A Rustle in the Paddy Field

Snakebite as an Occupational Disease of Poor Rural Workers in Asia

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Extent of the Snakebite Problem

• Should we be worried about snakebite?
• Approximately 2.5 to 5 million venomous snakebites occur globally every year
• More than 100,000 people die from snakebite every year
  • Some experts estimate up to 200,000 deaths/yr
  • In India alone >45,000 die annually
• About 400,000 people require amputations following snakebite annually
• Snakebite is the most neglected of all neglected tropical diseases
World Health Organisation

• Several years ago WHO finally agreed to add snakebite to it’s list of Neglected Tropical Diseases
  • A few years later it removed it from the list, demoting it other tropical diseases of lesser importance

• Why?
  • Because powerful lobby groups with money wanted to ensure resources for their issues were not diluted
  • They pointed to the relatively patchy data on snakebite

• Hope on the horizon
  • In 9 days time the full WHO Assembly will devote time to considering the snakebite problem, with many countries, led by Costa Rica, promoting this debate
Who is at risk of snakebite?

• Almost everyone

• Particular risk groups include
  • Rural workers
  • Poor people especially in the rural tropics
  • Remote area workers (mining, petroleum etc industries)
  • People working with snakes/venoms
  • Military personnel

• Snakebite is, overwhelmingly, an occupational disease
Snakebite as an Occupational Disease

• Some comparisons
  • Asbestos-related diseases cause ~ 100,000 deaths/yr globally
  • Work-related accidents and diseases cause ~ 2.3 million deaths/yr

• Snakebite kills >100,000/yr, most likely >150,000
  • May account for equivalent of 5% of all work-related deaths
Snakebite in a poor rural community

- The person bitten most often is a productive worker, supporting their family & community
- The patient will often need to seek medical care remote from their home/work

Economic costs
- Cost of transport to hospital
- Cost of lost earning capacity/time
- Cost of relatives accompanying to provide in-hospital care
- Cost of lost earning capacity/time for relatives

Example
- In Myanmar commonly total cost exceeds total family income for 1 year!
- This condemns family to years of poverty
Tackling the Snakebite Problem

• Prevention
  • Arguably the most cost effective response
  • Community education
    • Make clear the potentially severe consequences of snakebite
    • Death or permanent injury
    • Economic cost
  • Avoid risky behaviour
  • Reduce likelihood of snake encounters
  • Reduce attractants for snakes in areas people frequent
  • Training on how to respond if snakes are found in areas people frequent
  • Identify, train and support local “champions” of prevention strategies
Tackling the Snakebite Problem

- Prevention
- Education of specific at-risk groups
  - Make clear the potentially severe consequences of snakebite
    - Death or permanent injury
    - Economic cost
  - Use of appropriate PPD
  - Avoid risky behaviour
  - Reduce likelihood of snake encounters
  - Reduce attractants for snakes in work areas
  - Training on how to respond if snakes are found in work areas
  - Identify, train and support local “champions” of prevention strategies within the workforce
  - May include training on snake removal
Tackling the Snakebite Problem

• Treatment
  • Ensure health staff at all levels are trained in snakebite management
  • Efficient provision of effective care
  • Provide appropriate resources where most needed
  • Antivenom etc at smaller hospitals to allow short bite-to-needle time
  • Appropriately trained staff

• Ensure antivenom is
  • Appropriate for snake fauna
  • Both safe and effective
  • Affordable
Tackling the Snakebite Problem

• The realities of snakebite
  • Health resources are often poor or non-existent in areas of most need
  • Rural communities have little trust in health systems and so use traditional healers
  • TDs provide useless or dangerous treatment and delay reaching definitive care
  • Antivenom is often unavailable, or of poor quality, or is too expensive
  • Corruption allows distribution of inappropriate antivenoms
  • Health staff often untrained in snakebite and afraid to use antivenom even when available
Tackling the Snakebite Problem

• Define the extent of the problem
• Statistics on snakebite and other forms of envenoming are often lacking
• Hospital data accounts for only a small fraction of the actual disease burden for snakebite
  • The Indian million death study dramatically illustrates this
• There is an urgent need to accurately document the true disease burden
  • Delineating the problem will allow appropriate resource allocation
Tackling the Snakebite Problem

- What about foreign workers sent to snakebite-prone areas?
  - Need to define the nature of the risk
    - Local snake fauna
    - Likely mechanisms of bites - develop prevention strategies
    - Available health resources locally if a worker is bitten
    - Develop a clear clinical response pathway before deployment of personnel and provide required resources (antivenom etc)

- How to achieve this?
  - Engage a clinical toxinology expert
An Example
Myanmar
Myanmar Snakebite Project

- **Myanmar (Burma)**
  - A poor, backward, SE Asian nation of ~ 55 M people, covering diverse ethnic groups
  - A vibrant venomous snake fauna, notably
    - Vipers: Russell’s viper, green pit vipers
    - Elapids: cobras, kraits, king cobras, sea snakes
  - An historic snakebite problem
    - Snakebite has been amongst the top 10 causes of death
    - Officially at least 14,000 cases & >1,000 deaths/yr
    - Estimate of ~ 80,000 cases & >2,000 deaths/yr
    - Snakebite causes >70% of all cases of AKI and these have ~ 30+% mortality rate
  - Myanmar has long produced it’s own antivenom
  - Recent problems with production resulted in importation of Indian AV
Russell’s viper - *Daboia siamensis*
Monocellate cobra - *Naja kaouthia*
Green pit viper - *Trimeresurus albolabris*
Malayan krait - *Bungarus candidus*
Myanmar Snakebite Project

• What clinical problems does snakebite cause?

• Current information suggests
  • Russell’s viper - coagulopathy, kidney failure, skin damage, shock, Sheehan’s syndrome (anterior pituitary haemorrhage)
  • Cobras - neurotoxic paralysis and/or skin damage
  • Green pit vipers - coagulopathy, skin damage
  • potential diagnostic confusion with Russell’s viper bite
  • Kraits - neurotoxic paralysis, possibly systemic myolysis
Myanmar Snakebite Project

• What are the current issues affecting outcome for snakebite patients?

• Inadequate training of health staff in snakebite management

• Inappropriate resourcing of peripheral levels of the health system

• Can cause loss of community confidence, increased bite-to-needle time

• Inability to produce enough antivenom locally

• Flow on effect is increasing use of Indian antivenom which is far less effective
Myanmar Snakebite Project

- We were approached by the Myanmar government to help solve their snakebite problem, starting with antivenom production.
- We have successfully applied for Australian Government (DFAT) funding to tackle the snakebite problem in Myanmar.
- Foreign aid funding granted in late 2014, running through till 2018 (~$4 million).
- Project managed through the University of Adelaide.
- Project executive:
  - Dr. Chen Au Peh (RAH - renal physician)
  - Prof. Julian White AM (WCH - clinical toxinologist)
  - Dr. Afzal Mahmood (UniAdelaide - public health physician)
Myanmar Snakebite Project

- The Project in outline
  - The Project central aim is to improve outcomes for snakebite patients throughout Myanmar
  - Our approach is holistic
  - There are 3 Project focus areas
    - Improve the quantity and quality and sustainability of Burmese antivenom production and to achieve full self-sufficiency
    - Improve the distribution and availability of antivenom to all those in need
    - Improve the management of snakebite from the village level through to major hospitals
Myanmar Snakebite Project

• Improving antivenom production

• We noted 3 problem areas, each of which we are tackling
  • Poor snake husbandry & venom production
  • Poor horse husbandry & plasma production
  • Poor quality assurance control
Myanmar Snakebite Project

- Improving clinical training and response
  - We identified several issues all of which we are tackling
  - Lack of sufficient training and resources
  - Lack of antivenom availability
  - Poor record keeping strategies

Myanmar Snakebite Project

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Guide to Snakebite Assessment

- History
  - Patient age & gender
  - Where was the bite? (Location of bitten site)
  - Where did the patient get to the hospital?
  - Where did the patient get bitten?
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In Summary

• Snakebite is a significant occupational disease

• For local workers (farmers etc) a multi-pronged approach is needed

• For companies using imported workers
  • Engage clinical toxinology experts to assist in determining
    • Risk profile
    • Prevention strategies including PPD
    • Training requirements and delivery
    • Care plans to best manage any cases that may arise
  • Health resource needs locally including antivenom
Questions?