Butterflies and Avalanches: Common Errors in Avalanche Rescue

Dale Atkins
CHAOS = DISORDER

Science:

small differences in initial conditions may result in very different outcomes
CHAOS = DISORDER

small differences in initial conditions may result in very different outcomes

Rescue:

Atkins, 2011
Problems and errors in avalanche rescue are often attributed to “chaos” of rescue.
HUMAN ERROR – DEFINITION

An error is a failure of achieving the intended outcome in a planned sequence of mental or physical activities when that failure is not due to chance.

Atkins, 2011
UNDERSTANDING ERRORS

4 Parts

What?

When?

How?

Why?
WHEN?

Five Core Phases of SAR

Alert  Locate  Access  Stabilize  Transport

time (minutes, hours, days...)
WHEN?

call late

no transceiver

Alert  Locate  Access  Stabilize  Transport

time (minutes, hours, days...)

Atkins, 2011
WHEN?

call late  transceiver (yes)  no shovel

Alert  Locate  Access  Stabilize  Transport

time (minutes, hours, days...)

Atkins, 2011
WHEN?

Perfect Rescue

Alert → Locate → Access → Stabilize → Transport → time (minutes, hours)

Atkins, 2011
DATA

US Rescues from 1980-2011

Total US accidents reported = 2364

Companion Rescues = 306

Organized Rescues = 201
CAUTION of PERCENTAGES

Significant Bias:

Rescue details and errors are under reported.
RESULTS – SHORT VERSION

We ALL make errors!

No new errors, same errors or variations.

Accumulation of small errors may lead to bigger problems.

Atkins, 2011
SERIOUS ERRORS

Organized Rescue:

very few ... ~4%
Organized Rescue:

caught in groups
(average 2.6 caught)

groupthink

resulted in 2 deaths
(1 rescuer & 1 patient)
SERIOUS ERRORS

Companion Rescue:

few ... ~10%
TRENDS

Companion Rescue:

- overconfidence
- poor rescue skills

[one known death & many unknown]
ERRORS

Organization

Information

Tactics

Attitudes
Organization

- no rescue plan
- leadership problems
- improperly trained
- inadequate physical condition
- groupthink

Atkins, 2011
GROUPTHINK

Rational conformity without critical testing, analyzing, and evaluating ideas.

– Whyte, 1952; Janis, 1972
Information

- poor communications
- inaccurate information
- not re-evaluating after new information
- mobile phones
- SPOT, PLB

Atkins, 2011
Tactics

inadequate immediate search
lack of proficiency with beacons & recco
not using available resources (e.g. dogs & recco)
not carrying beacons, shovels, recco, saws, etc.
not searching the right area

Atkins, 2011
Attitudes

abilities are greater than capabilities

hasty generalization – dead body

reluctant to adopt new technologies

Atkins, 2011
NO NEW ERRORS

People / rescuers make the same mistakes repeatedly.

Atkins, 2011
SERIOUS ERRORS

Often result from an accumulation of small errors.

Atkins, 2011
Count the passes made by the white team.

So, how many passes?
Did you see anything odd?
INATTENTIONAL BLINDNESS

We fail to notice large changes when absorbed in the inspection of something else.

(Bálint, 1907; Neisser, 1979; Simons & Chabris, 1999)
AVALANCHE RESCUE – GOAL

To perform an efficient, fast, and safe search and rescue in order to save a life.

Atkins, 2011
More rescuers and/or newer equipment does not always mean better rescues.
RESCUE PARADOX

Sometimes “text book” rescues are slow, and sometimes “sloppy” rescues are fast.

Atkins, 2011
RESCUE PARADOX

Sometimes “text book” rescues are slow, and sometimes “sloppy” rescues are fast.

Sometimes “text book” rescues do not save lives, but sometimes “sloppy” rescues save lives.
HARMFUL OUTCOMES

Incident:
non-life threatening – typically adds delays

Accident:
life threatening
Atkins, 2011

(adapted from Reason, 1990)
Attentional failures

Distractions

Blindness

Atkins, 2011

(Adapted from Reason, 1990)
Atkins, 2011

(Adapted from Reason, 1990)
unintended action

slip

lapse

intended action

mistake

violation

attentional failures

distractions

blindness

memory failures

place-losing

omissions

(adapted from Reason, 1990)
unintended action

slip

lapse

intended action

mistake

violation

memory failures

attentional failures

distractions

blindness

place-losing

resources

triage

not searching entire slide

transceiver rescue

omissions

transceivers/recco/dogs

(adapted from Reason, 1990)

Atkins, 2011
unintended action
- slip
- lapse

intended action
- mistake
- violation

attentional failures
- distractions
- blindness

memory failures
- place-losing
- omissions

rules-based mistakes
- misapplication of good rule
- application of bad rule

(adapted from Reason, 1990)
unintended action
  ↓
  slip
  ↓
  distraction
  blindness
  ↓
memory failures
  ↓
place-losing
  omissions
  ↓
  attentional failures
  ↓
rules-based mistakes
  ↓
misapplication of good rule
  untested resources
  no backup
  ↓
application of bad rule
  calling for help late
  not-practiced rescue plan
  travel together

(intended action)
  ↓
  mistake
  ↓
  misapplication of good rule
  untested resources
  no backup
  ↓
application of bad rule
  calling for help late
  not-practiced rescue plan
  travel together

(Atkins, 2011)
unintended action

- slip
- lapse

intended action

- mistake
- violation

attentional failures
- distractions
- blindness

memory failures
- place losing
- omissions

rules-based mistakes
- misapplication of good rule
- application of bad rule

routine violations
- exceptional violations

(adapted from Reason, 1990)
Atkins, 2011

unintended action

- slip
- lapse

intended action

- mistake
- violation

attentional failures
- distractions
- blindness

memory failures
- place losing
- omissions

rules-based mistakes
- misapplication of good rule
- application of bad rule

routine violations
- travel together
- weak leadership

exceptional violations
- deliberate alert of wrong location

(adapted from Reason, 1990)
HUMAN ERROR

People are not deliberately careless.

People commit errors because they think they will not commit errors.
WHERE ARE YOU

accident

operational band (risk band)

excessive conservatism

(adapted from McClung, 2002)
PREVENT HUMAN ERRORS

\[ R_e + M_d \rightarrow 0 \]

Reduce errors and Manage defenses to prevent human errors
WHAT CAN YOU DO

• Implement a risk management plan for loss prevention.
• Look for “why” things happen
• ID basic error types (slips, lapses, mistakes, violations)
• Seek “how” to prevent future incidents.
• Nurture a strong “feeling of uneasiness”.
• Create a culture of open communications.
• Use an *advocatus diaboli*.

Atkins, 2011
DON’T

Do not let the courts / legal system decide “why”.

Atkins, 2011