas, Yeomans, & Boer, 2005).

Several studies have supported the relationship between HCR-20 risk factors and violence (Doyle, Dolan, & McGovern, 2002; Gray et al., 2003), with areas under the curve (AUCs) for total or subscale scores typically ranging from $\cong .65$ to $\cong .80$, which represent moderate to large effect size (Mossman, 1994). Encouraging results in longitudinal studies with psychiatric patients show values for HCR-20 total score between .76 and .80 in the prediction of physical violence, which indicates that long-term predictions could be highly accurate (Douglas, Ogloff, Nicholls, & Grant, 1999). Clinical and risk management subscales, composed by dynamic risk factors, seem to be more useful than historical items in identifying patients at high risk for exhibiting institutional aggression (McDermott et al., 2008). For example, several studies have found that the clinical subscale was a robust predictor of violence in samples with both mental disorders (Gray et al., 2003; McNiel, Gregory, Lam, Binder, & Sullivan, 2003; Tengström et al., 2006) and personality disorders (Belfrage et al., 2000). The final risk judgment of low, moderate, and high risk also shows a relationship with violent behavior, in some cases improving the numerical use of the HCR-20 (Douglas et al., 2003).

Most studies of the predictive validity of HCR-20 have been developed in northern countries in America or Europe, but research into the Spanish version (Webster, Douglas, Eaves, & Hart, 2005) is still scarce.

The Hare Psychopathy Checklist: Screening Version (PCL:SV; Hart, Cox, & Hare, 1995) is conceptually and empirically related to the PCL-R, psychometrically sound, and based on a similar symptom construct scale (Hart et al., 1995). Although not truly risk assessment measures *per se*, PCL:SV and its longer version, PCL-R (Hare, 1991) have consistently been shown to predict institutional violence among civil (e.g. McNiel et al., 2003; Nicholls, Ogloff, & Douglas, 2004) and forensic (e.g. Dernevik, Grann, & Johansson, 2002; Doyle et al., 2002; Gray et al., 2003; Tengström et al., 2006) psychiatric inpatients. A meta-analysis of the predictive utility of the PCL measures for institutional violence has shown a higher effect size in non-US samples (Guy, Edens, Anthony, & Douglas, 2005). It has been proposed that the predictive power of the PCL:SV is based mainly on the antisocial behavior factor, more than on the interpersonal and affective components of psychopathy (Douglas et al., 2005; Pham, Remy, Daillet, & Lienard, 1998; Skeem & Mulvey, 2001). Some direct comparisons between HCR-20 and PCL:SV suggest that for low levels of violence, which are more common in the hospital context, the HCR-20 without H7 (the psychopathy item) adds predictive accuracy to PCL:SV but not the other way round, in both civil psychiatric (e.g. Douglas et al., 1999; Nicholls et al., 2004; Skeem & Mulvey, 2001) and forensic samples (e.g. Belfrage et al., 2000; Douglas et al., 2005; Gray et al., 2003, 2004).

To summarize, HCR-20 and PCL-SV have consistently proved to be useful predictors of violent outcomes in forensic and civil psychiatric inpatients. Research in civil psychiatric hospitals where violent behavior represents a daily problem is still scarce in Spain, and the lack of studies is particularly evident in samples with chronically affected inpatients.

The main purpose of this study was to evaluate the accuracy of HCR-20 and PCL:SV for predicting violent behavior in a sample of chronic adult psychiatric inpatients. This is the first study of the HCR-20's predictive validity in a Spanish civil mental health hospital. We maximized the power of our analyses by (a) decreasing the error of undetected violence by conducting our research in a controlled field (a hospital) (b) maintaining a stable context between assessment and follow-up, (c) using blind observer ratings of the outcome variables to minimize false negatives, and finally (d) using a prospective design. Our study design was exploratory since no previous information on inpatients' aggression base rate was available. We established a 12-month follow-up period to guarantee the outcome occurrence. Since aggression is context-specific (Cohen & Felson, 1979), we examined multiple and consecutive time periods to control the influence of temporal factors such as seasonal or staff vacations on aggressive conduct. We chose physical violence as the focus of the predictive analyses since it was thought to have the greatest policymaking and clinical repercussions. On the basis of previous studies, we hypothesized that the proposed tools would be related to violent behavior throughout a 1-year follow-up period, especially the clinical items and the behavioral component of psychopathy. Furthermore, HCR-20 structured clinical judgments might be expected to possess incremental validity over the HCR-20 numerical scores.

Method

Risk assessment measures

Psychopathy checklist: Screening version (PCL:SV)

It is a 12-item instrument that is quicker and easier to administer than the Psychopathy Checklist-Revised (PCL-R; Hare, 1991). The scale consists of two parts: Part 1 measures selfish and callous personality and relates mainly to interpersonal and affective traits. Part 2 measures socially deviant behavior and past criminality. PCL:SV (Hart et al., 1995) items are scored as 0, item not present; 1, possible presence of item; 2, item definitely present. Scores range from 0 to 24, with a recommended cut-off at 18 in samples of US offenders. The psychometric properties of PCL measures were extensively explored in forensic Spanish population by Moltó, Poy, and Torrubia (2000) who found a reliability and factor structure comparable to those of US samples.

The historical, clinical and risk management 20-items scheme, version 2

This 20-item scale (Webster et al., 1997) is rated as 0, 1, 2 in a similar manner to the PCL:SV, higher scores indicating higher risk of violence. Furthermore, it requires users to produce final summary risk ratings of low, moderate, and high risk. These are considered as “structured clinical or professional judgments” – “structured” because they are based on a consideration of a standardized set of operationally defined risk factors (Douglas & Ogloff, 2003a). HCR-20 contains three subscales combining static, historical information (10 items), clinical evaluations (5 items), and situational factors (5 items). The Historical (H) variables represent relatively static background factors included in earlier actuarial tools: i.e. *psychopathy* measured by the PCL-R or PCL:SV is an item in its own right in this subscale (H7). The Clinical (C) variables reflect risk in the light of current presentation; state of symptoms, insight, and attitudes. The risk management (R) variables represent a systematized appraisal of future risk, including plan feasibility, social network support and contextual factors. In several studies, HCR-20 has shown interrater reliability and internal consistency indices around .80 or higher (e.g. Belfrage, 1998; Dernevik et al., 2002; Douglas, 2001; Douglas et al., 2003; Douglas & Webster, 1999).

Outcome measure

During follow-up, violent incidents were prospectively monitored with a Spanish adaptation of the Modified Overt Aggression Scale (MOAS; Kay, Wolkenfeld, & Murrill, 1988) by the nursing staff. The MOAS is a non-intrusive scale designed to document and measure specific aspects of aggressive behavior based on observable criteria. Aggressive behaviors are divided into four categories: verbal aggression, aggression against property, aggression against self, and physical aggression against others. MOAS was selected from among a variety of tools because it is easy to use (Nijman et al., 1999), and it is recommended for recording medium severity acts such as those occurring in hospital (Steinert, Wölffe, & Gebhardt, 2000). The method has shown evidence of validity and has yielded reliability coefficients ranging up to .94 (interrater concordance) and .91 (test-retest correlation) for aggressive psychiatric patients (Kay et al., 1988; Margari et al., 2005).

For the purpose of this study, only two subscales were considered: aggression against property (wanton and reckless destruction of ward paraphernalia or other possessions) and physical aggression against others (violent action intended to inflict pain, bodily harm, or death upon another), as these are of greatest concern in a psychiatric setting. Unless stated otherwise, violence was operationally defined as any incident of physical violence/aggression towards another person or property ranging from slamming doors angrily or smashing windows to making menacing gestures

or punching or kicking another person. With the aim of improving the comparability of the results with previous research, certain analyses will be repeated using an outcome variable limited to physical aggressions against others. This is also in keeping with the definition of violence in the HCR-20 manual, in which damage to property is defined as violence if it was intended to induce fear or had the potential to harm persons.

Participants

The setting comprised two 80-bed medium and long-term psychiatric units in a mental health hospital in the Barcelona metropolitan area. Patients admitted to this ward are adults with severe psychiatric disorders (e.g. schizophrenia or mania) who need a locked environment to protect them or others from harm. Admission duration on these wards may range between three months to several years. Subjects were selected from these two specific units (the units of chronic and subacute patients) to maximize the probability that they would remain in hospital at the end of the study. Files of 78 adult psychiatric inpatients identified by their psychiatrists as having a history of violent behavior either inside hospital or in community were coded. All patients who met the selection criteria (past violence and long stay units) were included in the sample. A high-risk group was chosen to ensure a reasonable violence base rate during follow-up. At the time of the study, the sample's mean duration of current hospitalization was 1472 days ($SD = 1443$).

Most participants studied were male (74.4%) and the mean age at the time of assessment was 42.8 years ($SD = 9.7$). Most were unemployed (97.4%), single (75.6%), with zero or low education level (73%). Primary diagnoses included paranoid schizophrenia (55%), other schizophrenia (14.1%), schizoaffective disorder (10.3%), affective disorder (3.8%), personality disorder (10.3%), organic disorder (3.8%), and other disorders (1.3%). Thirty-three (42.3%) had at least one comorbid disorder. Almost half (47.4%) were involuntary admissions, 42.3% were voluntary admissions, and the rest were admitted by court authorization (2.6%) or court order (7.7%). The clinical files of involuntarily admitted patients contain brief forensic reports. Past criminal behavior information was collected from these reports when available. Most patients had prior psychiatric hospitalizations (93.6%), and a mean of 7.1 previous admissions ($SD = 6.9$).

Procedure

The study was approved by the local hospital directive committee. Socio-demographic and clinical information was taken from case files. The admission summaries, psychiatric assessment reports, forensic reports

(if available), and nurse reports were used to score HCR-20 and PCL:SV. The information lacking in clinical files, especially those related to clinical and risk management factors, was gathered from structured interviews with the psychiatrists and psychologists who acted as collateral informants. The PCL measures and HCR-20 manual recommend the use of an interview for clinical purposes, although file-based coding and information registered from collateral informants is acceptable and permissible for research purposes (Douglas & Ogloff, 2003b). All cases were assessed for the study within the three months prior to the beginning of the follow-up.

One trained rater (K.A.) coded the files. She is a clinical psychologist who was trained for two days in using the HCR-20, Version 2 (Webster et al., 1997) by one of the authors of the instrument (S. Hart). In addition, the question of how to interpret the items within the Spanish framework was discussed in detail with one of the translators (A. Andrés-Pueyo).

Prior to the beginning of follow-up, nursing staff received a 2-h training session on how to complete MOAS. The trained nurses prospectively registered inpatients' aggressive behaviors during 12 months following the assessment. This information was collected immediately using the MOAS after the occurrence of the incident or during the shift change. Nursing staff were blind to the scores on the risk assessment tools to avoid bias in data collection.

Statistical analysis

Most of the bivariate and multivariate analyses considered physical violence against property and people as the outcome variable since this is one of the most serious expressions of aggression in wards. Violence was coded dichotomously as present or absent for most analyses. Relative risks and chi-square test were calculated to determine the size of association between violence risk assessment tools and subsequent violence. Point biserial correlations were used to compare associations on continuous variables and violence. Logistic regression analysis was used to examine key predictors in relation to the violent outcome measure. Regression analyses were also used to evaluate whether the HCR-20 structured final risk judgment added incrementally to the HCR-20 numerical score. A measure's incremental validity is its ability to provide significant information to prediction when an alternate variable has already been entered in the model. Finally, receiver operating characteristic (ROC) analyses were used to explore the predictive validity of the measures for dichotomous violent outcome (see Douglas et al., 2005; Hanley & McNeil, 1982; Mossman, 1994). The ROC-AUC parameter (range 0–1) can be used to compare accuracy between instruments. It is particularly useful as it provides data that are fairly independent of the base rate of violence in a given population (Mossman, 1994). Instruments or clinicians able to distinguish violent from non-violent

patients with nearly perfect accuracy would have ROC-AUCs approaching 1.0, and $AUC = .5$ represents no better than random prediction. In general, ROC-AUCs $> .75$ are considered large effect sizes (Dolan & Doyle, 2000). Instruments with missing data were prorated according to instructions in the manuals. The follow-up was divided into three consecutive time gates of four months, on the grounds that the prediction could be affected by the period to which it refers (Doyle et al., 2002). The analyses were conducted for each time gate separately. Data were analyzed using SPSS version 15.0s for Windows.

Results

At the end of the study, 11 patients had been released from the hospital or transferred to another unit. Forty-two patients (53.8%) were involved in at least one physically violent incident against other people during the year after assessment. In the same period, 28 (35.9%) were violent against objects, 38 (48.7%) showed severe verbal aggression (violent threats) and finally, 11 (14.1%) were self-aggressive. These two latter figures are only informative; they are not included as outcome variables since the instruments under investigation were never intended to predict this sort of outcome.

The PCL:SV total score ranged from 0 to 23, with a mean score of 8.7 ($SD = 6.2$). The interpersonal and social deviance mean scores were 4 ($SD = 3.2$) and 4.7 ($SD = 3.6$), respectively. The correlation figures between PCL:SV measures were significant (Table 1). The HCR-20 total score ranged from 11 to 37, with a mean score of 27.1 ($SD = 5.8$). The subscales' mean scores were 14.4 ($SD = 3$) for historical items, 7.2 ($SD = 2.1$) for the clinical items and finally, 5.6 ($SD = 2.3$) for risk management items. The correlation between the HCR-20 total score and the HCR-20 subscales remained highly significant (Table 1).

As the HCR-20 includes terms based on the PCL:SV score, item 7 (Psychopathy) was removed from the correlational analysis to avoid

Table 1. Intercorrelations between study risk assessment measures.

Measure	<i>H</i>	<i>C</i>	<i>R</i>	PCL:SV	Part 1	Part 2
HCR-20	.76**	.76**	.78**	.60**	.50**	.59**
<i>H</i>		.35**	.33**	.60**	.51**	.59**
<i>C</i>			.50**	.36**	.30*	.35**
<i>R</i>				.40**	.33**	.40**
PCL:SV					.90**	.92**
Part 1						.67**

Note: * $p < .05$; ** $p < .01$.

conflation. The total scores of both tools were found to correlate highly ($r = .60, p < .001$) (J. Cohen, 1988).

Focusing on the criterion variable to be considered in the predictive analyses we found that 47% of inpatients showed aggressive behavior against property or other people in months 1–4, 39% did so in months 5–8, and finally, 41% did so in the last time period. Compared with non-violent subjects, patients with aggressive behavior at some point in the follow-up showed higher mean total scores on the HCR-20 ($t = -4.4; df = 72; p < .001; M = 29.8 [SD = 4.8]$ vs. $M = 24.7 [SD = 5.2]$, respectively) and on the PCL:SV ($t = -2.4; df = 66; p < .05; M = 10.6 [SD = 6.6]$ vs. $M = 7.2 [SD = 5.3]$, respectively). Table 2 presents two indices of the strength of the relationship between institutional violence and the various measures for each time gate separately: the point biserial correlation (r_{bp}) is the correlation between a continuous and a dichotomous measure, and the partial point biserial correlation (*partial* r_{bp}) is achieved by partialling out the variance of other relevant measures (Douglas et al., 2005). HCR-20 total score produced correlations with violence ranging between .35 and .45; the indices were higher for clinical subscale in all time gates. The PCL:SV scores produced similarly significant relationships with violence only in the short-term (months 1–4), and were non-significant after this period. The correlation between the HCR-20 and violence in the first 4 months dropped from .45 to .32 as a result of controlling for the PCL:SV, but remained significant. Furthermore, none of the PCL:SV correlations was significant after controlling for the HCR-20. This suggests that there is a unique relationship between the HCR-20 and violence that is independent of the variance in the HCR-20 relative to the PCL:SV, but not *vice versa*. In the partial point biserial correlation with HCR-20 subscales and parts of

Table 2. Intercorrelations between risk assessment measures and violence outcome.

	Follow-up periods					
	Months 1–4		Months 5–8		Months 9–12	
	r_{bp}	Partial r_{bp}^a	r_{bp}	Partial r_{bp}^a	r_{bp}	Partial r_{bp}^a
HCR-20	.45***	.32*	.35**	.24*	.41**	.42**
<i>H</i>	.21	-.05	.13	-.16	.21	.07
<i>C</i>	.49***	.33*	.54***	.50***	.43***	.30*
<i>R</i>	.38**	.14	.24*	-.08	.38**	.19
PCL:SV	.36**	.09	.21	.03	.18	-.13
Part 1	.33**	.10	.17	.01	.11	-.13
Part 2	.32**	.10	.22	.18	.22	.08

Note: ^aControl variable for HCR-20 was PCL:SV, and vice versa. For each subscale the rest of subscales were controlled; * $p < .05$; ** $p < .01$; *** $p < .001$; $df = 65, 62, 59$ consecutively for total scores and $df = 62, 59, 56$ consecutively for subscales.

the PCL:SV the only measure that maintained a significant and robust correlation with violence after controlling for the other measures was the clinical subscale. The results of correlational analyses were very similar when the outcome criterion was restricted to violence against persons; the only difference was that the correlation with the clinical subscale was no longer significant in the last time gate.

Using ROC analysis to predict physical violence against objects and other people, the AUCs based on the PCL:SV measures were significant only in the first time gate, but not in the following periods. The AUCs of the HCR-20 total score (without item 7) ranged between .69 and .77, and were all significant. The HCR-20 final risk judgment and clinical subscale showed the highest predictive validity during the whole follow-up period, with AUCs ranging between .76 and .81 (Table 3). As in the correlational analyses, this figure was very similar when violence was restricted to interpersonal aggressions, with no substantial changes in AUC values.

We also present the relative risk (RR) as this allows comparison of the relative likelihood of an event occurring between two distinct groups, those exposed to the risk factor versus those not exposed to it. Psychopathy was defined by a score of 18 or greater (i.e. the recommended manual cut-off) on the PCL:SV. We found that 71.4% ($N = 5$) of the participants with a score > 18 were violent at least once and the relative risk for physical violence using this cut-off score dropped from 1.8 to 1.4 during the year of the follow-up. Using the PCL sample mean (> 9) as cut-off score, the relative risk for physical violence against people and objects dropped from 2 to 1.3 over the course of the year. In contrast, the risk of violence was higher and remained stable throughout follow-up for patients with HCR-20 total scores above the mean (see Table 3).

For descriptive purposes, we compared the HCR-20 structured final judgments and descriptive numerical categories. We found that the proportion of subjects who were violent at least once during follow-up differed significantly across structured final risk judgments of low, moderate, and high risk, ($\chi^2 = 19.8$; $df = 2$; $p < .001$). Among the 32 patients rated as low risk, 31.3% were violent; of the 23 judged to be moderate risk, 60.9% were violent and of the 19 rated as high risk, 94.7% were violent.

We carried out two series of forward stepwise logistic regression analyses (one for total scores, and one for subscales). The analyses used violent behavior for each period of follow-up as the dependent measure, and total scores and subscales of both tools as predictors. We removed the psychopathy item from the HCR-20 to provide a more independent comparison of this instrument with the PCL:SV. In the first series of analyses, for each time gate PCL:SV and HCR-20 total scores were included using forward conditional entry procedures. Only the HCR-20 contributed significantly to the prediction of physical violence during all periods

Table 3. ROC curve analyses and relative risks.

Measure ^a	Follow-up periods											
	Months 1-4				Months 5-8				Months 9-12			
	AUC	p	RR	IC 95%	AUC	p	RR	IC 95%	AUC	p	RR	IC 95%
HCR-20	.75	.000	2.5	1.3-4.5	.69	.012	2.1	1.05-4	.77	.000	2.5	1.2-5.1
H	.65	.038	1.4	0.9-2.3	.59	.024	1.7	0.9-3.1	.65	.048	1.8	1-3.3
C	.77	.000	2.6	1.4-4.7	.81	.000	4.2	1.8-9.9	.76	.001	2.7	1.3-5.4
R	.71	.003	1.9	1.1-4.1	.61	.135	1.7	0.9-3.1	.73	.003	2.2	1.2-4.2
SCJ ^b	.78	.000	-	-	.78	.000	-	-	.77	.000	-	-
PCL:SV	.70	.005	2	1.2-3.5	.63	.094	1.5	0.8-2.9	.61	.155	1.3	0.7-2.4
Part 1	.69	.008	1.8	1.1-3.2	.61	.162	1.3	0.7-2.5	.57	.355	1.02	0.5-2
Part 2	.69	.009	1.9	1.1-3.2	.62	.110	1.6	0.9-3.1	.62	.121	1.4	0.7-2.6

Note: ^aVariables are dichotomized by sample mean in relative risks analyses; ^bStructured clinical judgement is the non numerical measure obtained from HCR-20.

($\beta = .21, p < .001$ for months 1–4; $\beta = .14, p < .05$ for months 5–8; $\beta = .22, p < .01$ for months 9–12). When HCR-20 subscales and PCL:SV parts were entered in a new set of analyses, only clinical items remained in the model for each time period ($\beta = .65, p < .0001$ for months 1–4; $\beta = .85, p < .0001$ for months 5–8; $\beta = .60, p < .01$ for months 9–12). The same analyses were repeated using the restricted outcome variable (violence against persons). The results were the same for both sets of analyses, the only exception being that in the last time gate the risk management factors remained in the model but the clinical factors did not ($\beta = .39, p < .01$; $AUC = .70, p < .01$).

We therefore used logistic regression to see whether structured final clinical judgements could add incremental validity to the model in addition to HCR numerical scores. First, HCR-20 total scores were directly entered as block 1. In block 2, the HCR-20 structured final risk judgments were entered by using the forward conditional method. This entry procedure was used so that HCR-20 structured final risk judgments would be included only if they significantly improved the overall model. The results revealed that only the structured final risk judgments were significant in the final model, but this was true for time gates 1 and 2, that is, for the first eight months of the follow-up; after this period only the HCR-20 numerical scores remained in the model. As such, these analyses show that for shorter periods structured final clinical judgements added incremental validity to the HCR-20 numerical scores used actuarially to predict physical violence in hospital, but that after this period the numerical scores are robust single predictors of inpatient violence. Once again, the results were very similar when outcome was restricted to physical violence against persons.

Discussion

In spite of the fact that the violence base rate in chronic and subacute inpatients represents a frequent problem in psychiatric facilities, these groups have frequently been overlooked in violence risk assessment studies (Nicholls et al., 2004).

This study assesses and compares the predictive validity of two contemporary violence risk assessment measures in a sample of chronic psychiatric patients in long-term stay units. The novelty lies in the fact that it is the first prospective research study to evaluate HCR-20 and PCL:SV jointly in a Spanish setting, thus undertaking the important task of testing commonly used measures across countries. The primary strength of the study is methodological, since it seeks to overcome the limitations of previous studies by the use of a true longitudinal design with a standardized outcome measure in a high-risk population. Violence was operationally defined in accordance with the behaviors described in two MOAS subscales. Another advantage is the consideration not only of the total scores, but also

of the subscale scores and the structured final risk judgment derived from the HCR-20. Furthermore, we used interviews with collateral informants when direct interview with patients was not possible, because this allowed us to score future oriented items (risk management items).

Instruments were scored from case files and interviews with psychiatrists. This methodology has been validated in earlier research (Douglas et al., 1999; Webster et al., 1997). Previous studies successfully used case file information alone to score PCL:SV and HCR-20 in institutions with detailed records (e.g. Belfrage, 1998; Douglas et al., 1999; Doyle et al., 2002; Grann, Långström, Tengström, & Gunilla Stålenheim, 1998; Harris, Rice, & Quinsey, 1993).

The sample showed a relatively high base rate of inpatient aggressive behavior, with slightly over half of the patients engaging in at least one incident of physical aggression towards other people or objects during the one-year follow-up. Comparison with previous research is difficult because base rates of inpatient violence vary between studies due to differences in samples, settings, length of follow-up periods, and definitions of violence (De Vogel & de Ruiter, 2004). For example, in some studies in civil hospitals the physical violence rate ranges between 9% to 25% (Arango, Calcedo Barba, Gonzalez Salvador, & Calcedo Ordoñez, 1999; Binder & McNiel, 1988; McNiel, Binder, & Greenfield, 1988; Noble & Rodger, 1989; Palmstierna & Wistedt, 1989) and it has been reported to be as high as 40–47% in forensic samples (Belfrage et al., 2000; McMillan, Hastings, & Coldwell, 2004; Nicholls, Brink, Desmarais, Webster, & Martin, 2006).

Our figure is similar to that reported by Doyle et al. (2002) within the first 12 weeks of admission of a sample of mentally disordered patients in a medium-security unit, where 52% were involved in at least one violent incident such as threats, property damage or physical assault according to nursing notes. Another study with forensic mental disordered inpatients found that 32.4% showed aggression against property and physical assaults registered prospectively from files during 3 months (Gray et al., 2003). In the study by Nicholls et al. (2004) with chronic involuntary civil psychiatric patients, the base rate of physical violence (bodily acts of aggression against others) during hospitalization was around 44–48%, and approximately 70% of subjects committed some form of inpatient violence (physical violence and threatening behavior). The study by Arango, Calcedo-Barba, Gonzalez and Calcedo-Ordoñez's (1999) in a Spanish civil hospital restricted violence to acts of physical aggression towards others, and found such behaviors during the admission period (around 1 month) in 25.4% of inpatients. The criterion for inclusion in our study (pre-admission violence or violent behavior while in hospital), the immediate coding of aggressive incidents, an outcome variable including behaviors of diverse severity and a relatively long follow-up (1 year) may all have contributed to increasing the violence base rate.

Only a small proportion of the assessed patients (9%) obtained PCL:SV scores above 18 which suggested the presence of psychopathy to be confirmed by the PLC-R. This figure is similar to those recorded in previous research, which range between 3 and 8% in forensic (Gray et al., 2004) and civil (Nicholls et al., 2004; Skeem & Mulvey, 2001) samples.

The HCR-20 mean total score was relatively higher than in previous studies with civil psychiatric samples (Douglas et al., 1999; McNiel et al., 2003; Nicholls et al., 2004). There are at least two possible explanations for this result: a conservative approach to item coding, and some particular characteristics of the sample. For example, although civil psychiatric inpatients would be expected to present lower scores on H items, the inclusion of patients with criminal records or with civil commitment increases HCR-20 scores (Belfrage, 1998). Actually, our HCR-20 and H mean scores were similar to those reported in many forensic settings (Belfrage, 1998; Belfrage & Douglas, 2002; Belfrage et al., 2000; Claix & Pham, 2004; Douglas et al., 2003; Tengström et al., 2006).

Nevertheless, the mean score of seven on clinical items was similar to that reported for a similar sample of civil chronic inpatients (Nicholls et al., 2004). This figure is to be expected because patients admitted for long term periods remain in psychiatric facilities if they are in an active phase of the mental disorder, so it is natural that they score relatively high on clinical items. The chronic course of the illness may also contribute to keeping the clinical subscale scores high.

As in previous studies, PCL:SV and HCR-20 total scores show a high correlation (Belfrage, 1998; Douglas & Webster, 1999; Gray et al., 2003). This cannot be attributed to the inclusion of the psychopathy rating item in the HCR-20, because it was controlled in the correlational and regression analyses. It may be because they both rate similar variables such as impulsivity, past or current antisocial behavior or procriminal attitudes. There is strong evidence that both measures show a significant amount of shared variance (Douglas et al., 2005; Gray et al., 2003).

Scores above the mean on both tools increased the violence risk. The mean scores on the risk assessment tools were significantly higher in patients who were violent at any time during follow-up. The HCR-20 total score showed the greatest difference between groups, and also correlated more significantly with violent behavior than the PCL:SV. Clinical factors, which broadly reflect characteristics related to current psychological functioning, showed the highest predictive accuracy for physical violence during the whole follow-up.

Partial point-biserial correlations showed that while all measures decreased in predictive strength through the consecutive time gates of follow-up, PCL:SV measures and historical items did so more than others. HCR-20 total score and clinical factors maintained a significant partial correlation with violent behavior during follow-up. The remaining indices,

including PCL:SV scores, were no longer significantly related to violence as a result of controlling the other variables. When outcome criterion was restricted to violence against persons, the only difference was that the clinical subscale did not correlate with violence in the long term. This could be due, first, to the restricted criterion and second to the dynamic nature of the items. Nonetheless, since the number of cases included in the analyses gradually falls in each period of follow-up it would be advisable to exercise caution in the generalization of these results.

Both tools correlated significantly with the presence or absence of institutional violence during the first 4 months of the follow-up, but only HCR-20 showed a significant association after this period. The significant contribution of the HCR-20 score to the prediction of institutional violence was demonstrated in the logistic regression analyses, where it was the only measure to significantly predict inpatient aggression during the whole year. This suggests that temporal variables such as seasonal changes or staff vacations do not influence the predictive power of the measure. The ROC analyses indicate that this instrument provides significantly better than chance predictions of violence in inpatient settings, and the AUC of .77 (95% CI .67–.88) for physical violence are considered to be large effect sizes. Not surprisingly, we found that the C subscale of the HCR-20 is a robust predictor of physical violence in hospital, corroborating previous research that suggests that dynamic risk factors are the most useful in identifying patients at higher risk for exhibiting institutional behavior (McDermott et al., 2008; McNiel et al., 2003). The superiority of the risk management subscale as a predictor of the restricted outcome in the last time gate may have been due to the fact that these factors focus on predicting how individuals will adjust to future circumstances. As these factors were assessed at one time only; further research would benefit from examining them in a dynamic way by repeated assessments.

In regression analyses, the PCL:SV total and factor scores significantly predicted violence during the first time period but not in the following periods. We hypothesized that this finding could be due to diverse factors: on the one hand, it is known that the longer the span prediction, the more likely it is to fail. This is because the probability of changes in environmental and opportunity variables is increased as time goes by (Cohen & Felson, 1979). Then, although stable individual variables such as psychopathic traits could be good predictors, for long-term assessments situational variables should be considered. Furthermore, it is important to note that partial correlations analyses showed that the PCL:SV's predictive utility was due entirely to its shared variance with the HCR-20. On the other hand, the relatively poor performance of the PCL:SV may be due to the low psychopathy prevalence in our sample of people with chronic major mental disorders and the lack of a direct interview with patients. The majority of our sample (71%) had scores in the low range of the PCL:SV, and only 9%

had scores in the high range. As Gray et al. (2004) pointed out, any scale in which the scores are concentrated at one end of the range suffers from the effect of reduced variance and therefore reduced statistical sensitivity. The core personality features of psychopathy captured by Part 1 of the PCL:SV were essentially unrelated to violence. This finding is consistent with previous research showing that the behavioral features of psychopathy tend to be most strongly related to violence (Douglas et al., 2005; McDermott et al., 2008; Skeem & Mulvey, 2001).

The structured final risk judgment offered by the HCR-20 was strongly related to violence. The observed proportion of violence in aggressive inpatients varied from 31% in the low risk group to 95% in the high risk group. As noted previously by Douglas, Ogloff, and Hart (2003), these percentages are not intended to represent the true possibility of violence for low or high risk patients, but rather to test whether the structured professional decisions related to violence risk, in general, tend to relate to the outcome and hence have some significance. The structured final judgments demonstrated incremental predictive power over the HCR-20 numerical scores in periods 1 and 2 of follow-up, but the effect was not significant in period 3. These results suggest that structured clinical judgment provides more significant information than numerical scores for predicting inpatients' physical violence in the relatively short term, but for longer forecasts numerical scores seem to be better risk level indicators.

Conclusions

Despite the fact that issues of risk and dangerousness are among the most important in forensic and psychiatric institutions, few attempts have been made to adopt risk assessment instruments in Spanish routine clinical practice. This study examines the HCR-20 Spanish translation in a sample of high-risk psychiatric inpatients. This is an important research topic, given that the cross-cultural evaluations of violence risk assessment tools are scarce; specifically, few studies of the HCR-20 and PCL:SV have been performed outside the US and northern Europe. This study demonstrates that the Spanish adaptation of the HCR-20 is a useful measure for predicting the likelihood of inpatient violence in a civil psychiatric environment not only in the short term, but also in the medium term (one year). At hospital admission, clinical rather than sociodemographic variables were more predictive of violence. This finding has practical importance because clinical symptoms and situational variables are amenable to therapeutic approaches because of their dynamic nature. In line with Bonta and Wormith (2008) our study suggests that, in view of the availability of valid and reliable tools for violence risk assessment, there is little justification for professionals in our context to continue to use

unstructured professional judgment to make decisions related with risk. Incorporating tools such as HCR-20 into clinical assessments is likely to enhance the assessment process by structuring professional judgements, providing a more accurate and transparent record of the risk factors, informing risk management and treatment strategies, and finally, by justifying and rationalizing clinical decisions.

However, our study has several limitations. First, we did not include interviews with patients, which may have led to an underestimation of scores for the measures; however, the interview with a collateral informant was included to make up for this limitation. Second, a single rater completed the measures. The lack of interater reliability analyses means that there is no control of systematic bias due to the characteristics of the rater (a conservative coding style, for example). This study only considered the predictive validity of the tools; no consideration was given to the differential properties of the test across cultures. Empirical investigation of the cross-cultural generalizability of HCR-20 and PCL:SV Spanish versions is sorely needed. Subsequent research would also benefit in terms of generalizability by including, where possible, interview-based sources of information to complete the measures. It would also be important to examine clinical and risk management items in a dynamic way by means of successive assessments, since they are dynamic “context-dependent” risk factors and have demonstrated a robust relation with future inpatient violence. Finally, further prospective studies in Hispanic samples are required to assess the predictive validity of these tools for community violent recidivism. Work in this direction is currently under way.

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