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Sexual Assault Injuries and Increased Risk of HIV Transmission

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Sexual assault was the sixth leading cause of non-fatal injury in the United States (US) in 2007 (Department Of Justice, 2008). There were approximately a quarter of a million sexual assault victims in 2007 (DOJ, 2008). This public health concern coexists and in fact may feed another epidemic: that of the Human Immunodeficiency Virus (HIV) and Autoimmune Deficiency Syndrome (AIDS). The same group of young men and women (age 18–25) most at risk for sexual assault are also the fastest growing groups contracting HIV (El-Bassel, Cadeira, Ruglass & Gilbert, 2009; Greenwood et al., 2002; Petroll, Hare & Pinkerton, 2008). Sexual contact remains a major contributor to the spread of HIV transmission.

Risk of transmission is a product of the risk that the source person is HIV positive and the risk associated with a particular exposure (Fisher et al., 2006). Sexual transmission per any consensual sexual contact has been estimated between 0.1% and 3%, with higher transmission corresponding to receptive anal intercourse (DeGruttola, Seage, Mayer & Horsburgh, 1989; Gray et al., 2001). This article will explore the unique ways in which sexual assault may increase the likelihood of HIV transmission.

Description of the injury

A large portion of the sexual assault literature to date has focused on treatment of patients following sexual assault. The scope has been as narrow as injury to a specific part of genital tissue (Keller & Nelson, 2008) to the outcomes achieved by sexual assault nurse examiners (SANE) or forensic nurse examiners (FNE) in contrast to post-sexual assault care offered by physicians (Campbell et al., 2006). As the majority of reported assaults for which data exists were perpetrated by a male assailant upon a female victim, the mechanism of injury in sexual assault is most commonly blunt force trauma inflicted by a penis. Genital injuries typically range from point tenderness to lacerations requiring suture repair. HIV transmission is possible anytime there is a breach in the patency of skin i.e. exposed cell nuclei such as one might see with toluidine blue dye (Zink et al., 2010). It has been thought that sexual assault should be associated with higher risk of transmission as there is higher likelihood of broken skin with a violent assault than with consensual intercourse.

Consensual versus Non-consensual

A recent study by Anderson, Parker and Bourguignon (2009) compared chart review data from non-consensual intercourse to prospectively collected data from consensual intercourse. Using hierarchical logistic regression comparing the number of sites with injury and/or ecchymosis, total surface area of the injuries, and the number of hours since intercourse the researchers were able to correctly differentiate injuries consistent with non-consensual intercourse from those consistent with consensual intercourse 85% of the time (Anderson et al., 2009). This is not a great enough degree of certainty to convict a perpetrator of a crime; however, this well-designed study contributes important evidence to the knowledge base.

Using similar methods, Anderson, Parker and Bourguignon (2008) also found that after consensual intercourse the evidence of injury decreases inversely with time. This is

consistent with pathophysiology of injury and the body's response and natural course of healing. It could be inferred that the same decrease in apparent evidence of injury would hold true for non-consensual intercourse the greater the length in time between the assault and examination.

Assault-related Injury and Associated Risk

Injuries which increase risk of transmission include abrasions and lacerations (broken skin). These injuries are most often to the posterior fourchette and the fossa navicularis. These injuries are found in 22% to 90% of patients reporting sexual assault (Anderson, McLain & Rivellio, 2006; Palmer, McNulty, D'este & Donovan, 2004; Sommers, 2007; Stears, Rossman, Wynn & Jones, 2008). As stated in the introduction, the risk of transmission varies by the type of exposure. Between 15% and 30% of patients do not know what area was exposed during their assault (Drocton, Sachs, Chu & Wheeler, 2008; Du Mont et al., 2008). There are many reasons for not being able to recall what happened, ranging from drug facilitated sexual assault (date-rape drugs) to unintentional memory blocking as a protective mechanism.

Anal and/or rectal injury—Of those who can recall what happened during their assault, 10% to 15% of reported sexual assaults including unprotected receptive anal intercourse which has the highest recorded rate of HIV transmission (Drocton et al., 2008; Girardet, Lemme, Biason, Bolton & Lahoti, 2009; Hilden, Shei & Sidenius, 2005; Kerr, et al., 2003). The reason for higher risk of transmission is because the rectal tissue is more friable, non-lubricating and more prone to tearing.

Oral injury—Oral penetration is on the opposite end of the HIV transmission risk spectrum. About 25% of sexual assaults involved oral penetration (Riggs, Houry, Long, Markovchick & Feldhaus, 2000). Transmission after ingesting infected fluids can be increased by abrasions and other open sores (either present or induced during assault) (Mbopi-Keou, Belec, Teo, Scully & Porter, 2002). It is possible to have frenulum tears inflicted during both consensual and nonconsensual oral acts. Furthermore, if the patient was beaten around the face prior to oral penetration it is likely that more broken skin and mucous membranes would be vulnerable to HIV transmission via ejaculate.

Vaginal injury—The vast majority of assaults 55% to 80% include vaginal penetration (Kerr, Cottee, Chowdhury, Jawad & Welch, 2003). There are many factors which may affect risk of HIV transmission for example the age of the patient and attendant postmenopausal changes in vaginal lubrication (Poulos & Sheridan, 2008). A recent review examined the evidence available specific to cervical injury and found most commonly that there was erythema only to the cervix following sexual assault (Keller & Nelson, 2008). Unfortunately, the literature available is dated and suffers from lack of consistency in documentation and examination of injuries as well as what caused the specific injuries. Erythema does not indicate that the skin was broken.

Object penetration associated injuries—In Sturgiss and colleagues' (2010) ground breaking study of object penetration during sexual assault, they found that when an object was utilized for penetration there was a greater likelihood of both genital and extra-genital injuries. The authors performed a retrospective chart review comparing sexually assaulted patients who reported object penetration to sexually assaulted patients who did not report object penetration. Sturgiss and colleagues (2010) also found that a significant portion of their study sample experienced other types of penetration in addition to object penetration, including penile penetration. If a patient had injuries inflicted by the object (often a glass bottle or even a piece of glass) there is much greater likelihood of associated trauma. If this

is then followed by penile insertion (with or without ejaculation) the likelihood of HIV transmission would be greatly increased. Similarly, with sexual assault there are often extra-genital injuries, that is, injuries to other parts of the body.

Other assault-related injuries—Sexual assaults are often associated with injury to areas of the body in addition to genital injury. Over 60% of patients in Belgrade over a five year period sustained extra-genital injuries, the majority of which were contusions which would not increase likelihood of HIV transmission (Alempijevic, Savic, Pavlekic & Jecmenica, 2007). In a study of police reported sexual assault in Baltimore MD (Read, Kufera, Jackson & Dischinger, 2005) the authors found that 45% of patients had some type of non-genital injury. Maguire, Goodall and Moore (2009) found non-genital injuries in 60% of patients, 40% abrasion, 4% lacerations and 1% included burns and bites. Consistent with Anderson and colleagues' findings (2008) patients examined within 72 hours of the assault had greater frequency of bodily injury than those presenting after 72 hours. This may be due to natural healing, or that patients who present within 72 hours have more severe bodily injuries.

These extra-genital injuries may pose an increase in transmission risk depending on severity, location, and mechanism of injury. For example, an assailant punches his victim in the mouth and gets a "fight bite" (the victim's tooth or teeth penetrate the knuckle). His blood is now exposed. It is highly likely that while being punched in the face, the victim's skin is broken. Now there are open wounds on both the perpetrator and the victim: risk of transmission is increased. Similarly, HIV transmission through bloody bite marks (Campo, et al., 2006) or other open wounds has been documented.

Perpetrator Characteristics

There are many factors related specifically to the perpetrator that may or may not play a part in the practitioner's HIV exposure risk assessment as it will usually depend on the quality of the patient's recall at time of exam. Specifics such as multiple assailants and acts performed may be much easier to recall than whether or not a condom was used, whether the perpetrator had another sexually transmitted infection (STI) or was circumcised.

Multiple assailants—In a retrospective analysis of over 1000 cases of sexual assault Riggs and colleagues (2000) found that 20% of their sample experienced an assault involving multiple assailants. In the study of object penetration, they found that assaults involving multiple assailants were also more likely to involve penetration with an object with injuries of greater extent (Sturgiss et al., 2010).

Erectile dysfunction—In a related study, Jones, Rossman, Wynn and Ostovar (2009) found that there was a greater incidence of extra-genital injuries (72% versus 46%) when a patient's assailant was unable to maintain an erection sufficient for penetration. In their sample 8% of assailants experienced erectile impotence (Jones et al., 2009). The authors did not find any difference in type of non-genital trauma between the women whose assailant experienced erectile impotence and those who did not.

Condom use—Condom use has been shown to decrease HIV transmission by 80% (Weller, & Davis-Beaty, 2002). However, in a study of incarcerated sexual offenders, 42.1% of rapists never used a condom (Davis, Shraufnagel, George, & Norris, 2008). If a condom was not used during an assault, the presence of concurrent STI in the perpetrator (and the patient) may present another venue for infection. Open sores on the penis would increase likelihood of HIV transmission (Galvin & Cohen, 2004; Fleming & Wasserheit, 1999). In Campbell and colleagues' (2008) review of literature regarding intimate partner violence (IPV) and HIV risk they found that abusive partners were more likely to commit non IPV

sexual assault and have multiple other sexual contacts, increasing their likelihood for STIs and HIV transmission (Campbell, et al., 2008).

Circumcision—There has been much discussion as to whether circumcision is protective against HIV infection. Researchers found that circumcision is more protective against HIV for the insertive person (De Vincenzi, & Mertens, 1994). The foreskin increases risk of HIV infection due to the high density of HIV target cells (Bailey, Plummer, & Moses, 2001; Weiss, 2007). Circumcision may decrease HIV transmission by up to 60% and reduce risk for other STIs (Bailey, Plummer & Moses, 2001; Weiss, 2007). This effect may be more pronounced in resource-poor areas where HAART is less available (Millett, Flores, Marks, Reed & Herbst, 2008). This may be more important in cases of male patients with incidence of forced penetration of their assailant, no matter the sex of the perpetrator.

Treatment Implications

As can be seen in the research previously discussed, accurate assessment and documentation of injuries sustained during a sexual assault is especially important in the context of HIV risk assessment. This assessment and documentation of injuries as well as the patient's report of what occurred during the assault will have an effect on whether or not the patient is offered HIV post-exposure prophylaxis (PEP).

In 2005 the CDC updated its non-occupational PEP (nPEP) guidelines such that nPEP is offered routinely, only to those who are at 'high risk'. A high risk exposure is: exposure of the vagina, rectum, eye, mouth, or other mucous membrane with blood, semen, vaginal secretions, and rectal secretions, only when the source is known to be HIV infected (CDC, 2005). When the source has unknown serostatus the health care provider, must make an assessment and nPEP is then offered on a case by case basis. Many sexual assault centers have developed site specific algorithms for offering nPEP in order to decrease the gray area (e.g. Wieczorek, 2010).

The consequences of not providing nPEP to an appropriate patient are life-altering and expensive. The estimated cost of treating one case of AIDS is \$223,000 versus the \$600-\$1200 for 4 weeks of nPEP; or approximately \$65–128 for a 3 day starter pack (CDC, 2005; Pinkerton et al., 2004). These costs are based on the CDC preferred medication regimens (CDC, 2005). Most states have mechanisms for reimbursing victimized patients for related expenses, including medical costs.

If the advanced practice emergency nurse feels or suspects that she or he is treating a patient who has experienced sexual assault, it is vital that the patient is provided appropriate forensically-based post-sexual assault care. This care is ideally coordinated through a forensic nursing or Sexual Assault Nurse Examiner (SANE) program where available. For further information regarding post-sexual assault care and follow-up, Linden (2011) reviews the care which should be provided to adult patients following sexual assault.

Conclusions

As can be seen from the discussion in preceding sections the factors associated with increased risk of HIV transmission following sexual assault are multivariate and complex. Appropriate assessment and documentation are vital during risk assessment for HIV transmission. The literature regarding injury in sexual assault is still sparse. In particular, associations between specific injuries and unambiguous mechanism of injury still need greater depth and breadth of inquiry. Furthermore, there are many difficulties inherent in linking HIV transmission and sexual assault therefore further research into nPEP after

sexual assault is needed. It may be further be appropriate to consider undertaking the creation of a measure relating to severity of injuries sustained both genital and extra genital to assist in HIV risk assessment.

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Biography

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