

Ethical and Procedural challenges to study Pedestrian Trauma in UK Road Traffic Collisions

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Road Safety Trust



Its charitable objective is to support road safety research or practical interventions intended to reduce the numbers of people killed or injured on the roads. Practical interventions may focus on education, engineering or enforcement approaches or a mixture of two or all of these.

“Reducing Road Traffic Casualties
through Improved Forensic Techniques
and Vehicle Design (RoaD)”

Road Safety Trust (RST 65 _3_2017)



The curse of the pedestrian hit-and-run case



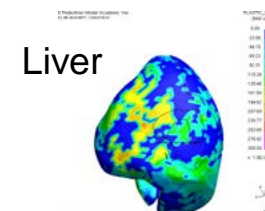
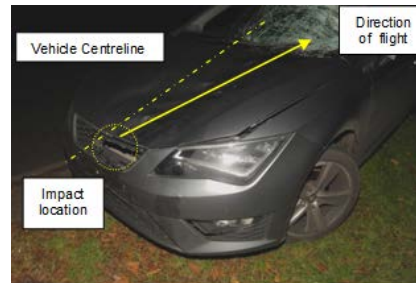
- December 2015:
 - Visit of UKPF to Coventry University to discuss research potentials
 - Showed THUMS pedestrian model with organs
 - Case of the hit-and-run scenario (15 case per year)
 - Challenge: can the vehicle impact speed be extracted from the deceased Post-Mortem in hit-and-run cases?
 - Access to UKPF pedestrian accident and PM data granted by UKPF
- June 2016:
 - 2 papers on accident reconstruction at LS-Dyna European conference
 - Discussion with Prof. Clive Neal-Sturgess about PVP method
 - PVP can predict AIS (but at that time never tested on CAE)



The curse of the pedestrian hit-and-run case



- September 2016:
 - Discussion with Kambiz Kayvantash at CADLM (lots of coffee)
 - Idea to extend the hit-and-run case as a generic method to link:
 - Vehicle profile
 - Vehicle speed
 - Post-mortem
 - Anthropometry



	Vehicle profile	Vehicle speed	PM	Anthropometry
UKPF	Given	Output	Given	Given
A&E	Given	Given	Output	Given

Create a portable tool to save lives as well as for forensic work

The curse of the pedestrian hit-and-run case



- December 2016:
 - Meeting with UKPF, UK Coroner and UHCW Hospital
 - A major research opportunity with high societal impact was found
 - Agree to proceed with research – Green light from all parties
- January 2017 – March 2017:
 - EPSRC bid write-up
 - Internal review: rejected – “Not theoretical enough”
- March 2017 – June 2017
 - Writing and submission to **Road Safety Trust**
 - Bid accepted in principle but judged too ambitious
- October 2017:
 - Re-scoping project as a **PILOT STUDY**
 - **Remove the trauma calculator, but show that the scientific underpinning works**
 - Granted fully awarded and contract signed April 2018

2.5 years in the making
2 year project
£40,000 (around)
50/50 CU and UHCW

“RoAD” PILOT study space



- Vehicles no more than 5 years (likely to meet a good pedestrian rating)
- ‘A’, ‘B’ or ‘C’ class vehicles (no SUV)
- Impact speed no more than 50km/h with “no” secondary impacts
- Male (preferably)
- Body shapes and masses: $\pm 1\sigma$. (control of kinematics)
- Ethical approval of next of kin granted
- Deceased 18 to 50 (year old). (Older and material properties degrade too much)
- PVP and AIS are proportional, and PVP will be age dependant as:

Initial work using PVP are showing great promise to address the prediction of trauma using computer models

$$PVP \propto \sigma \cdot \dot{\epsilon}$$

and

$$\sigma = \sqrt{E\rho} \cdot v$$

When “RoAD” is complete, its findings will be used to design safer vehicles, according to human trauma indices and not injury criteria from crash test dummies

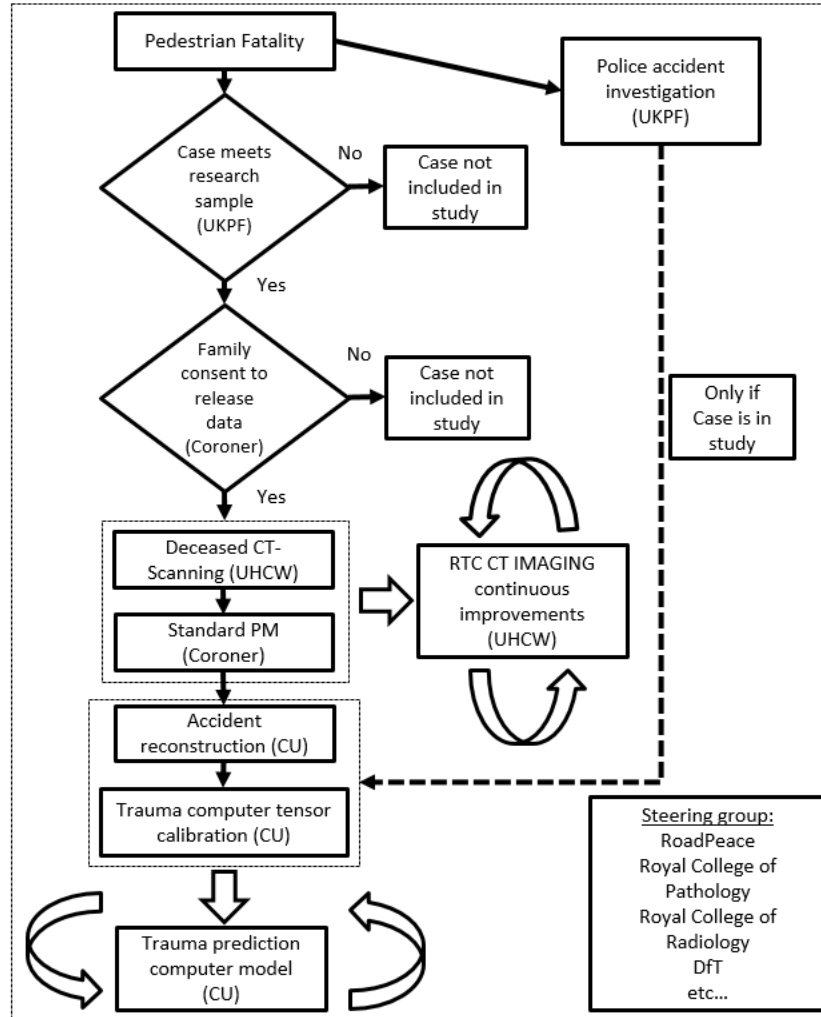
Opportunities found



- UK Coroner: ethnical minoring reticence to post-mortem on loved-ones by the next of kin.
 - Christians: PM acceptable, as long as the body is treated with respect
 - Indians and Sikhs: Body must be cremated usually within 3 days, creating a “logistical” problem
 - Muslims: routine PM are not acceptable (“tensions”)
- Opportunity to perform a virtual PM or CTPM:
 - Help Coroner to respect all wishes from the population
 - Reduce stress on families (PM are intrusive and thought unpleasant for next of kin)
 - Faster turn-around of PM (no need of a pathologist)
 - Justice: CTPM provides same level of PM for Crown prosecution and the Defence thanks to digital recording of PM
 - Support CU to locate exactly the trauma where it should be
 - Support UHCW to build expertise in virtual traumatology for court expert witness duties
 - Creates teaching material for medical students

Substantial societal impact

“RoAD” PILOT flow chart



- Proposed “RoAD” (PILOT) project works live along side the UKPF investigation
- Each case will be cross checked with CTPM for continuous predictions improvement
- Each case will be cross checked with PVP (AIS) predictions for improvement continuous



“Road” PILOT complete when CTPM and PVP predictions converge

Political climate (2018)



- Since the Conservative government came to power, both in coalition and after, the UKPF service has been devastated by cuts to officers and staff, including Police Community Support Officers (PCSO).
- The UKPF are now “under-staffed, over-worked and over-stretched”. In 2010 there were 79,500 police staff working for forces in England and Wales. **By March 2016, this number had dropped to 61,668, representing a cut of nearly 23% in the police staff workforce.**
- In 2018, the government increase Police funding by £450 million (mostly for counter terrorism)
- **The number of patrol cars has reduced by 30% since 2016**
- There is still a goal to drive efficiency, consequently the UKPF is going through in-depth reforms.



Protocol change needed



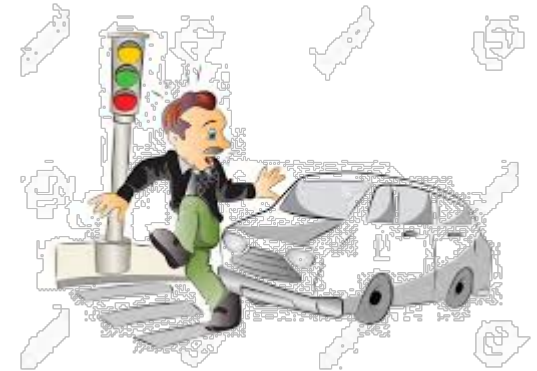
- UKPF's priority is to secure the road where the collision took place, gather for court proceedings, ensure that the body is retrieved, transferred to the hospital and the coroner made aware of the fatal collision.
- First stage of the project requiring the **UKPF to make the decision on whether the pedestrian collision meets the project sampling requirement is not possible and not reasonable knowing the current pressures.**
- This would require that a region of the UK would be trained and made aware of the project Road, which is also not practical.
- Overall, this is a major change to the RTC UKPF protocol, and as each UKPF's processes are different, it is not possible to acquire a global change across all the Force



Effects on “RoAD” PILOT



- The Political changes means that the data traceability between CTPM - PM - accident data from UKPF much harder to establish
- Some cases will be CTPMed but of no value to “RoAD”:
 - Vehicle too old
 - Impact speed excessive
 - Pedestrian out of the design space
- If some are of value to “RoAD”, the next of kin may refuse the release of data
- **CTPM vs PM part of “RoAD” will be the least affected, as any CTPM is useful information to solve this societal challenge (just need next of kin acceptance)**
- **PVP vs CTPM accident reconstruction will be the most affected, as full dataset will be much lower.**



Bigger coroner involvement?



First phase could be led by Coroner. (Not discussed to date, just an idea)

1. The coroner would obtain the vehicle model and year of registration from the UKPF and thanks to a set of rules, or by contacting directly Coventry University, would earmark the accident as a potential candidate for RoaD.
2. The coroner will have to locate the body after it has been sent to a hospital as well as a pathologist to confirm whether the deceased falls within the right age and sample size.
3. A special team of the UKPF, the Family Liaison Officers (FLO) would support the family, build a relationship and trust to support the consent signature at a later stage when the time is right.
4. Transfer the deceased to the correct hospital in which the “RoaD” researchers will performed an advanced CTPM
5. The UKPF will then take the lead on the investigation (data gatekeepers)

This would involve ALL or a group of coroners to agree to this process, in order to maximise the number of research sample data

**Problem solved !
All the right data
would be collected
and managed
BUT lot of work for
Coroners and UKPF**

Yes, BUT...



- “RoAD” project was setup to work alongside “live” court cases,
- **Research running in parallel with the prosecution (cases go to trial)**
- However, in 2018, as part of the English Law, all information must be made available to the Court
- **As a consequence, any data, even anonymised, which have been provided to a third party must be made known to the defendant, even if the purpose of the research is not for litigation purpose.**
- Consequently, the defence could contact the “RoAD” research team and gather information that may be used in court to cast doubts within the jury.
- Data extracted and not used, i.e. CTPM, could be questioned

Scenario not acceptable to UKPF (was not foreseen initially a problem)

Workaround tried...



- UKPF have asked other Forces if CTPM on RTC involving pedestrians were performed as standard. **This is not the case.**
- Ask DfT to CTPM all RTC and include this data in RAIDS. **Costly solution:**
 - 446 pedestrian death on UK roads in 2016
 - If £1,500 per CTPM (including scan, transport and expert report)
 - £700,000 per year if all RTC are done
 - Maybe a reduced set?
 - Discussion needed
- Using “living” cases. Under-discussion. Redraft of project would be needed
- Requested UKPF to extend use of data to other EU Police Forces/ EU research bodies. **Request under investigation. Problem of Brexit.**
- **Only obvious solution: wait for the court case to complete, leading to 6 to 8 months delay in obtaining the accident data. It is a 2 year project, so not ideal.**

Conclusions



- Project has just started
- Setting up a project is a lengthy matter. Expect the unexpected
- Project has found a “can-do” team to work around challenges.
- The societal benefits are understood both from coroners and UKPF
- CTPM vs PM study does not depend on the vehicle type, hence this part of the project should yield the highest
- Legal implications mean that the PVP vs CTPM study will be most hit, but will still go ahead with reduced data
- It is believed that vehicle designs and forensic computer investigations will be improved using the outcomes of “RoaD” (initial aim of the project)

Acknowledgements



- CADLM: for brainstorming, supporting the concept of the global “Road” project and providing the inspiration which has led to its successful acceptance.
- UKPF: for their unconditional support and their positive attitude toward the research Coventry University has so far undertaken
- UK Coroners: for their support and commitments support our society when in painful circumstances