Beware of false prophets

Scientific and ethical problems with risk assessment

Olav Nielssen

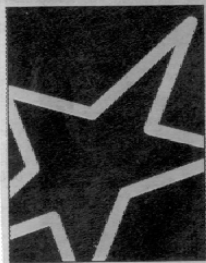# False prophets

THE SUN-HERALD January 31, 2010   53⁺

WEEK 2   SHARES RACE INVESTOR

1st Doreen Daze Astrologer

AMP	$9752
Goodman Fielder	$10,032
Macq Office	$9365
Metal Storm	$8182
Mount Burgess Min	$9444
Otto Energy	$13,333
Pac Brands	$9824
Rio Tinto	$9026
Wesfarmers	$9107
Zamia Gold Mines	$11,489
	$99,554

6th Dartboard

ANZ Banking Grp	$9888
Asciano Grp stpld	$9186
BHP Billiton	$9296
Fairfax Media	$10,086
Mirvac Grp stpld	$9259
Perpetual	$9593
Servcorp	$9681
Seven Network	$10,244
Telstra Corp	$10,209
Westfield Grp stpld	$10,119
	$97,563

3rd Paulina Duran AFR Analyst

Alliance Res	$9291
Alumina	$8723
BHP Billiton	$9296
Centennial Coal	$9026
Incitec Pivot	$9588
Otto Energy	$13,333
QBE Insurance Grp	$9422
Sims Metal Mgmt	$8831
Westpac Banking	$9685
Woodside Pet	$9021
	$96,218

4th Penny Pryor AFR Investor

BHP Billiton	$9296
David Jones	$9280
Foster's Grp	$9744
Iron Ore Hldgs	$10,667
iShares China 25	$9480
Kangaroo Res	$10,000
Swick Min	$8596
Westpac Office Tr	$9733
Woolworths	$9310
Invocare	$9497
	$95,604

5th Andrew Morello The Apprentice

AMP	$9752
Avexa	$10,313
Boart Longyear	$8846
Centennial Coal	$9026
CSR	$9495
ENV Clean Tech	$8780
Fortescue Metals Grp	$8788
Metminco	$8889
Ten Network Hldgs	$9235
Verus Invest	$11,220
	$94,343

2nd David Potts AFR Investor

Ausenco	$9059
Ausgold	$8511
Bank of Qld	$9833
Cellestis	$10,171
Centamin Egypt	$8821
Galaxy Res	$9126
Goodman Fielder	$10,032
Keybridge Capital	$9200
Metcash	$9932
Silex Systems	$9538
	$94,223

7th Glenn Mumford Smart Investor
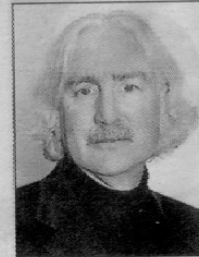
Aquarius Platinum	$9113
Atlas Iron	$8943
Caltex Aust	$9475
Fortescue Metals Grp	$8788
OM Hldgs	$9186
PaperlinX	$10,424
Pharmaxis	$9336
Ramsay Health Care	$9907
Riversdale Min	$9288
Ten Network Hldgs	$9235
	$93,694

8th Richard Pritchard Chartist

BHP Billiton	$9296
Blackthorn Res	$9340
Boart Longyear	$8846
Buccaneer Energy	$7760
Cape Lambert Res	$8862
Morning Star Gold	$9524
National Aust Bank	$9867
NKWE Platinum com	$8971
Roc Oil Co	$9643
Alinta Energy stpld	$9318
	$91,427

True prophet

The Minority Report

- Risk assessment has become the dominant ideology behind attempts to reduce harms associated with both mental disorder and crime
- Flawed because of weak science and limited application to individual cases

Insurance Analogy

- Basic equation for insurance and gambling is $R = L \times P$ (de Moivre, 1722)
- Not readily translated to mental health or criminal justice settings, because methodological limitations means the probability cannot be calculated, the loss varies, and the premium is in the form of loss of liberty or care

Some definitions

- True +ve: high risk person commits act
- False +ve: High risk person does not
- True –ve: low risk person does not
- False -ve: low risk person commits act

More definitions

- Sensitivity – the proportion of positives that are correctly identified
- Specificity – the proportion of negatives that are correctly identified
- PPV (precision rate) – the proportion of predictions that are correct
- NND – number of people needed to be detained to prevent one adverse event

Commonly used instruments

- HCR 20
- VRAG
- SVR 20
- PCL-R
- Static-99
- SORAG

Actuary or insurance salesman?

- Not risk assessment at all, but risk categorisation based on qualities of the original study population.

- No judgment regarding risk made by the assessor

- Less accurate in subsequent populations, especially if very different

What use is a positive finding?

- Even reasonably accurate predications have no practical significance, as the levels of sensitivity and specificity claimed for the available tools generate levels of false positives and negatives that prevent us from acting on the results (Mossman)
- Airport metal detector analogy – increase specificity at the expense of sensitivity, depending on tolerance of risk

Problems with risk assessment

- Fail to protect

- False predictions

- No proof they reduce harm

- Varying levels of harm

- No universal risk factors

- Wrong assumptions about human behaviour

- Misallocate resources

- Consent

Failure to protect

- Failure to protect – cannot predict a large proportion of events
- In practice, high sensitivity only possible with low specificity and hence many false positives
- Criticism after adverse events is usually not failure to predict, but failure to provide an adequate standard of care

False predictions

- Most predictions of harm are false positives
- Eg, for an instrument to have a PPV of 50%, the incidence of the adverse event would have to be 20% and the sensitivity and specificity of the instrument would have to be 80%
- Incidence of homicide in treated patients is 1 in 10,000 pa, and suicide among inpatients is about 1 in 300 admissions

Estimated rates of adverse events in schizophrenia

Event	Rate pa
Homicide of stranger	1 in 140,000
Homicide after treatment	1 in 10,000
Homicide before treatment	1 in 630
Suicide	1 in 200
Attempt suicide before treatment	1 in 5
Assault before treatment	1 in 6
Conviction for violent offence	1 in 100
Assault after discharge	1 in 10

Example

- A theoretical instrument with sensitivity and specificity of 0.8 (v high)
- Base rate of 1/10 pa – PPV is 0.3 in a year
- Base rate of 1/10,000 pa – PPV is 0.0003

Violence prediction in schizophrenia

- Main risk of violence to self or others associated with never treated schizophrenia who are not often subjected to risk assessment

- Events in treated schizophrenia rare, few features that distinguish the violent minority

Suicide after discharge

- Between 0.3% and 1.3% of all admitted patients suicide within a year of discharge

- Between 1% and 4% of patients labelled as "high risk" commit suicide within a year of discharge

- Prediction not possible

Quantifying loss

- Human tendency to focus on rare but catastrophic events
- However, few instruments attempt to distinguish between serious and minor harms

Lack of evidence of harm reduction

- Only one controlled study showing risk assessment reduced violence, and the result could have been an effect of the experiment itself, rather than the predictions of harm, as only one in 10 predictions proved to be correct
- Little evidence for most types of counselling
- Sex offender programs have no effect

Errors in choice of instrument

- The risk factors for homicide, violence, suicide, self harm and various crimes are not the same

- Hence the use of a certain instrument already includes a pre-judgment about the type of harm that is anticipated, excluding consideration of other forms of harm

Wrong assumptions about human behaviour

- Assumes tendencies are fixed, and cannot include the likely effect of environment and circumstances

- Human behaviour more like weather and financial markets, with unpredicted oscillations and feedback loops

Opportunity cost

- The time spent conducting risk assessments, is taken away from time that could be allocated to better care (2 to 40 hours per case)

- There is also a failure to allocate resources to low risk patients, despite the lack of response of some high risk patients and the inevitable false negatives

Consent

- No person deemed at risk with the capacity to give consent would actually give properly informed consent to participate in risk assessment or an instrument such as the PCL

- High risk patients share restrictions and stigma

- Low risk patients lose care

Harmful effects of risk assessment

- Resources go to control and containment over support and management
- Preoccupation with dangerousness, view patients as dangerous
- Encourages futile attempt to control all risk
- Unfair decisions in individual cases
- Restricts clinicians, leaves them exposed

Alternative to risk assessment

- Other fields of medicine mainly concerned with capacity to make decisions
- Advise about the risk faced by the patient
- Our role is the diagnosis and treatment of mental disorder, and improving patients decision making
- We should acknowledge that we cannot make clinically useful predictions and face up to the uncertainties of our professions