Injection site reactions following booster doses of DTPa vaccines– An education article

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With the introduction of the DTPa (Diphtheria, Tetanus, Acellular Pertussis) booster vaccine scheduled at 18 months, it is a very opportune time to revisit and discuss Injection Site Reactions (ISRs). These are one of the most commonly reported reactions to SAEFVIC (Surveillance of Adverse Events Following Vaccination in the Community).

Injection Site Reactions (ISRs) are coded as either minor/common/expected or severe (see table). Once coded the reports are forwarded to TGA/ADRs (Therapeutic Goods Administration/Australian Drug Reactions) which are summarised on their website: https://www.tga.gov.au/database-adverse-event-notifications-daen

Of the 280 reports for ISR following dose 4 of DTPa/IPV made to SAEFVIC in 2013-2014, 53% coded as minor/common/expected, 44% coded as severe and 3% were coded as cellulitis (all of which had been prescribed antibiotics).

ISR'S are one of the most frequently reported AEFI (Adverse Event Following Immunisation) post booster doses of DTPa containing vaccines. Of those who receive 4th/5th booster doses of DTPa containing vaccines, approximately 20% will experience a minor/common/expected ISR's and approximately 2% will experience a severe ISR. Severe ISRs can be confused with bacterial cellulitis (infection of the skin/ underlying tissues), which is extremely uncommon

With the uncertainty around the pathogenesis of ISR's a study was performed by Marshall et al 2006 investigating a small cohort of 12 4-6 year olds (due the DTPa booster) who had previously had an extensive limb swelling (ELS) post their 18mth DTPa. Those who developed ELS following their 5th booster dose at 4-6 years of age were enrolled in the study. They performed clinical assessment and ultrasound assessment of the affected area using the opposite limb as a control. They concluded that the ELS involved swelling of both subcutaneous and muscle tissues with swelling and duration more marked in the subcutaneous tissue suggesting angioedema of the tissues rather than inflammatory cellulitis.

When the presentation of ELS/Severe ISR is not identified correctly it can lead to a differential diagnosis of cellulitis. Careful consideration is necessary when making the diagnosis of cellulitis to ensure the appropriate choice of medical management i.e. antibiotics (Marshall et al 2006). Interestingly, K Lapphra and D Scheifele (2009) were unable to identify a single case of bacterial cellulitis as a complication of booster doses of DTPa/IPV containing vaccines between 1998-2009.

Learning Points

- Immunisation providers should be aware that ISRs post booster doses of DTPa containing vaccines do occur.
- It is important to inform parents/guardians of the risk of ISRs
- The peak time for symptoms is approximately 24-28hours and resolution of symptoms is usually within 1 week from onset.
- Tenderness is usually reported initially and resolves as the ISR enlarges.
- Severe ISRs will usually extend above (and/or below) the joints on the affected limb i.e. shoulder or elbow.
- Limitation of motion is uncommon.
- Symptomatic management is recommended including cool compress and analgesia.

- A history of ISR severe is **not** a contraindication to future DTPa containing vaccines. This will be a very important consideration with the introduction of the 4th booster dose of DTPa at 18mths and 5th booster dose at 4 years.
- If there is any level of concern about symptoms consider referral to a healthcare provider for assessment.

SAEFVIC can be contacted for advice on 1300 882 924 (option 1) between 9am and 4pm Monday-Friday.

To submit an adverse event report online please visit www.saefvic.org.au or by fax on 9345 4163.

Definitions

Brighton Collaboration Diagnostic Criteria – case definitions for coding Adverse Events Following Immunisation (AEFI). See the table below for diagnostic criteria relating to ISR's to assist in the assessment and diagnosis.

	ISR (minor)	**ISR (severe)**	**Cellulitis**
Diagnostic Criteria	Visible enlargement of injected limb	Visible enlargement of injected limb	Inflammatory condition of the skin related to bacterial infection
	Local swelling near to but not including injection site/s	Assessed by a healthcare provider as having "joint-to-joint" enlargement or swelling (i.e. from shoulder to elbow) including entire portion of limb between the joints	Assessed by healthcare provider
	Swelling including injection site/s	"Crossing joint" where enlargement or swelling crosses at least one joint (i.e. shoulder joint)	
Objective/Subjective signs and risk	Erythema	Erythema	Erythema
	Tenderness	Tenderness	Pain/tenderness
	Induration	Induration	Induration
			Systemic signs i.e. fever and toxicity
	Expected/Common	Expected	Rare
Suggested treatments	Spontaneous resolution with symptomatic relief i.e. cool compress and analgesia	Spontaneous resolution with symptomatic relief i.e. cool compress and analgesia	Antibiotic treatment

References and further reading

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4. Lapphra K & Scheifele D. Paediatrics & Child Health. 2009 April; 14(4):245

5. Marshall HS, Gold MS, Gent R, et al. Ultrasound examination of extensive limb swelling reactions after diphtheria-tetanus-acellular pertussis or reduced-antigen content diphtheria-tetanus-acellular pertussis immunization in preschool-aged children. Pediatrics 2006;118:1501-9.
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7. Quinn P, Gold M, Royle J, Buttery J, Richmond P, McIntyre P, et al. recurrence of extensive injection site reactions following DTPa or dTpa vaccine in children 4-6 years old. Vaccine. 2011;29(25):4230-7