



Lecture 2: Risk assessment and risk management in in-patient settings: Pitfalls in clinical practice and research

Prof. Dr. Tilman Steinert

Some remarks on research in a training school for future researchers

What is your objective with research?

- **research career**

- highly important to achieve publications in high-ranking publications
 - chose your supervisor well (ambitious, connected, safe position)
 - chose your subject well (not over-researched, promising idea, sufficient Ns feasible)

- **Obtaining a PhD and subsequently a good clinical or institutional position**

- important to reach your thesis with appropriate effort
 - chose your supervisor well (not too ambitious, probably available within next years)(how important is my work for my supervisor's career?)
 - chose your subject well (to get published in any journal, overseeable workload)

Avoid...

- unclear objectives (begin data recording, find objective later in the data)
- studies with too small or too heterogeneous samples (difficult to publish)
- overresearched objectives (e.g. aggressive behaviour on psychiatric wards)
- weaknesses in study design and methods that cannot be fixed later (e.g. sample selection procedures, managing dropouts)
- starting with an idea without reviewing existing literature
- designing research along your working conditions instead of research gaps

Very rewarding to make many thoughts and discussions on study designs in advance!

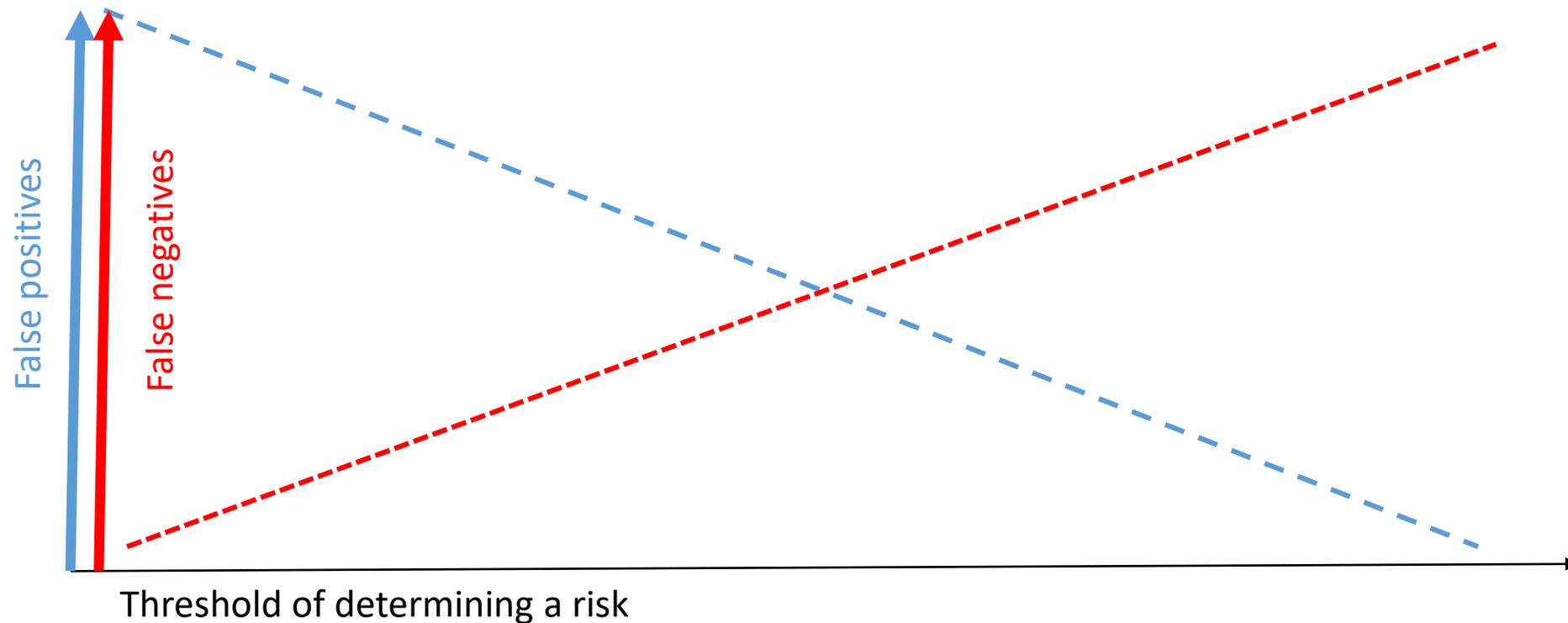
How do you determine risk?

- Risk of violence?
- Risk of coercion?
- For which setting is your instrument valid?
 - Community?
 - Hospital?
 - Specialised ward?
- Self-constructed (or innovative) risk assessment instrument or
- validated scale

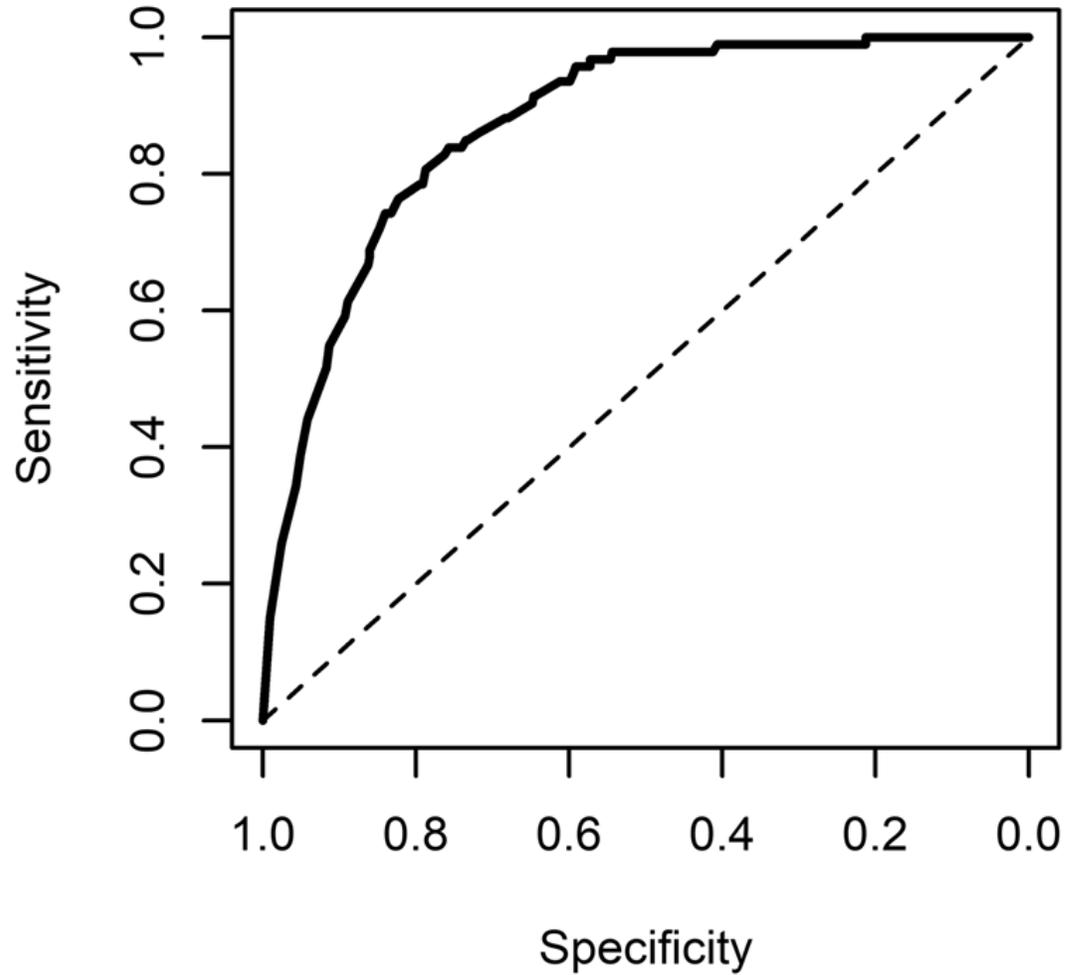
Risk assessment - why?

- Forensic psychiatry: one of core duties: Assessing of future risk in the community in the case of discharge
- Clinical Psychiatry: Assessing **and management** of violence risk in clinical settings

No prediction can be perfect: False negatives and false positives



Typical AUC Graph



FORENSIC RISK ASSESSMENT

A Metareview

JAY P. SINGH
SEENA FAZEL
University of Oxford

- **2010: 40 reviews and meta-analyses comprising 2.232 studies**
- **126 risk assessment tools**
- **No one consistently better than any other**

A large number of systematic reviews and meta-analyses have been conducted in the field of forensic risk assessment, and their conclusions have occasionally been conflicting. To examine the quality and findings of these reviews, a metareview was conducted. The authors identified nine systematic reviews and 31 meta-analyses from 1995 to 2009. The themes covered in these reviews and meta-analyses included the validity of actuarial tools compared with unstructured and structured clinical judgment, a comparison of various risk assessment tools, and the predictive validity of these tools for different genders and ethnic backgrounds. This metareview found that the quality and consistency of findings in these areas varied considerably. Sources of heterogeneity were not assessed in half of the reviews, and duplicate samples were not excluded in approximately half of the reviews. The authors suggest a standardization of review reporting with particular emphasis on methodological consistency.

Keywords: risk assessment; forensic; metareview; actuarial; psychiatric

Structured Assessment of Violence Risk in Schizophrenia and Other Psychiatric Disorders: A Systematic Review of the Validity, Reliability, and Item Content of 10 Available Instruments

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Objectives: To undertake a systematic review on structured violence risk assessment tools in individuals with schizophrenia. **Methods:** A systematic search was conducted from 1990 to 2011 to identify violence risk assessment tools and studies examining their predictive validity. **Item con-**

Introduction

Current treatment guidelines published by the American Psychiatric Association¹ and the UK's National Institute for Health and Clinical Excellence² recommend that vi-

Table 4. Overview of the Item Content of 10 Violence Risk Assessment Tools Developed for Psychiatric Populations and the Reporting Characteristics of Their Outpatient Prediction Literatures

Scale	Grading Criteria	Risk Assessment Tool									
		COVR	HCR-20	HKT-30	SAPROF	SORM	START	UK700	VRAG	V-RISK-10	VRS
Item content	Static factors included	●	●	●	●	—	—	●	●	●	●
	Dynamic factors included	●	●	●	●	●	●	—	—	●	●
	Risk factors included	●	●	●	—	●	●	●	●	●	●
	Protective factors included	—	—	—	●	●	●	●	●	—	—
Validity ^a	Predictive validity tested prospectively	●	●	●	—	●	—	—	●	●	●
	Predictive validity tested in civil psychiatric patients	●	●	●	—	—	—	●	●	●	—
	Predictive validity tested in forensic psychiatric patients	—	●	●	●	●	●	—	●	—	●
	Convergent validity tested	—	●	●	●	—	●	—	●	—	●
	Divergent validity tested	—	●	—	●	—	●	—	—	—	●
Reliability ^a	Interrater reliability tested	— ^b	●	●	●	●	●	—	●	●	●
	Internal consistency tested	— ^c	●	—	—	—	—	—	—	—	—

Conclusion: More accurate instruments needed

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A systematic review of risk assessment strategies for populations at high risk of engaging in violent behaviour: update 2002–8

R Whittington, JC Hockenhull, J McGuire, M Leitner, W Barr, MG Cherry, R Flentje, B Quinn, Y Dundar and R Dickson

Whittington et al. 2013

- Searched 19 bibliographical databases 2002-2008
- found 959 studies
- over 300.00 people assessed
- ca. 150 new studies per year
- several hundred tools, 11 used in > 25 studies

TABLE 12 Risk assessment tools studied

Risk assessments used	<i>n</i> (%)
PCL-R	192 (20)
STATIC-99	54 (5.6)
HCR-20	51 (5.3)
VRAG	45 (4.7)
SVR-20	12 (1.3)
OASys	0 (0)
Other	854 (89.1)

TABLE 19 Number of analyses reporting a statistically significant outcome by setting

Settings	<i>N</i>	Significant outcome, <i>n</i> (%)	No significant outcome, <i>n</i> (%)	χ^2	<i>p</i> -value ^a
Mental health (including forensic)					
Yes	113	106 (93.8)	7 (6.2)	0.591	0.442
No	710	651 (91.7)	59 (8.3)		
Penal institution (excluding forensic)					
Yes	206	189 (91.7)	17 (8.3)	0.020	0.887
No	617	568 (92.1)	49 (7.9)		
Community					
Yes	290	262 (90.3)	28 (9.7)	1.624	0.202
No	533	495 (92.9)	38 (7.1)		
Other					
Yes	183	171 (93.4)	12 (6.6)	0.682	0.409
No	640	586 (91.6)	54 (8.4)		

a Using SPSS.

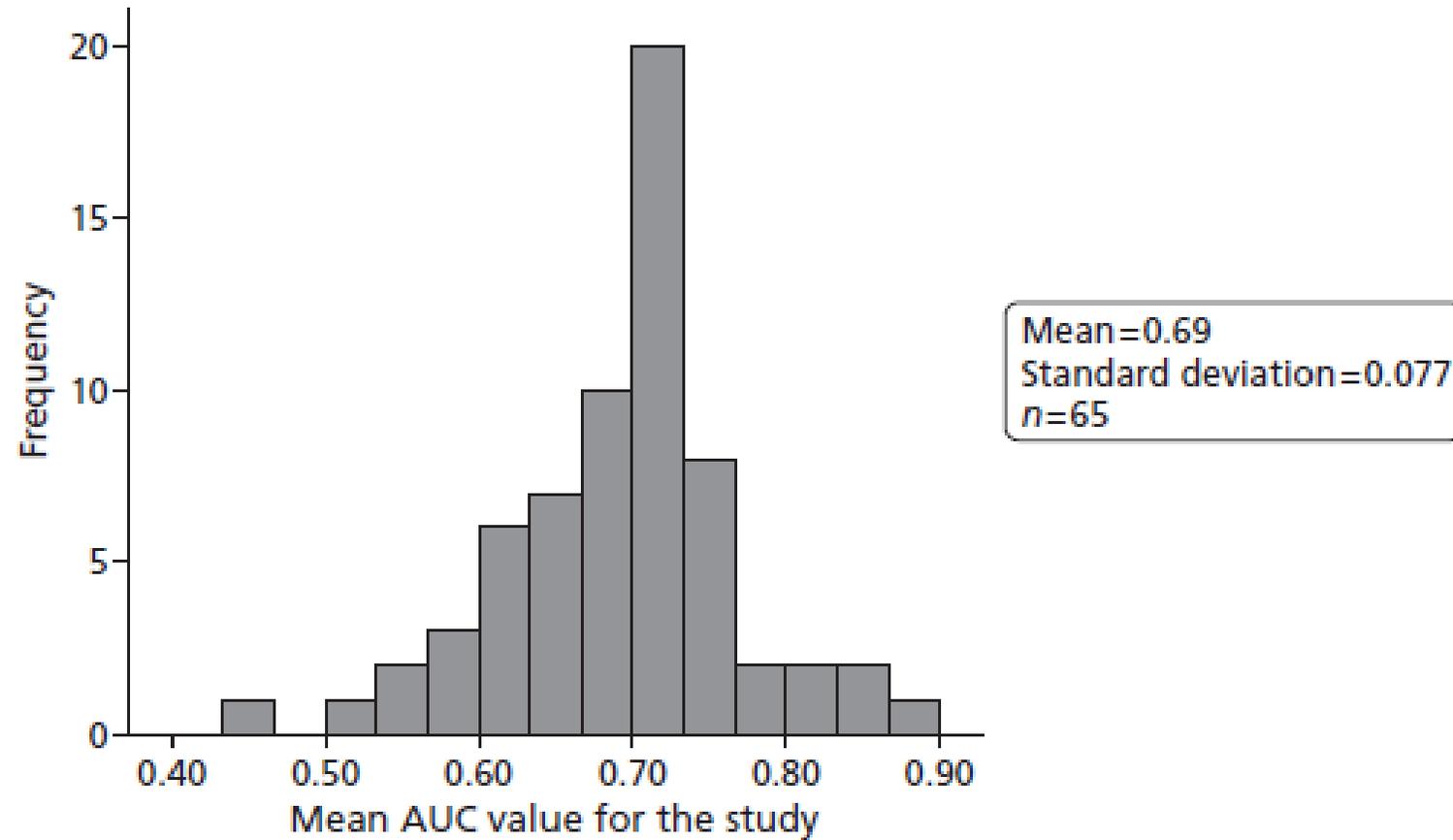


FIGURE 7 Distribution of AUCs across all 65 studies.

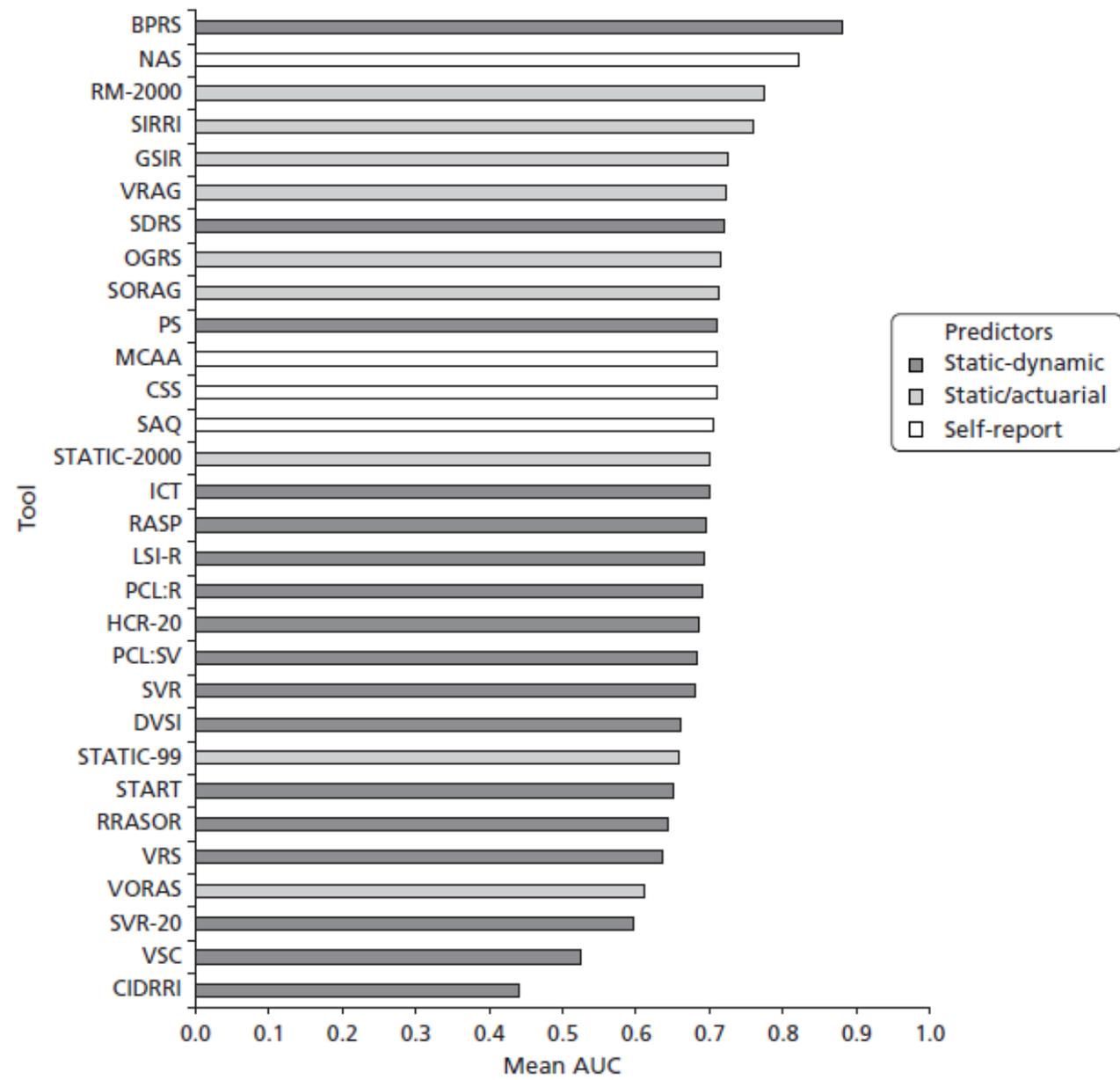


FIGURE 9 Mean AUC values for 30 risk assessment instruments.

RESEARCH ARTICLE

Identifying Causal Risk Factors for Violence among Discharged Patients

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N = 409, discharge from medium security wards into the community, follow-up serious violence 6mths/12 mths (14.5 % / 12 %)

Table 1. Predictive accuracy of HCR-20^{v3} historical items (measured at baseline).

	AUC ¹⁾	95% CI	P	AOR ²⁾	95% CI	P	AOR ³⁾	95% CI	P
Violence	0.49	0.44–0.54	0.736	0.97	0.50–1.87	0.920	0.83	0.43–1.58	0.570
Other antisocial behaviour	0.57	0.52–0.63	0.011	1.55	1.08–2.21	0.017	1.42	0.99–2.04	0.055
Relationships	0.51	0.46–0.57	0.688	1.15	0.74–1.78	0.545	1.22	0.78–1.91	0.376
Employment	0.55	0.49–0.60	0.096	1.43	0.93–2.20	0.103	1.34	0.87–2.06	0.190
Substance use	0.53	0.48–0.58	0.201	1.35	0.90–2.01	0.148	1.19	0.78–1.82	0.430
Major mental disorder	0.49	0.45–0.52	0.484	0.88	0.38–2.04	0.769	1.12	0.47–2.69	0.800
Personality disorder	0.54	0.48–0.60	0.188	1.27	0.90–1.80	0.181	1.24	0.85–1.79	0.262
Traumatic experiences	0.59	0.53–0.65	0.002	1.76	1.19–2.60	0.004	1.58	1.08–2.32	0.020
Violent attitudes	0.59	0.53–0.64	0.003	1.58	1.12–2.24	0.009	1.39	0.99–1.96	0.060
Treatment or supervision response	0.56	0.50–0.62	0.036	1.56	1.05–2.32	0.027	1.38	0.93–2.04	0.105
Total score	0.60	0.54–0.66	0.001	1.15	1.05–1.25	0.002	1.12	1.02–1.22	0.014

Table 2. Predictive accuracy of lagged vs. temporal proximity models—AUC values.

	Lagged/ predictive			Temporal proximity/ causal		
	AUC	95% CI	P	AUC	95% CI	P
HCR-20^{v3}—clinical						
Lack of insight	0.61	0.55–0.66	<0.001	0.70	0.64–0.76	<0.001
Violent ideation or intent	0.64	0.58–0.69	<0.001	0.79	0.73–0.84	<0.001
Symptoms of major mental disorder	0.52	0.46–0.58	0.475	0.68	0.62–0.74	<0.001
Instability	0.64	0.58–0.70	<0.001	0.79	0.74–0.85	<0.001
Treatment or supervision response	0.66	0.60–0.71	<0.001	0.70	0.64–0.76	<0.001
Total score	0.67	0.61–0.73	<0.001	0.82	0.77–0.87	<0.001
HCR-20^{v3} –risk management						
Professional services and plans	0.53	0.49–0.57	0.136	0.54	0.49–0.59	0.098
Living situation	0.57	0.51–0.62	0.014	0.59	0.53–0.65	0.003
Personal support	0.58	0.53–0.64	0.002	0.61	0.56–0.67	<0.001
Treatment or supervision response	0.67	0.62–0.72	<0.001	0.69	0.64–0.75	<0.001
Stress or coping	0.60	0.55–0.65	<0.001	0.75	0.71–0.80	<0.001
Total score	0.67	0.61–0.72	<0.001	0.75	0.70–0.81	<0.001
SAPROF						
Intelligence	0.45	0.39–0.51	0.078	0.46	0.41–0.52	0.206
Secure attachment in childhood	0.45	0.40–0.51	0.124	0.44	0.38–0.50	0.065
Empathy	0.37	0.31–0.43	<0.001	0.31	0.25–0.37	<0.001
Coping	0.34	0.29–0.39	<0.001	0.27	0.21–0.32	<0.001
Self-control	0.33	0.27–0.38	<0.001	0.21	0.17–0.26	<0.001
Work	0.40	0.36–0.45	<0.001	0.42	0.37–0.47	0.001
Leisure activities	0.38	0.32–0.43	<0.001	0.31	0.25–0.36	<0.001
Financial management	0.35	0.30–0.40	<0.001	0.39	0.34–0.45	<0.001
Motivation for treatment	0.38	0.33–0.43	<0.001	0.34	0.28–0.40	<0.001
Attitudes towards authority	0.34	0.29–0.40	<0.001	0.28	0.23–0.34	<0.001
Life goals	0.41	0.35–0.46	0.001	0.36	0.30–0.42	<0.001
Medication	0.43	0.38–0.48	0.007	0.37	0.31–0.43	<0.001
Social network	0.40	0.34–0.46	0.001	0.39	0.33–0.45	<0.001
Intimate relationship	0.50	0.45–0.54	0.882	0.51	0.47–0.56	0.612
Professional care	0.50	0.48–0.52	0.761	0.49	0.45–0.52	0.465
Living circumstances	0.43	0.38–0.49	0.014	0.50	0.45–0.56	0.902
External control	0.40	0.35–0.45	<0.001	0.49	0.44–0.55	0.834
Total score	0.26	0.21–0.31	<0.001	0.24	0.19–0.29	<0.001

- Assessment without impact on outcome (independence!)
- Predictive results rather poor

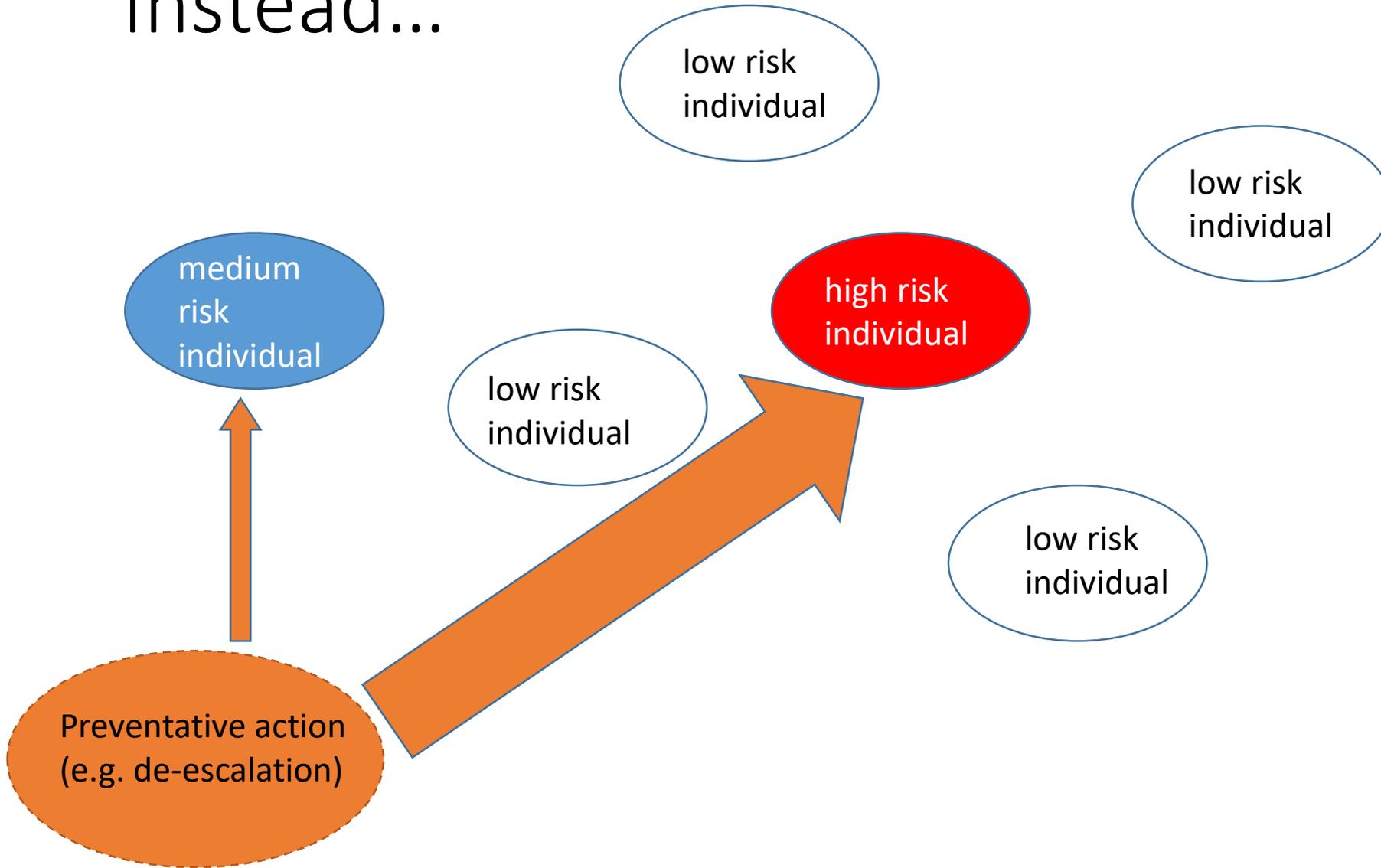
Risk assessment in clinical settings

To obtain similar conditions as in community studies,

- Risk assessment should be done by researchers independent from treatment
- Clinicians should be blind to the results of risk assessment
- Clinicians should be incapable to do their own inherent risk assessment and to act accordingly

 never happens in the real world!

Instead...



The resulting dilemma of risk assessment in clinical settings

- risk not realized  good clinical management  prediction failed
- risk realized  good prediction  clinical management failed

Good research idea to improve risk assessment in clinical settings?



Original Investigation | Psychiatry

Machine Learning Approach to Inpatient Violence Risk Assessment Using Routinely Collected Clinical Notes in Electronic Health Records

Vincent Menger, MSc; Marco Spruit, PhD; Roel van Est, MSc; Eline Nap, MSc; Floor Scheepers, MD, PhD

Abstract

IMPORTANCE Inpatient violence remains a significant problem despite existing risk assessment methods. The lack of robustness and the high degree of effort needed to use current methods might be mitigated by using routinely registered clinical notes.

OBJECTIVE To develop and validate a multivariable prediction model for assessing inpatient violence risk based on machine learning techniques applied to clinical notes written in patients' electronic health records.

DESIGN, SETTING, AND PARTICIPANTS This prognostic study used retrospective clinical notes registered in electronic health records during admission at 2 independent psychiatric health care

Key Points

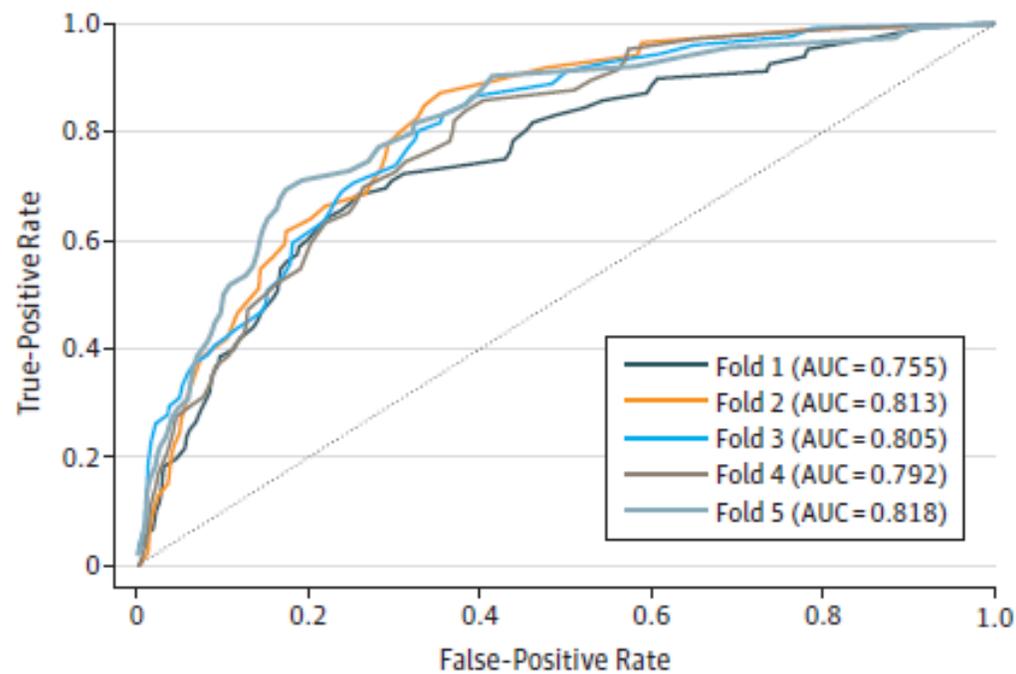
Question To what extent can inpatient violence risk assessment be performed by applying machine learning techniques to clinical notes in patients' electronic health records?

Findings In this prognostic study, machine learning was used to analyze clinical notes recorded in electronic health records of 2 independent psychiatric health care institutions in the

- automated analyses of clinical notes in two hospitals in > 3.000 admissions
- prediction of violence (OAS) in the next four weeks
- AUC .79 and .76, respectively
- using the model for the other site: AUC .72 and .64, respectively

Figure. Receiver Operator Characteristic Curves for Internal Cross-validations

A Receiver operator characteristic curves for site 1



B Receiver operator characteristic curves for site 2

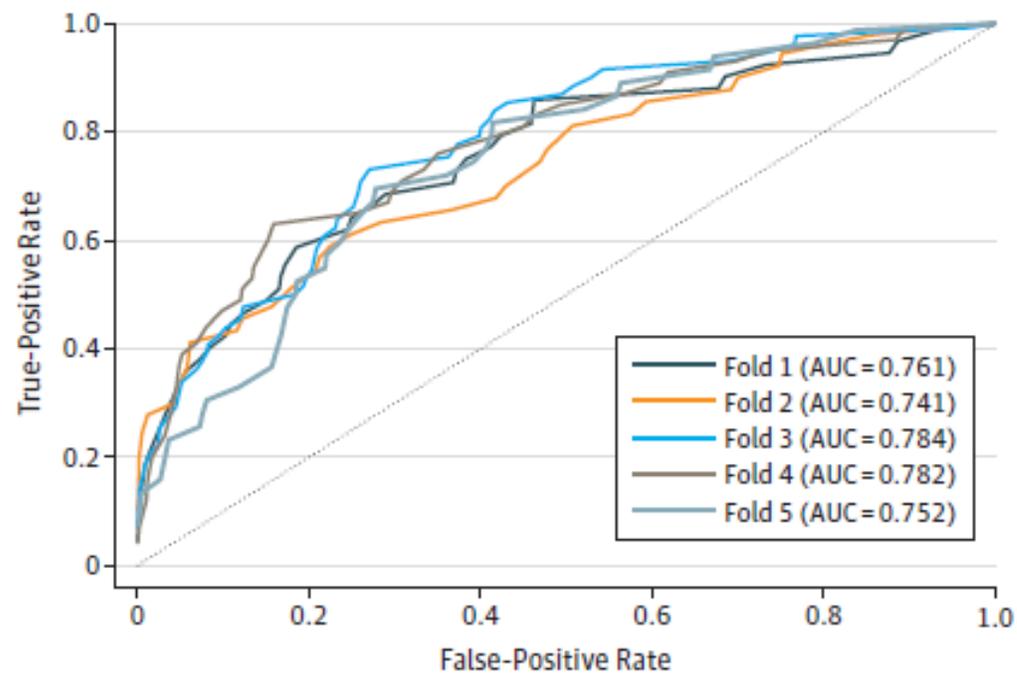


Table 3. Results of Exploratory Analysis

Rank ^a	Site 1				Site 2			
	Term (English Translation) ^b	Ratio	MCC (95% CI) ^c	P Value ^d	Term (English Translation) ^b	Ratio	MCC (95% CI) ^c	P Value ^d
1	Agressief (aggressive)	1.00	0.17 (0.13 to 0.21)	<.001	Verbaal (verbal)	1.00	0.14 (0.10 to 0.18)	<.001
2	Reageert (reacts)	1.00	0.15 (0.11 to 0.19)	<.001	Dreigend (threatening)	1.00	0.13 (0.08 to 0.16)	<.001
3	Aangeboden (offered)	1.00	0.14 (0.11 to 0.18)	<.001	Agressie (aggression)	1.00	0.15 (0.11 to 0.17)	<.001
4	Boos (angry)	1.00	0.16 (0.12 to 0.19)	<.001	Hierop (up) on this	1.00	0.13 (0.09 to 0.16)	<.001
5	Deur (door)	1.00	0.14 (0.10 to 0.18)	<.001	Kantoor (office)	1.00	0.12 (0.08 to 0.16)	<.001
6	Loopt (walks)	1.00	0.15 (0.11 to 0.18)	<.001	Personeel (staff)	1.00	0.12 (0.07 to 0.16)	<.001
7	lbs (arrest)	1.00	0.14 (0.10 to 0.17)	<.001	Aangesproken (spoke to)	1.00	0.11 (0.08 to 0.15)	<.001
8	Aanbieden (offer)	1.00	0.12 (0.08 to 0.15)	<.001	Agressief (aggressive)	0.99	0.11 (0.08 to 0.15)	<.001
9	Noodmedicatie (emergency medication)	0.99	0.14 (0.10 to 0.17)	<.001	Gevaar agressie (danger aggression)	0.99	0.11 (0.07 to 0.15)	<.001
10	Liep (walked)	0.99	0.12 (0.08 to 0.16)	<.001	Agitatie (agitation)	0.99	0.11 (0.07 to 0.14)	<.001
11	Agressie (aggression)	0.99	0.13 (0.09 to 0.18)	<.001	Geirriteerd (irritated)	0.99	0.10 (0.06 to 0.14)	.001
12	Vraagt (asks)	0.99	0.13 (0.10 to 0.17)	<.001	Separeer (seclusion room)	0.99	0.10 (0.06 to 0.15)	<.001
13	Status vrijwillig (status voluntary)	0.99	-0.12 (-0.14 to -0.09)	<.001	Loopt (walks)	0.99	0.11 (0.08 to 0.14)	.02
14	Psychotisch (psychotic)	0.98	0.12 (0.09 to 0.16)	<.001	Grond (ground)	0.98	0.10 (0.06 to 0.14)	<.001
15	Collega (colleague)	0.98	0.11 (0.07 to 0.15)	<.001	Aanvang (commencement)	0.98	0.11 (0.08 to 0.14)	.01
16	Spreekt (speaks)	0.97	0.12 (0.08 to 0.15)	<.001	Mede (also)	0.98	0.10 (0.07 to 0.14)	.001
17	Gehouden (obliged)	0.97	0.11 (0.07 to 0.15)	<.001	Dhr wilde (Mr wanted)	0.98	0.10 (0.06 to 0.14)	.001
18	Beoordelen (judge), verb	0.96	0.11 (0.07 to 0.15)	<.001	Liep (walked)	0.98	0.10 (0.06 to 0.14)	.006
19	Momenten (moments)	0.96	0.12 (0.08 to 0.15)	<.001	Geagiteerd (agitated)	0.96	0.10 (0.06 to 0.14)	.01
20	Somber (dejected)	0.95	-0.14 (-0.17 to -0.11)	<.001	cvd (not available)	0.96	0.10 (0.06 to 0.14)	.004



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Use of risk assessment instruments to predict violence in forensic psychiatric hospitals: a systematic review and meta-analysis



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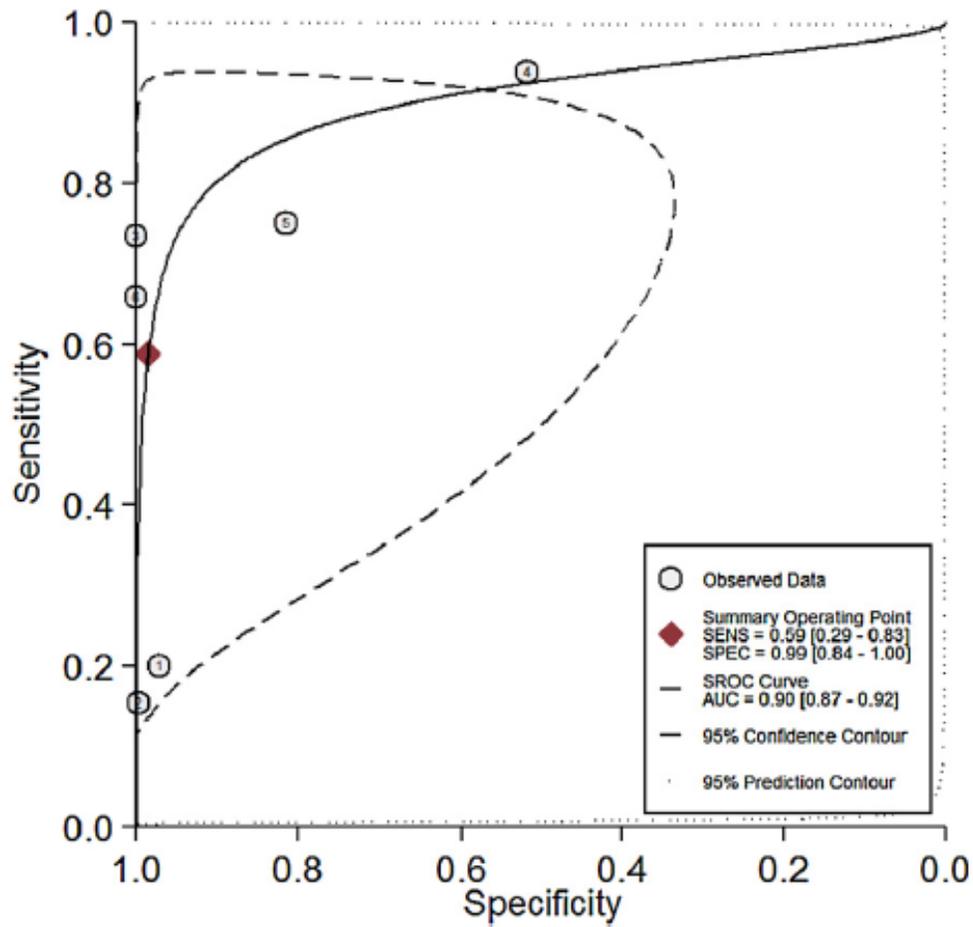
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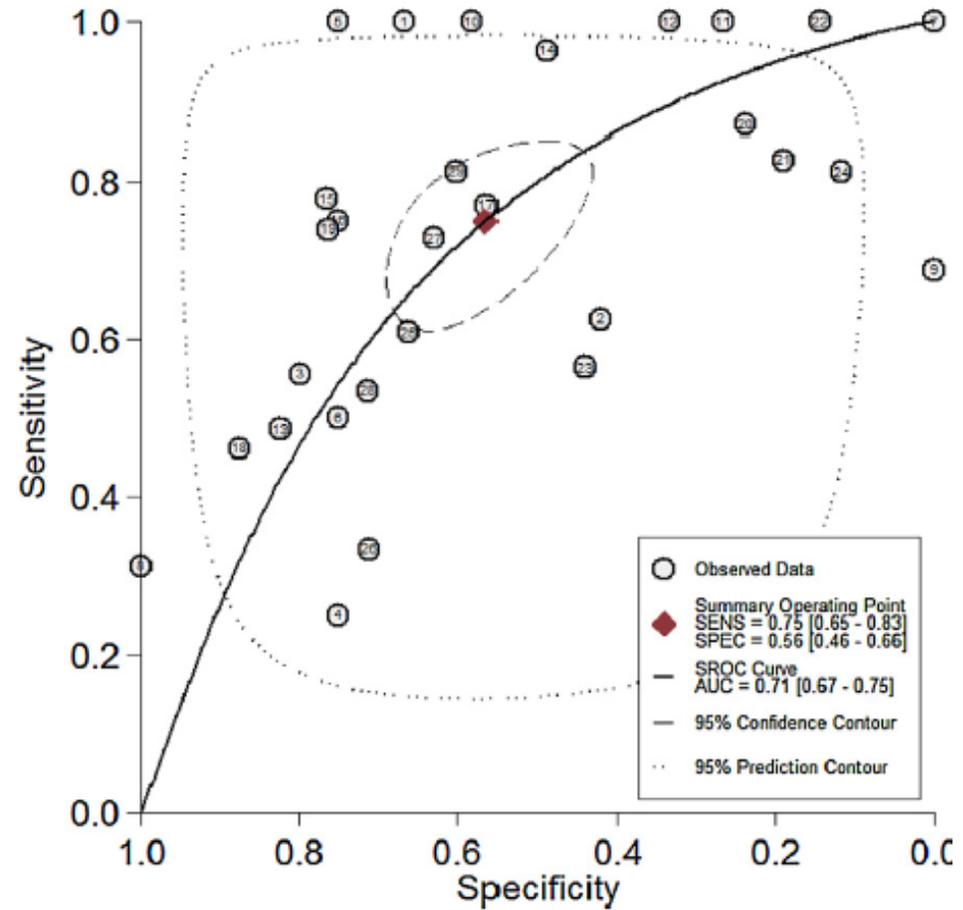
ABSTRACT

Background and Aims: Violent behaviour by forensic psychiatric inpatients is common. We aimed to systematically review the performance of structured risk assessment tools for violence in these settings.

Methods: The nine most commonly used violence risk assessment instruments used in psychiatric hospitals were examined. A systematic search of five databases (CINAHL, Embase, Global Health, PsycINFO and PubMed) was conducted to identify studies examining the predictive accuracy of these tools in forensic



AUC for tools assessing imminent violence risk (BVC, DASA, each 3 studies)



AUC for tool assessing longer-term risks

Original Article

*Joint second authors.

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Modifiable risk factors for inpatient violence in psychiatric hospital: prospective study and prediction model

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Maria Vazquez-Montes^{1,2}, Hasanen Al-Taiar^{1,2}, Achim Wolf^{1,2}, Omar Aziz^{1,2},
Vivek Khosla^{1,2}, Gautam Gulati^{1,2} and Thomas Fanshawe^{1,2}

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Abstract

Background. Violence perpetrated by psychiatric inpatients is associated with modifiable factors. Current structured approaches to assess inpatient violence risk lack predictive validity and linkage to interventions.

N=89, prospective, multiple assessments

Table 3. Associations between risk factors and occurrence of violent incidents

Variable	Adjusted odds ratio	95% confidence interval	<i>p</i> value
Main model			
Total dynamic score > 0 (v. 0 score)	3.39	1.25– 9.20	0.016
Age, per increase in 10 years	0.67	0.47–0.96	0.031
Female sex	2.78	1.04–7.40	0.041
Forensic ward (v. general ward)	0.71	0.23–2.21	0.560
Schizophrenia-spectrum disorder (v. other diagnoses)	0.50	0.20 to 1.21	0.125
Intercept	0.20	0.03–1.16	0.073
Models with individual dynamic scores (per 1-point increase in item score)			
Therapy non-adherence	1.13	0.90–1.42	0.291
Medication non-adherence	1.25	0.88–1.77	0.211
Aggression	1.26	0.97–1.65	0.083
Impulsivity	1.09	0.84–1.41	0.520
Paranoid delusions	1.14	0.73–1.79	0.564
Hallucinations	1.06	0.63–1.77	0.834
Anger due to psychosis	0.86	0.54–1.38	0.539
Drug misuse	1.53	0.81–2.87	0.186
Alcohol misuse	0.63	0.14–2.90	0.554
Anxiety	0.88	0.62–1.25	0.463

Table 3. Associations between risk factors and occurrence of violent incidents

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Total dynamic score > 0 (v. 0 score)	3.39	1.25– 9.20	0.016
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Female			
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Aggression	1.26	0.97–1.65	0.083
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Paranoid delusions	1.14	0.73–1.79	0.564
Hallucinations	1.06	0.63–1.77	0.834
Anger due to psychosis	0.86	0.54–1.38	0.539
Drug misuse	1.53	0.81–2.87	0.186
Alcohol misuse	0.63	0.14–2.90	0.554
Anxiety	0.88	0.62–1.25	0.463

AUC 0.77

AUC without dynamic risk score 0.75

= only minimally worse than using only

female sex and age as predicting variables

Risk assessment combined with intervention

Structured risk assessment and violence in acute psychiatric wards: randomised controlled trial

Christoph Abderhalden, Ian Needham, Theo Dassen, Ruud Halfens, Hans-Joachim Haug and Joachim E. Fischer

Background

There is a lack of research on the possible contribution of a structured risk assessment to the reduction of aggression in psychiatric in-patient care.

Aims

To assess whether such risk assessments decrease the incidence of violence and coercion.

Method

A cluster randomised controlled trial was conducted with 14 acute psychiatric admission wards as the units of randomisation, including a preference arm. The intervention comprised a standardised risk assessment following admission with mandatory evaluation of prevention in high-risk patients.

Results

Incidence rates decreased substantially in the intervention wards, whereas little change occurred in the control wards. The adjusted risk ratios suggest a 41% reduction in severe aggressive incidents and a 27% decline in the use of coercive measures. The severity of aggressive incidents did not decrease.

Conclusions

Structured risk assessment during the first days of treatment may contribute to reduced violence and coercion in acute psychiatric wards.

Declaration of Interest

None. Funding detailed in Acknowledgements.

BVC-Schieber

VAS

No risk

Very high risk

Wie gross ist das Risiko, dass der Patient / Patientin bis zur nächsten Einschätzung gegen Personen gewalttätig werden könnte?

Kein Risiko
0

Sehr hohes Risiko

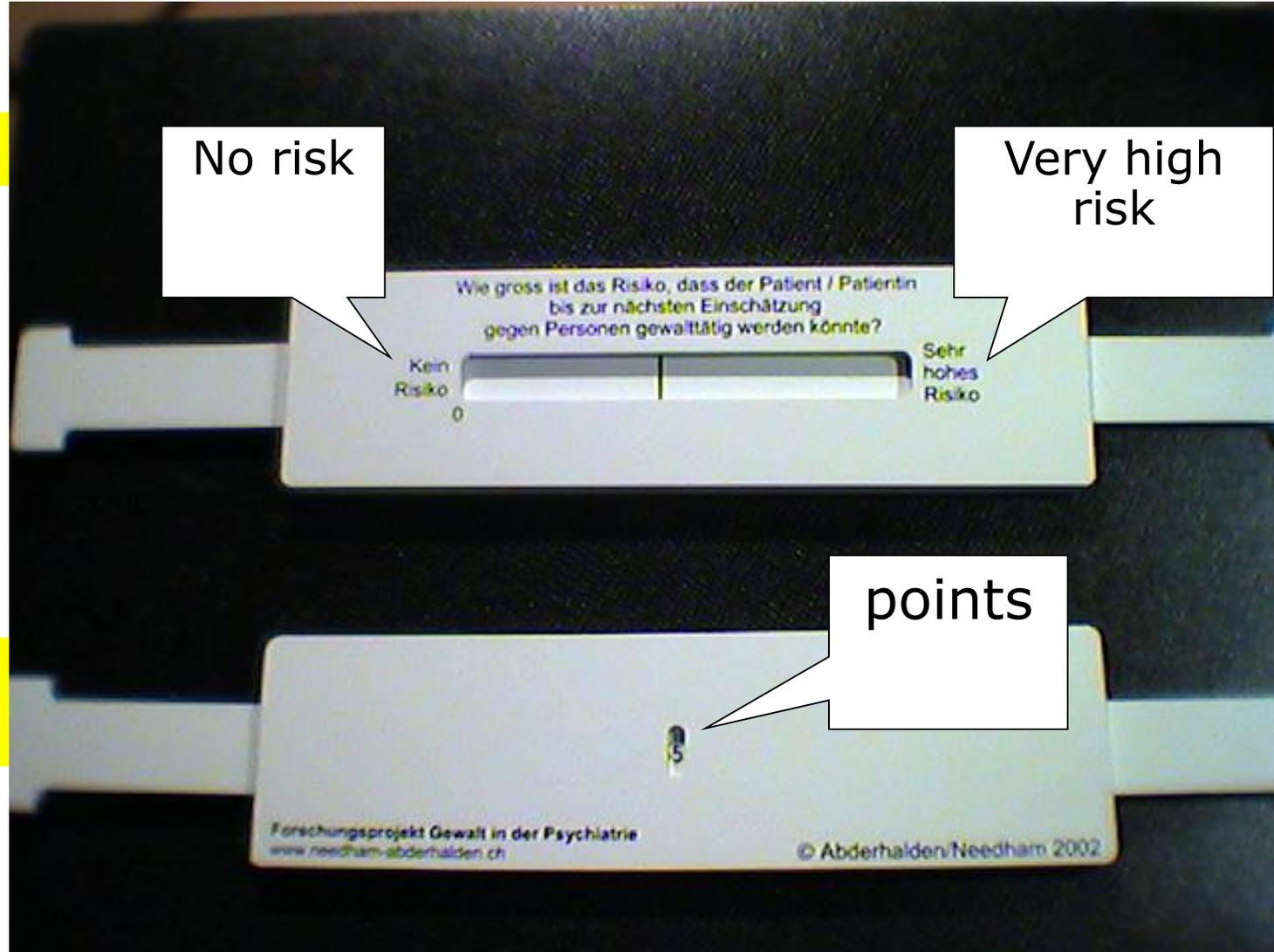
Back side

points

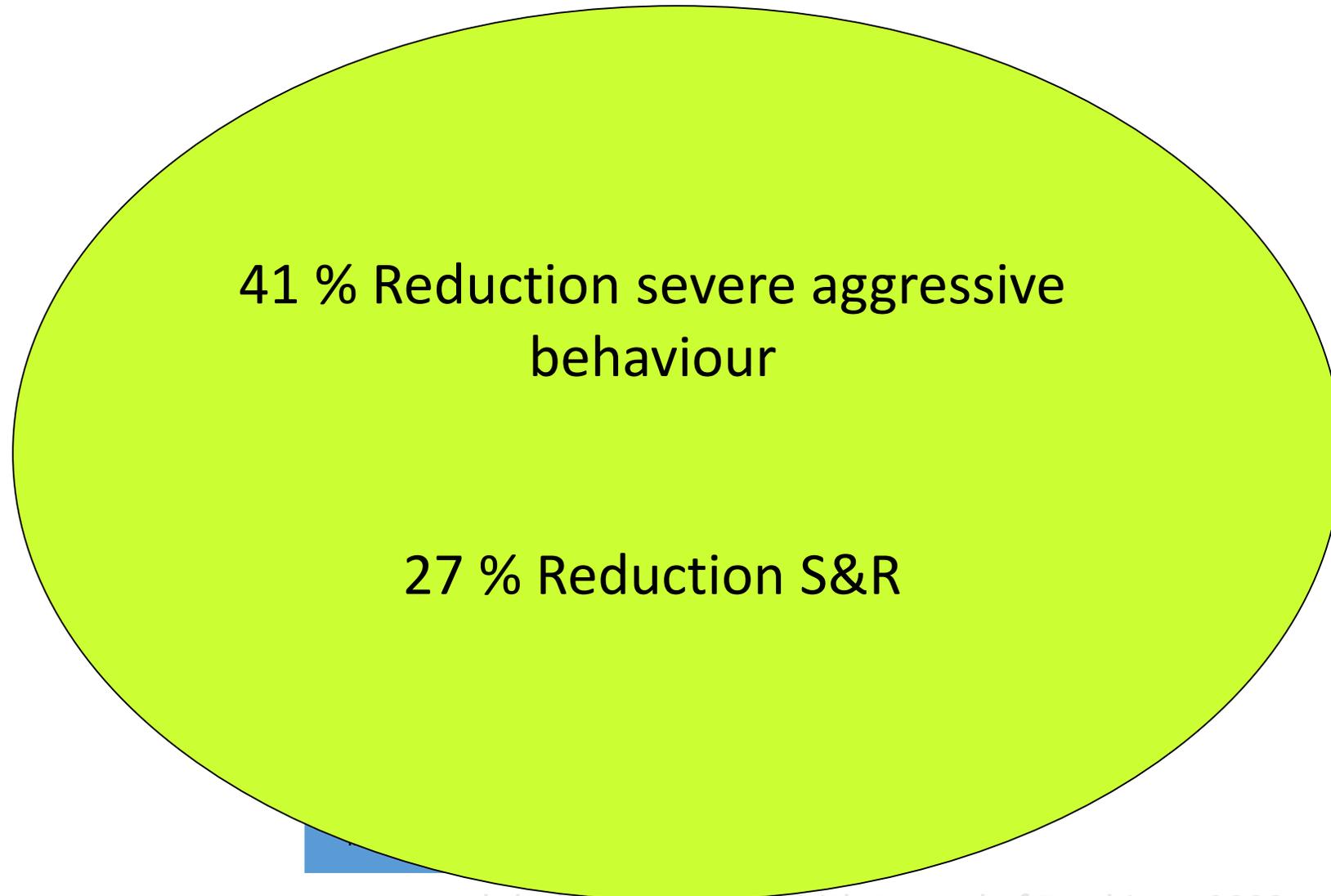
5

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Effects of systematic risk assessment on in-patients aggression and coercive measures



Aggression and seclusion on acute psychiatric wards: effect of short-term risk assessment

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Background

Short-term structured risk assessment is presumed to reduce incidents of aggression and seclusion on acute psychiatric wards. Controlled studies of this approach are scarce.

Aims

To evaluate the effect of risk assessment on the number of aggression incidents and time in seclusion for patients admitted to acute psychiatric wards.

Method

A cluster randomised controlled trial was conducted in four wards over a 40-week period ($n=597$ patients). Structured risk assessment scales were used on two experimental wards, and the numbers of incidents of aggression and seclusion were compared with two control wards where assessment was based purely on clinical judgement.

Results

The numbers of aggressive incidents (relative risk reduction -68% , $P<0.001$) and of patients engaging in aggression (relative risk reduction $RRR=-50\%$, $P<0.05$) and the time spent in seclusion ($RRR=-45\%$, $P<0.05$) were significantly lower in the experimental wards than in the control wards. Neither the number of seclusions nor the number of patients exposed to seclusion decreased.

Conclusions

Routine application of structured risk assessment measures might help reduce incidents of aggression and use of restraint and seclusion in psychiatric wards.

Declaration of interest

None.

Results (vs. control wards)

- Time in seclusion – 45 %
- Number of seclusions n.s.
- % patients with seclusion n.s.
- Number of aggressive incidents 58 %
- Number of patients with aggressive incidents -50 %

Not confirmed: Hvidhjelm et al. 2016

Discussion: earlier assessment of reduced risk during seclusion?

A Clinical Decision Support System to Prevent Aggression and Reduce Restrictive Practices in a Forensic Mental Health Service

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Objective: Preventing aggression and reducing restrictive practices in mental health units rely on routine, accurate risk assessment accompanied by appropriate and timely inter-

Results: eDASA+APP implementation was associated with a significant reduction in the odds of an aggressive incident (OR=0.56, 95% confidence interval [95%

Psychiatric Services 2021 (two psychiatric wards)

HIGHLIGHTS

- Use of an electronic clinical decision support system combining the Dynamic Appraisal of Situational Aggression instrument with an aggression prevention protocol (eDASA+APP) was associated with significantly reduced odds of aggressive behavior in a forensic mental health unit.
- eDASA+APP was also associated with a significant reduction in the use of more controlling interventions (e.g., administration of as-needed medication) and with a significant increase in proactive, non-coercive interventions.
- eDASA+APP use prompted a larger number of nursing interventions early during an escalation.

Conclusions

- Risk prediction and risk assessment tools: exhaustive research
 - AUC > 0.75 for inherent reasons not achievable (except for very short-term predictions)
 - Actuarial variables have better predictive validity than clinical ones (even if all clinicians believe the opposite)
- Plenty research on risk of violence, little on risk of coercion up to now
 - Coercion rather used as a secondary outcome
- Innovative research:
 - Use new techniques
 - Combine assessment with intervention