

Background

- Anaphylaxis is a life threatening systemic allergic reaction with an annual incidence of 10.2/100000 in the UK and approx 20 deaths/yr.^{1,2}
- Intramuscular (IM) epinephrine is first line treatment for anaphylaxis.
- Studies have shown that injection into the vastus lateralis muscle provides more rapid onset and higher peak plasma concentrations than subcutaneous routes in both adults and children.^{1,3}
- As most episodes occur outside of medical facilities the use of epinephrine autoinjectors (EAI) is necessary.
- The 2 common EAIs in the UK are EpiPen and Jext, with mean exposed needle length 15.02mm and 15.36mm respectively.⁴
- Given the increasing epidemic of obesity in Europe (52.6% either overweight or obese)⁵, we assessed whether current EAIs have adequate needle length for IM delivery.

Aims

1. To ascertain if the needle length of common EAIs are of sufficient length to reach the recommended injection site (vastus lateralis)
2. Assess suitability of other injection sites in our population of allergy patients.

Method

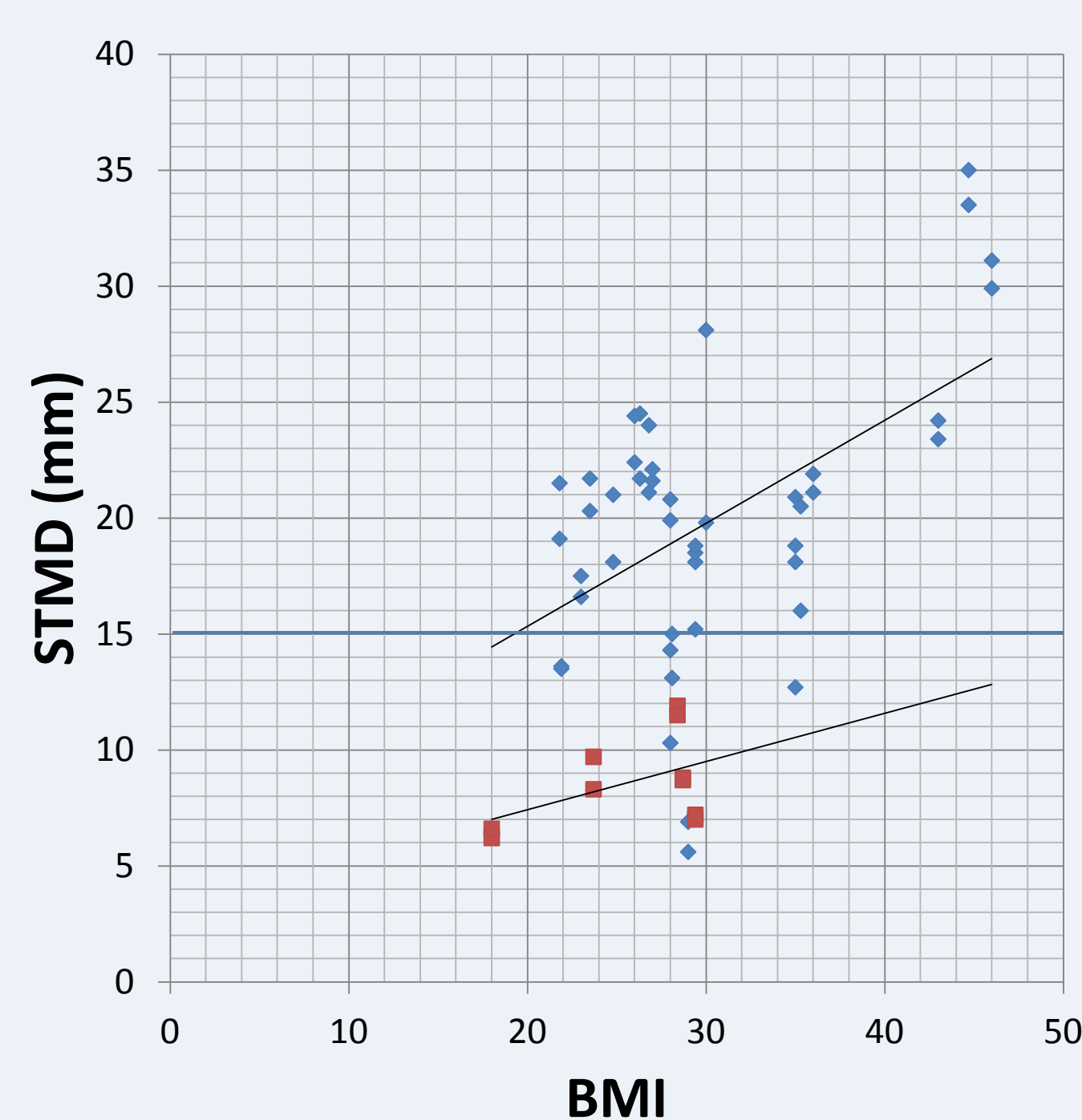
Adult patients already prescribed EAIs for a clinical history of anaphylaxis over the preceding 4 years were examined with ultrasound (US) and measurements of skin to muscle distance (STMD) at anterolateral thigh, anterior thigh and deltoid areas were performed.

Results

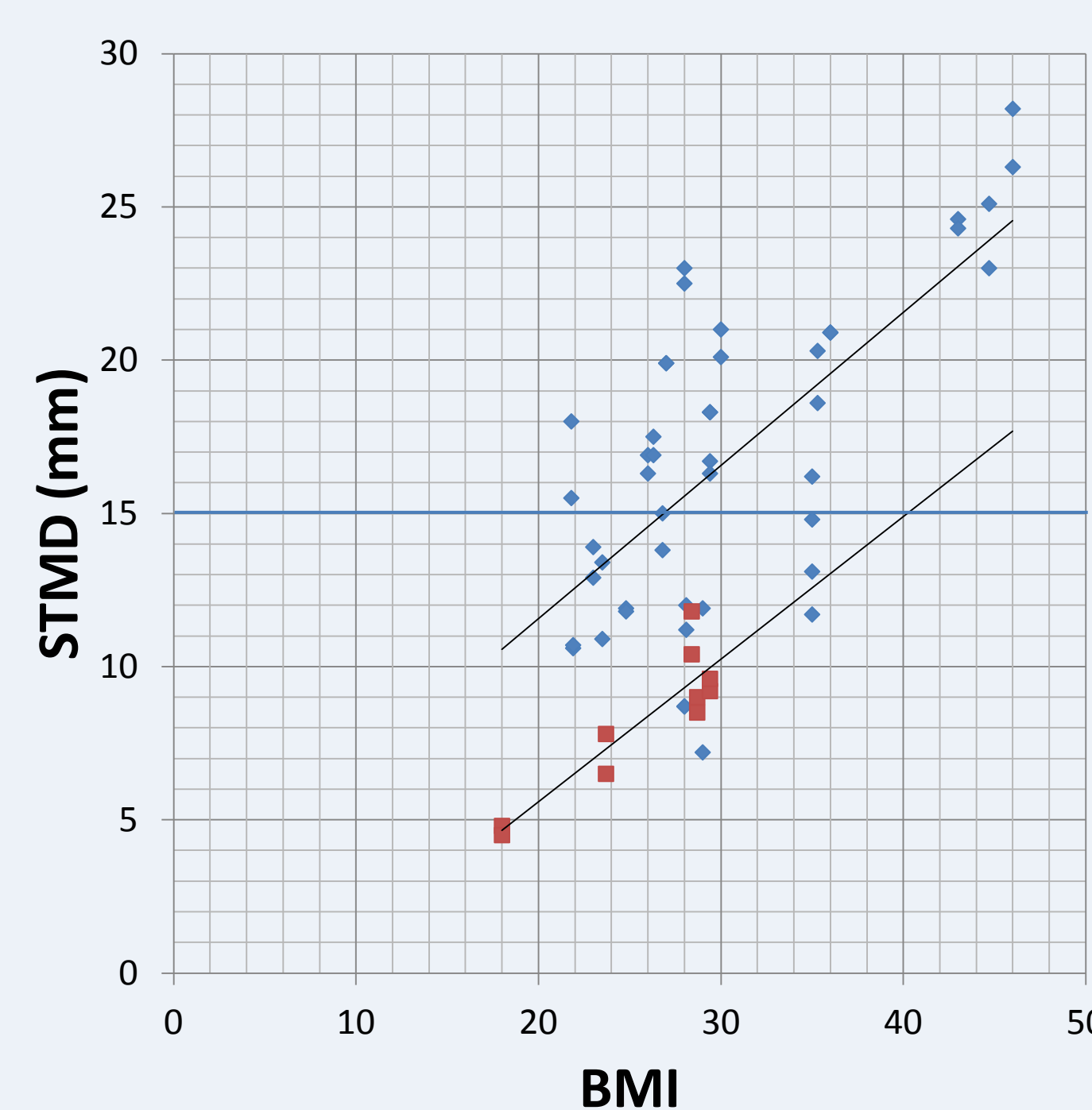
- 28 patients with female to male ratio 23:5
- Age range 18-75years
- BMI range 18-44

	Left Ant-lat thigh	Right Ant-lat thigh	Left ant thigh	Right ant thigh	Left deltoid	Right deltoid
Mean STMD (mm)	17.4	18.3	15.1	15.3	11.2	11.1
No. with STMD > needle	18	19	13	14	5	6
% with STMD > needle	64.3	67.9	46.4	50	17.9	21.4

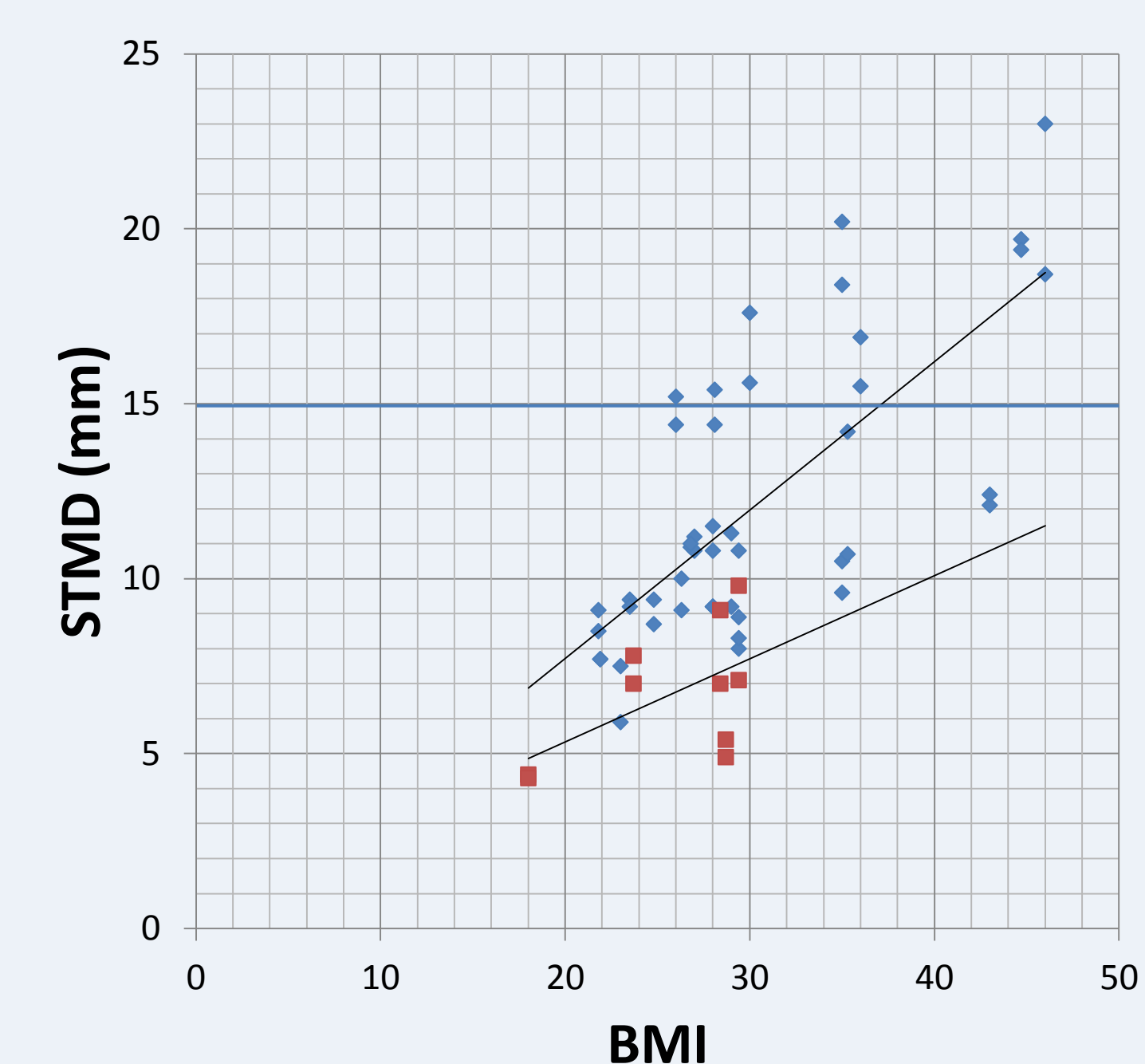
Scatter plots showing the relationship between STMD, BMI and gender for each anatomical site



• Anterolateral thigh female
• Anterolateral thigh male



• Anterior thigh female
• Anterior thigh male



• Deltoid female
• Deltoid male

Key – Blue line equals the mean length of an EpiPen needle (15.02mm), Black line equals line of best fit

Discussion

- Jext and EpiPens have insufficient needle length to administer IM adrenaline to vastus lateralis in 68% of our patient group.
- There is a strong correlation with increasing BMI and female gender with increasing STMD.
- We would recommend that when EAIs are prescribed a bed side US should be performed to assess STMD and the best injection site determined. In Emergency Departments or Respiratory clinic this would be facilitated by the routine presence of hand held US equipment.
- In cases where there is no suitable site located extra advice and training should be provided including recognising an anaphylactic reaction early, calling for help early and carrying two pens at all times.
- Pharmaceutical companies need to consider producing EAIs with a range of needle sizes including longer needles. This will allow physicians to tailor their choice of needle size to the individual patient.

References

1. A Frew. What are the 'ideal' features of an adrenaline (epinephrine) auto-injector in the treatment of anaphylaxis? Allergy 2011; 66: 15–24.
2. NICE clinical guideline 134 Anaphylaxis: assessment to confirm an anaphylactic episode and the decision to refer after emergency treatment for a suspected anaphylactic episode. Issued: December 2011.
3. F Estelle, X Gu, and K Simons. Epinephrine absorption in adults: Intramuscular versus subcutaneous Injection (sc vs IM). J Allergy Clin Immunol. 2001;108:871-3.
4. A Schwartz and H Seeger. Comparison of the robustness and functionality of three adrenaline auto-injectors. Journal of Asthma and Allergy 2012;5 39–49.
5. <http://www.hscic.gov.uk/catalogue/PUB13648/Obes-phys-acti-diet-eng-2014-rep.pdf> Statistics on Obesity, Physical Activity and Diet: England 2014

Conflict of interest

In relation to this presentation, I declare the following, real or perceived conflicts of interest: lmed, the makers of the EAI Emerade, have supplied a travel bursary for this conference. This was sought after both the research and the analysis had been completed.