Optimising delivery of intensive blood pressure lowering: experience at a UK comprehensive stroke centre and association with survival and kidney injury

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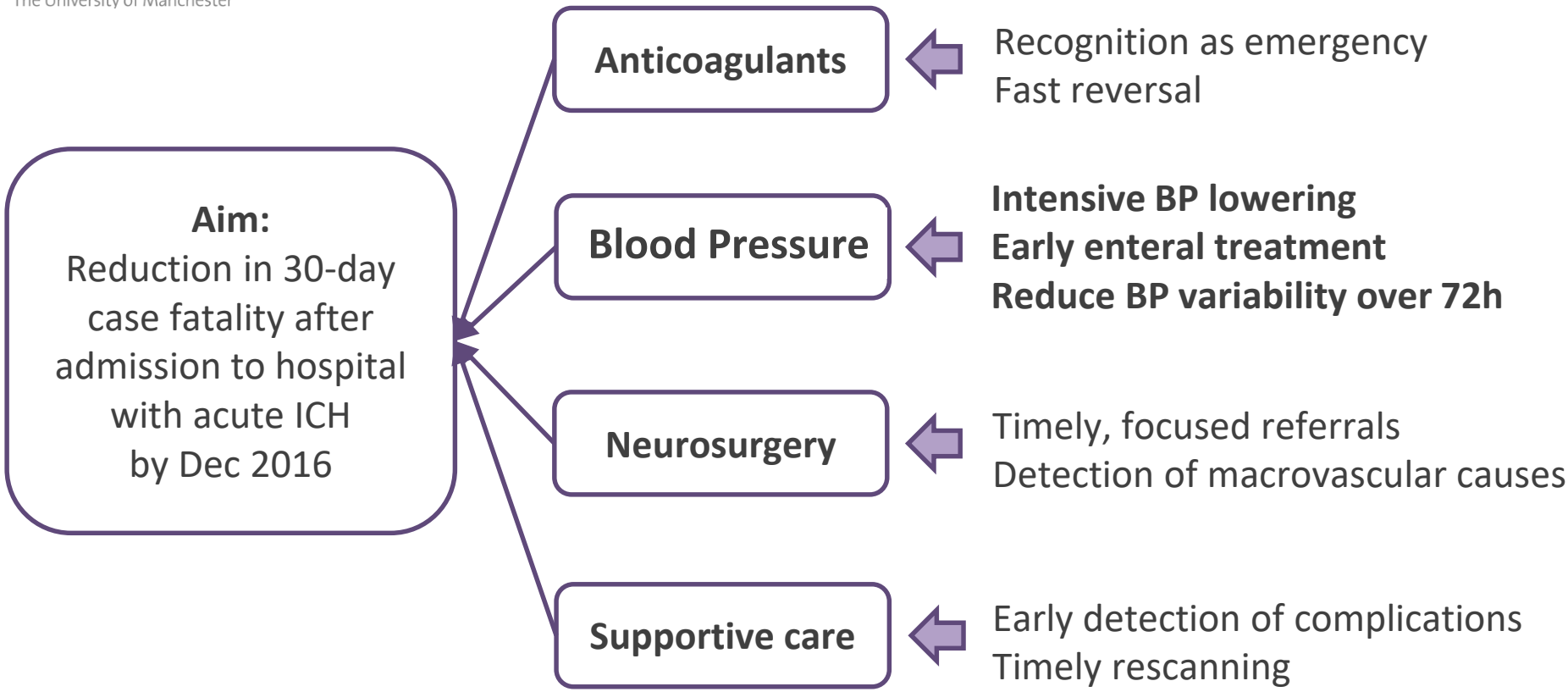
Intensive blood pressure lowering in ICH

- **INTERACT2 (2013)**
  Target SBP 130-140 mmHg within 1h
  Improved functional outcomes on ordinal shift analysis
  No difference is SAEs

- **ATACH2 (2016)**
  Target SBP 110-139 vs 140-179 mmHg within 2h
  Neutral on all outcomes
  Increased renal AEs (9.0% vs. 4.0%, p=0.002)

Methods

- **Design**: Quality improvement project using Model for Improvement
- **Aim:** Reduce 30-day case fatality after admission with acute ICH
- **Setting**: Salford Royal NHS Foundation Trust, UK
- **Dates of QI project**: Jun 2015 – Jun 2016
- **Patients**: All consecutive admissions with spontaneous ICH; case ascertainment via coding June 2013 - Jan 2017
- **Data collection**: Demographics, baseline characteristics, acute management, imaging, renal function, survival


Aim:
Reduction in 30-day case fatality after admission to hospital with acute ICH by Dec 2016
Anticoagulants
Recognition as emergency
Fast reversal
Blood Pressure
Intensive BP lowering
Early enteral treatment
Reduce BP variability over 72h
Neurosurgery
Timely, focused referrals
Detection of macrovascular causes
Supportive care
Early detection of complications
Timely rescanning

Intensive blood pressure lowering protocol

Aim: Deliver intensive blood pressure lowering to target 130-140 mmHg with a needle-to-target time of less than 60 min

Key changes

Standardised protocol introduced Jun 2015:

- IV GTN monotherapy as first line for 30 min, then adding IV labetalol boluses
- Referral to critical care if not controlled by 60 min
- Transition to enteral treatment within 24 h

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Baseline characteristics

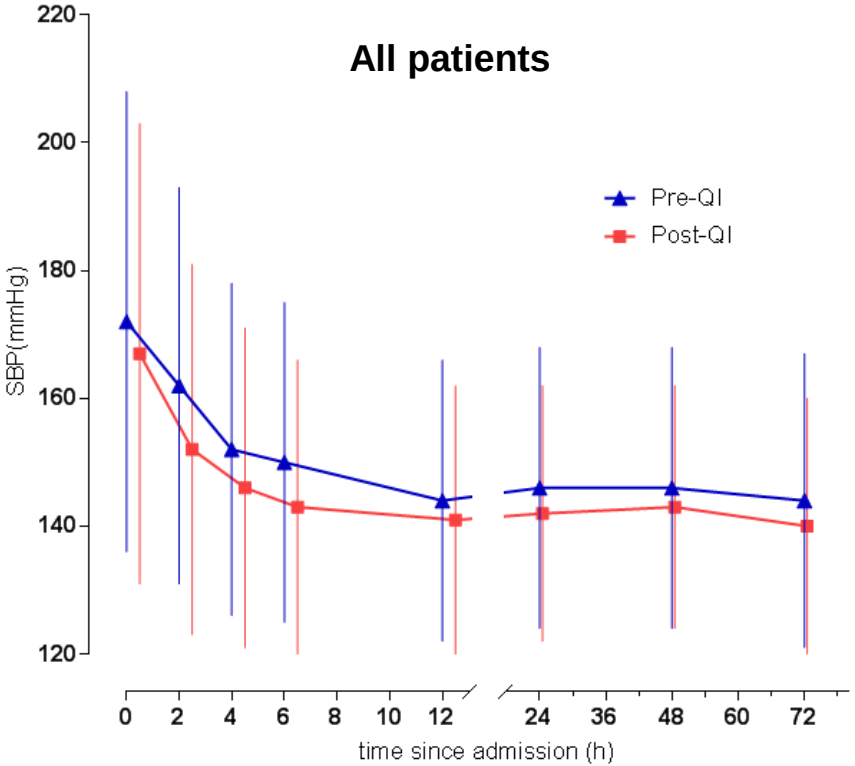
Factor	Pre QI (n=372)	Post QI (n=423)	p
Age	71.7 (57.0 – 81.2)	70.4 (56.3 – 80.2)	0.83
Premorbid mRS (0-2)	289 (79.6%)	260 (82.3%)	0.20
Anticoagulant	53 (14.2%)	55 (13.0%)	0.61
Sex (female)	179 (48.1%)	189 (47.7%)	0.91
GCS	14 (10-15)	14 (10-15)	0.85
Infratentorial	46 (12.4%)	51 (12.1%)	0.89
IVH	144 (38.7%)	159 (37.9%)	0.55
ICH volume (ml)	17.3 (6.2 – 48.3)	16.7 (5.3 – 42.3)	0.36

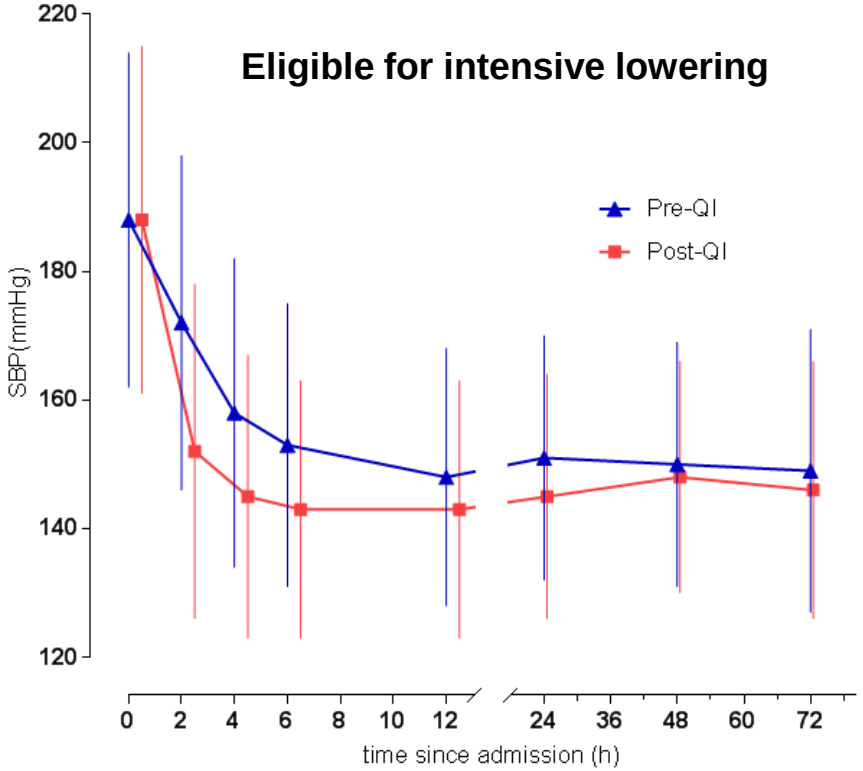
Pre QI: Jun 2013 – May 2015; post QI: Jun 2015 – Jan 2017. Excluded 33 cases not admitted under stroke or neurosurgery (22 pre, 33 post)

Blood pressure

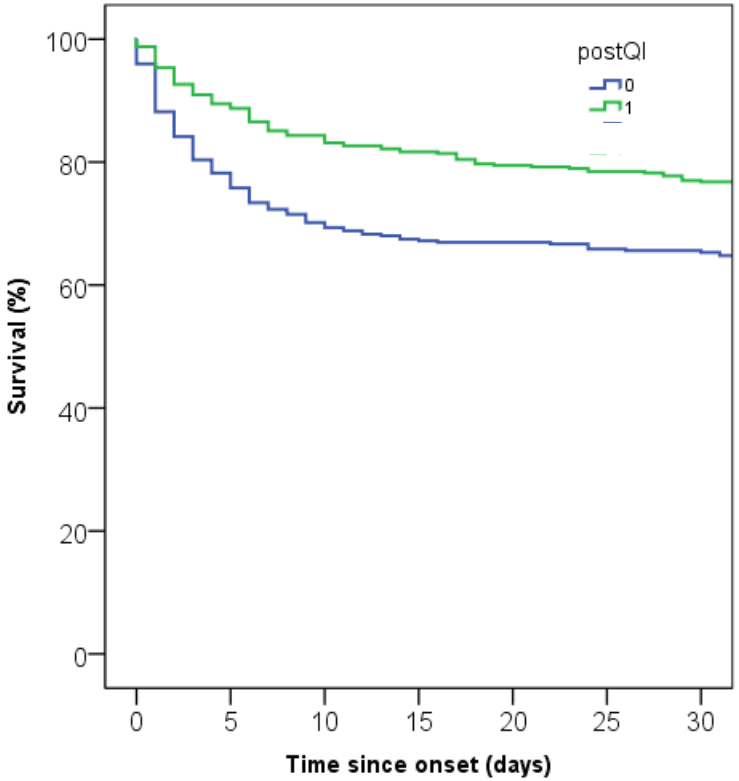
	Pre QI (n=372)	Post QI (n=423)	p
Eligible for int. lowering	200 (54%)	150 (36%)	<0.0001
Received int. lowering (as % of eligible)	98 (49%)	106 (71%)	<0.0001
Labetalol	77 (21%)	62 (15%)	0.027
GTN	82 (23%)	161 (38%)	<0.0001
Critical Care	69 (19%)	124 (29%)	0.001
NTT (min) median (IQR)	365 (211-1080)	65 (35-252)	<0.0001
Mean over 72 h	150.3 (136.8-161.8)	142.0 (133.4 – 153.6)	<0.0001
SD over 72 h	16.2 (11.1-22.4)	15.4 (11.1 – 20.5)	0.109
AKI Yes No Unknown	9 (2.4%) 193 170	13 (3.1%) 189 221	p=0.512

Blood pressure profiles over 72 h





Unadjusted analysis of survival



Pre-QI:

- Jun 2013 – May 2015
- 372 cases admitted
- 30-day case fatality = 34.7%

Post-QI:

- Jun 2015 – Jan 2017
- 423 cases admitted
- 30-day case fatality = 23.2%

Logrank test: **p=0.001**

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Cox regression analysis

Factor	HR	95% CI	Sig.
GCS	0.88	0.85 to 0.91	<0.0001
Anticoagulant	1.36	1.01 to 1.83	0.04
Infratentorial	1.94	1.40 to 2.69	<0.0001
IVH	1.37	1.07 to 1.75	0.013
ICH vol	1.009	1.007 to 1.011	<0.0001
Age	1.052	1.043 to 1.062	<0.0001
Post QI	**0.65**	**0.51 to 0.83**	**0.001**
Post QI (unadj)	0.68	0.54 to 0.86	0.001

Conclusion

- Successful implementation of intense BP lowering to target 130-140 mmHg in 60 min
- 11.5 pp (33% relative) reduction in 30 day case fatality after implementation of ABC-ICH bundle, independent of case mix
- No evidence of increased AKI with available lab data

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A nhsa project