

The impact of assault by vitriolage on quality of life

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ABSTRACT

Aims: To analyse quality of life post vitriolage and explore factors affecting an individual's everyday functioning after an acid attack.

Background. Despite increasing incidences of acid assaults worldwide, there is a paucity of research exploring its impact on quality of life. The unique patient-centred role of nurses means they are well-placed to meet acid assault survivors' needs. However, the consequences of this event must first be exposed to address such issues in practice and support reintegration into society.

Design: Integrative review.

Data Sources: 570 articles retrieved from Medline, CINAHL Embase and Psychinfo between 2004-2017. Reference chaining and hand-searching yielded 12 further articles. Following application of inclusion and exclusion criteria, quality appraisal and relevancy scores, 12 articles underwent data extraction and analysis.

Review Methods: Whittemore and Knalf (2005).

Results: Five themes were identified; contextual factors, physical wounds, psychological wounds, social wounds and legal factors, as demonstrated by a conceptual model exploring traumatic events experienced by survivors.

Conclusion: The event, the burn injury itself, scarring and ocular damage are core factors that impair quality of life. Legal and socio-cultural factors also influence outcomes and psychological functioning. Overall, patients find it difficult to reintegrate into society following the assault and discrepancies between medical and social services further prevent them from achieving their premorbid level of functioning. Nurses can use the biopsychosocial findings of this review to provide effective care for those assaulted by acid. It also provides a basis of discussion and application to other permanently disfiguring conditions and intentional injuries.

Impact:

What problem did the study address?

The study has addressed the need to determine the impact of acid assaults on quality of life since the global incidence of acid violence has become increasingly prevalent over the last 15 years.

What were the main findings?

Survivors of an acid assault often experience legal, physical, psychological and social problems; all of which negatively impact their ability to function within society. Findings suggest no single person will have the same experiences since the burden of injury is dependent on socio-cultural and contextual factors rather than the degree of injury alone. Inadequate coordination between medical, social, legal and political services hinders reintegration into society and causes some survivors to be permanently traumatised.

Where and on whom will the research have an impact?

This review can assist nurses in understanding how acid assaults impact upon quality of life to help reduce the burden of injury and support reintegration into society upon discharge.

This will lead to more holistic and effective nursing care for those assaulted by acid; ultimately improving survivors' quality of life.

Keywords: Integrative review; nursing; acid assault; acid attack; acid burn; acid throwing; chemical burns; intentional violence; burns; quality of life

INTRODUCTION

An acid attack (or vitriolage) refers to the process by which a perpetrator throws an acidic substance onto a victim, causing intentional harm by disfiguration (Herndon, 2017). Globally, the incidence of chemical assaults has increased in recent years, however epidemiological data must be considered contextually (Mannan, Ghani, Clarke & Butler, 2007). Compared with other mechanisms of burn injury, acid assaults are unique in that patient outcomes and injury severity depend on potency of acid used and duration of exposure of corrosive substance with the skin (Palao, Monge, Ruiz & Barret, 2010). Aside from basic and alkaline substances, common agents used for assault include sulfuric, nitric, hydrofluoric and hydrochloric acids; all of which cause extensive physical and psychological damage (Mannan *et al.* 2007; Milton, Mathieu, Hall & Maibach, 2010).

Background

Acids are defined as corrosive substances with a pH <2 (Maibach and Honari, 2010). Direct contact of acids with the epidermis can cause a continuous burning process, whereby damage worsens until the chemical reaction has finished or treatment (neutralisation) is initiated (Maibach and Honari, 2014). Following exposure, redox reactions and hydrolysis result in protein denaturation; severely damaging the skin (Palao *et al.* 2010). Ultimately, the degree of damage following assault depends on the acid's concentration, quantity, length of contact with skin, penetration and mode of action (Palao *et al.* 2010). Immediate first aid is therefore vital to reduce the extent of injury through irrigation and examination; with treatment for systemic toxicity, ocular damage and inhalation injury if evident.

Historically, acid has been used as a chemical warfare agent, however it has become an increasingly popular means of assault due to availability and limited traceability (Peck,

2012). A literature review by Mannan *et al.* (2007) **emphasized** that acid attacks are a worldwide problem with country-specific trends. Analysis of this phenomenon has proven difficult due to a paucity of epidemiological studies and uneven distribution in reporting acid assaults internationally, potentially because acid violence is more prevalent in developing countries (Mannan *et al.* 2007). Therefore, alongside individual hospital-based studies, information from non-governmental **organizations** (NGOs) has been widely used to understand the extent of acid violence. Table 1 shows vitriolage is an international, topical issue with a predominance in Asian countries and a range of potential motivations including gender-based violence, robbery and unprovoked attacks.

[Insert table 1 about here]

Regardless of motive, the unique circumstances surrounding an acid attack and specific mode of injury leave survivors with permanent disfiguration. This results in a sudden change in their ability to function, cope and continue living as they did pre-assault (Khoshnami, Mohammadi, Rasi, Khankeh, Arshi, 2017). Such concepts can be explored by investigating quality of life (QoL); a term which describes an individual's perceived position in life, encompassing their purposes, hopes, values and concerns (World Health Organization, 2018). Thus, it is of great importance that nurses caring for those assaulted by acid understand specific factors associated with impaired QoL to enhance recovery and reduce the burden of injury following this life-changing event (Demetris *et al.* 2014).

THE REVIEW

Aim

To conduct an integrative review analysing quality of life post vitriolage and explore factors affecting an individual's everyday functioning after an acid attack.

Research Question: How does assault by vitriolage impact on an individual's quality of life?

Design

An integrative review was selected to explore survivors' views and analyse quality of life (QoL) post vitriolage, with consideration of factors influencing QoL and the significance of the context in which it occurred. This was guided by Whitemore and Knafl's (2005) evidence-based framework since it enabled analysis of both quantitative and qualitative data sources in a systematic, rigorous manner. An integrative approach was selected due to there being a small but significant number of primary research articles from diverse methodologies focussing on acid attacks. Furthermore, interesting findings have been published concerning

functional outcomes and health-related quality of life following general burn injuries (Stavrou *et al.* 2014; Thompson & Kent, 2001), however reviews focussing on acid attacks as a distinct aspect of burn injuries have not yet been conducted. Thus, integrating research from various primary data sources enables a comprehensive and in-depth understanding of this complex phenomenon (Whittemore and Knalf, 2005) in the context of increasing global recognition of acid assaults and its significance to nursing care.

Search Methods

This review included papers from 2004-2017. Literature searching was undertaken by SD using an iterative approach, whereby search terms were refined and combined to retrieve relevant articles, while **minimizing** the potential to exclude significant research by over-specificity. Preliminary database searches, including the Cochrane database of systematic **reviews were** undertaken to determine whether similar reviews had been previously conducted (Gerrish & Lathlean, 2015). None were identified.

Use of SPIDER (Cooke, Smith & Booth, 2012) (Table 2) guided formation of the research question and search terms. Synonyms for each term were combined using relevant Boolean operators. Search terms included variations of ‘acid* attack*’ and ‘quality of Life’. These were guided by topic and author-specific terminology among existing literature, as well as the PRESS (2015) validated checklist to prevent search error bias (McGowan *et al.* 2016). Medical subject headings (MESH) and free-text searching were used, depending on outcomes and specificity. Terms were truncated and, to avoid overly complicating results, proximity searching was deemed inappropriate.

[Insert table 2 about here]

Potential databases were searched between October-November 2017. Some (Web of Science and PubMed) were excluded following an excess of irrelevant journals. Medline,

Cinahl, Embase and PsychInfo were found most relevant. Results were limited to English Language and displayed using the Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram (Moher, Liberati, Tetzlaff & Altman, 2009). Database searches were saved, and search alerts set up to identify newly-published articles during the review period. Results were then exported to RefWorks, after which handsearching and reference chaining were used to retrieve any omitted articles. Finally, inclusion and exclusion criteria (Table 3) were applied.

[Insert table 3 here]

Search Outcome

A total 570 articles were retrieved from four databases (Medline=277, Cinahl=50, Embase=228, PsychInfo=15), after which handsearching and reference chaining generated 12 further articles. Search alerts generated no additional articles. Following application of inclusion and exclusion criteria, 16 papers were critically appraised using the Mixed Methods Appraisal Tool (MMAT) (Pluye, Gagnon, Griffiths and Johnson-Lafleur's, 2011), resulting in rejection of two articles. Two additional articles were rejected because of low relevance (Supplementary table 1), despite initially seeming appropriate. Thus, there was a final dataset of 12 articles, summarised in the PRISMA diagram (Figure 1) (Moher *et al.* 2009).

[Insert supplementary table 1 here]

[Insert figure 1 here]

Quality appraisal

Pluye *et al.*'s (2011) MMAT was used to ascertain rigour of retrieved articles. This tool was selected for all studies since it enables concurrent appraisal of all study designs

based on generic quality criteria (Pace *et al.* 2011). Scores (poor:*, Fair:**, Good:***, excellent:****) were converted into percentages, providing an overall score for each study.

This enabled standardisation and comparison across qualitative and quantitative studies (Pace *et al.* 2011).

Synthesis

Thematic analysis was approached using Braun and Clarke's (2006) six-stage framework involving data familiarization, generating initial codes, searching for, reviewing, defining and naming themes. To facilitate this, similar topics were extracted into Microsoft Excel, where themes were compared and contrasted across articles. Where unsure, themes were verified by JT.

RESULTS

Table 4 provides an overview of included studies. Articles originated from numerous countries, with a prevalence in Asia (Bangladesh, $n=4$; Nepal, $n=1$; Cambodia, $n=1$; Sri Lanka, $n=1$). Remaining articles originated from UK, Nigeria, Uganda and Iran. Only one qualitative study was identified. A combination of prospective, cross-sectional analytical and descriptive papers was compiled, but most studies ($n=8$) were retrospective reviews that analyzed patient records from one hospital over a set time interval. All except three studies used purposive sampling, however this was occasionally inferred rather than stated. Included studies were of fair to excellent quality, as determined by the MMAT. Khoshnami *et al.*'s (2017) qualitative study was the most relevant and rigorous, having thoroughly considered reflexivity and taken measures to reduce bias; resulting in evidence-based conclusions. Nevertheless, some lacked evidence of statistical analysis ($n=7$) and consideration of bias; limiting the degree to which conclusions can be drawn.

Findings **revealed** factors affecting QoL and the impact on QoL. Five key themes emerged: contextual factors, physical wounds, psychological wounds, social wounds and legal factors. These are compiled in supplementary Table 2 and subthemes considered significant and relevant to QoL were selected for discussion. This is summarised by Figure 2, Figure 3 and Figure 4.

[Insert figures 2, 3 and 4 here]

[Insert table 4 here]

Influencing factors and impact on quality of life:

Contextual Factors

Delayed presentation

All patients in one study presented within 24 hours of injury (Das, Olga, Peck, Morselli & Salek, 2015), however eight studies revealed victims failed to seek immediate medical assistance. A large-scale Cambodian retrospective review ($n=254$) showed over 50% presented after two years of injury (mean: 1518 days) (Waldron *et al.* 2014). Interestingly, those who presented early had a significantly increased number of surgical interventions ($\bar{x}=3.1$) ($p=0.0003$) compared to those presenting late ($\bar{x}=1.5$). However, Mannan *et al.* (2006) found delayed presentation did not significantly influence psychological distress.

Inadequate treatment

Inadequate treatment occurred in pre-hospital and acute settings. Many patients had elementary education and lacked knowledge of first aid requirements. At times, insufficient irrigation and use of substances other than water caused more extensive burns (Karunadasa *et*

al. 2015; Olaitan & Jiburum, 2008). Regarding inadequate inpatient treatment, all cases in Tahir, Ibrahim and Terna-Yawe's (2012) study and superficial burns in Das, Khondokar, Quamruzzaman, Ahmed & Peck's (2013) study underwent conservative management because of delayed presentations and inadequate facilities, resources and skills. Additionally, surgeon uncertainty regarding the level of excision delayed grafting (Das *et al.* 2015) and operating time shortages meant one patient waited 21 days for an escharotomy (Asaria *et al.* 2004).

Physical wounds

Injury severity

Supplementary **table 5** demonstrates how injuries involve visible, public-facing, anterior aspects of the body; particularly the face, neck and abdomen (Asaria *et al.* 2004; Tan, Bharj, Nizamoglu, Barnes & Dziewulski, 2015; Waldron *et al.* 2014). Facial disfigurement, noted in 11 studies, was strongly linked with loss of beauty and identity, e.g. comparing their 'new face' with their 'old one'. Participants in Khoshnami *et al.*'s qualitative study felt their beauty had been destroyed, causing nonacceptance and worry it would not improve. Patients stated, "I always have the chagrin of my previous face"; "you became like a ghost without a face" (Khoshnami *et al.* 2017 p. 612-613).

Mannan *et al.* (2006) rated disfigurement severity using the **validated Katz observer rated nine-point Likert disfigurement scale**, which graded 65.9% ($n=44$) participants between 6 and 9 points; toward the severe end of the scale. This was not significantly correlated with psychological outcome, suggesting injury severity did not influence psychological distress. Despite this, the Derriford appearance scale (DAS59) revealed survivors had significantly higher self-consciousness and negative self-concept scores ($p<0.05$; $p<0.01$; $p<0.01$) compared to UK trauma norms.

Ocular damage

Ten studies noted ocular involvement and its effects (Table 5). Partial and complete blindness commonly occurred, although not all with ocular injuries suffered vision loss (Asaria *et al.* 2004; Karunadasa *et al.* 2010; Tahir *et al.* 2012). Resulting ocular complications (corneal opacity, perforation and ectropion) usually required specialist surgical management (Olaitan & Jiburum, 2008; Das *et al.* 2015; Karunadasa *et al.* 2010).

[Insert table 5 here]

Surgical procedures

Surgery was a core management option, however patients often had unrealistic expectations, leaving them dissatisfied post-operatively (Khoshnami *et al.* 2017). On average, 48.3% cases required surgical management, of which at least eight surgically-related fatalities occurred (Olaitan & Jiburum, 2008; Waldron *et al.* 2014). Procedures varied depending on injury severity, but significantly higher ($P < 0.0001$) levels of z-plasty and contracture release occurred among chronic patients compared to acute patients, who underwent more excision, debridement and grafting procedures (Waldron *et al.* 2014). Facial reconstruction was notably complex due to intricate three-dimensional structures and irregular, linearly burned skin in-between areas of healthy tissue (Tahir *et al.* 2012; Das *et al.* 2015). Many victims therefore experienced prolonged hospitalization and further outpatient appointments following discharge (Tan *et al.* 2015).

Scarring

Scarring commonly occurred post vitriolage (Table 5). Permanent scarring occurred in 93.3% ($n=15$) cases in Asaria *et al.*'s (2004) study, and Tahir *et al.* (2012) highlighted difficulty concealing facial scars. Scar contractures were a major problem, causing functional and aesthetic impairment (Waldron *et al.* 2014). Furthermore, mis-management and poor compliance with scar therapy often caused further disfigurement (Karunadasa *et al.* 2010; Das *et al.* 2015).

Complications

Survivors experienced various complications (Table 5). **Direct complications from the acid assault included ectropion, infection, respiratory distress and renal failure, in addition to sepsis, pulmonary edema and suicide** (Olaitan & Jiburum, 2008; Waldron *et al.* 2014).

Disfigurement and long-term functional issues included nasal deformities, mentosternal

contractures, lip ectropion, microstomia and pinna loss (Asaria *et al.* 2004; Tahir *et al.* 2012).

These often restricted airway access, causing anaesthetic issues, suboptimal surgical outcomes and surgical fatalities (Tan *et al.* 2015).

Psychological wounds

Psychological support and rehabilitation

Islam *et al.* (2014) revealed 84% ($n=112$) faced psychological problems following the attack, in agreement with Lama *et al.*'s (2015) study, where 8% ($n=36$) had a psychological condition and 53% reported interpersonal conflict or adjustment problems. Thus, rehabilitative support is necessary. Despite this, uptake of support services was lacking. In Sri Lanka pressure garment incompliance was noted and only 39% ($n=46$) patients attended a follow-up rehabilitation clinic (Karunadasa *et al.* 2010). In Uganda, only one patient ($n=15$) received a consultation with the psychiatrist and social worker (Asaria *et al.* 2004), while 8 patients were reviewed by clinical psychologists, despite all 21 being offered psychological support in Tan *et al.*'s (2015) study.

Hopelessness

Patients often felt futile post vitriolage, particularly when faced with sudden disfiguration.

Individuals stated,

“I have no hope of recovery”; *“I am very exhausted”*; *“In the first few months I was broken”*; *“I was not the previous person, I couldn't bear anything”* (Khoshnami *et al.* 2017, p.612).

Such psychological trauma caused some patients to commit suicide (Tahir *et al.* 2012; Waldron *et al.* 2014). Nevertheless, others reported self-restoration by accepting their

circumstances, choosing to carry on living and ignoring discriminatory remarks (Khoshnami *et al.* 2017).

Anxiety and depression

Compared to UK trauma group norms, Mannan *et al.* (2006) found greater levels of anxiety, depression ($p < 0.001$; Hospital anxiety and depression scale) and post-traumatic stress disorders post vitriolage. This was linked with negative coping strategies, low self-concept and low self-esteem (Khoshnami *et al.* 2017; Mannan *et al.* 2006).

Social wounds

Impact on family

Acid attacks altered family dynamics. Often, roles were altered, and relatives feared recurrence. Patients stated,

“Because I was burnt on my face, I didn’t go out with my children” and “My husband...performs my motherhood responsibilities, especially those that require going out” (Khoshnami *et al.* p.612-613).

Some survivors experienced anger, increased annoyance and loss of temper; adding strain on family relations. Other studies found 50% ($n=36$) survivors lacked family support and 84% ($n=112$) experienced family negligence and dependence for day-to-day living (Islam *et al.* 2014; Lama *et al.* 2015). Consequently, the premorbid functioning of the family unit within society changed, creating additional burdens and leaving some without a support system.

Isolation

Depression, exhaustion and rejection by society meant survivors depended on others for survival and thus became social recluses (Asaria *et al.* 2004). Patients remarked:

“In a small community...people had close relations” and “when one person knew you, that was enough to spread all the news about you. My town was not big...everything that happened...everyone will know about very soon” (Khoshnami *et al.* 2017, p.613).

Therefore, survivors felt rejected, dismayed and unfairly judged and rarely ventured outside.

Financial constraints

A lack of supportive healthcare systems commonly resulted in patients funding treatment themselves. In Nepal, 50% patients ($n=36$) had insufficient economic-capacity to pay for treatment (Lama *et al.* 2015). Consequently, patients were discharged despite presenting early, and necessary interventions were postponed (Olaitan & Jiburum, 2008; Tahir *et al.* 2012). **Non-governmental and governmental support also appeared to be unhelpful:**

“I went to various governmental institutions...to get financial help but they were not helpful...they did not understand my situation. I also went to several charities...it was futile” (Khoshnami *et al.* 2017, p.613).

Legal factors

Lack of evidence

Insufficient evidence contributed to low conviction rates (Das *et al.* 2013). One study found health professionals were reluctant to provide evidence in court due to financial implications while absent from work and some assailants hired perpetrators unknown to the victim to avoid prosecution (Das *et al.* 2013). Furthermore, documenting substances as ‘unknown’

further complicated verification of the crime (Karunadasa *et al.* 2010; Tahir *et al.* 2012; Tan *et al.* 2015).

Lack of pursuit

Patients commonly failed to initiate or pursue justice. Contrary to Khoshnami *et al.*'s (2017) study, Karunadasa *et al.* (2010) found financial constraints did not prevent patients from seeking justice since a non-governmental **organization** provided free legal services. Instead, they found patients lacked initiative and knowledge to obtain legal help; possibly due to guilt and involvement in the assault or continued acquaintance with perpetrators following the incident. Unwillingness, inability to testify and fear of retaliation caused lack of pursuit among children (Das *et al.* 2013; Tan *et al.* 2015).

Dissatisfaction with outcome

Tan *et al.*'s (2015) medicolegal exploration found 21 patients (42.9%) initiated criminal investigations, yet only two proceeded to indictment following media publicity. In Bangladesh, failure of local authorities to investigate cases meant many injuries were classified as accidental despite healthcare professionals' suspicions (Das *et al.* 2013).

Although survivors expected justice, they lacked confidence in the judicial system and felt hearings were prolonged. One individual stated, "*one of my concerns is that...my case...which has been investigated for a long time, wouldn't end in a fair result and the punishment would be unjust*" (Khoshnami *et al.* 2017, p.613). Consequently, patients were dissatisfied and some desired revenge.

DISCUSSION

This review was conducted to explore the impact of acid assaults on QoL due to their increasing prevalence. Reviewed literature was generally of good quality, however, minimal use of measurement tools and statistical analysis limits validity of findings. Synthesis of

findings generated five themes: contextual factors, physical wounds, psychological wounds, social wounds and legal factors, as supported by reviewed articles and Khoshnami *et al.*'s (2017) study. Relationships between themes are represented by a conceptual model (Figure 3), explaining the complex traumatic experiences of acid assaults on an individual's QoL. Figure 2 simplifies this, while Figure 4 demonstrates specific factors influencing QoL.

Physical wounds

The perpetrator's primary intent to disfigure meant physical wounds were noted in all studies. This review found severe disfiguration and early presentation post vitriolage are significantly linked with additional complications, increased operations and prolonged **hospitalization** (Asaria *et al.* 2004; Olaitan & Jiburum, 2008; Waldron *et al.* 2014). These are associated with poor family support and economic loss due to inability to sustain employment (Lama *et al.* 2015).

Furthermore, unrealistic reconstructive expectations lead to dissatisfaction with outcomes and an irreplaceable sense of loss; triggering patients to question their identity (Khoshnami *et al.* 2017; Das *et al.* 2015; Tahir *et al.* 2012). Such operations carry a greater mortality risk since complex facial injuries complicate anaesthetic induction and maintenance (Tahir *et al.* 2012; Waldron *et al.* 2014). These factors (combined with a paucity of resources, surgical skills and finances) collectively worsen outcomes, however scarring and ocular damage are particularly debilitating consequences.

Facial disfiguration was present in all studies, with evidence of orinasal deformities, visual impairment, hearing loss and scarring (Olaitan & Jiburum, 2008; Tahir *et al.* 2012). These injuries, in addition to hypertrophy, keloids and contractures, cause sensory impairment, postural disability and appearance-related distress (Goel & Shrivastata, 2010;

Islam *et al.* 2014; Waldron *et al.* 2014). Karunadasa *et al.* (2010) emphasized mandatory scar management using pressure garment therapy (PGT) to minimise the impact of this common yet unpredictable complication. However, patients often lack compliance because of insufficient education and under-appreciation of its importance (Das *et al.* 2015). Although research shows PGT may reduce pain and provide security, negative aspects include self-consciousness, problems applying garments and appointment-related burdens (Jones *et al.* 2017). In addition to expense and aesthetically-displeasing findings, a meta-analysis found a small, yet statistically significant, improvement in scar size following its use (Anzarut, Olson, Singh, Rowe & Tredget, 2009). Thus, the negligible effect on reducing scar size and detriment to QoL question PGT effectiveness.

Ocular damage, resulting in partial or complete visual loss, is another prominent finding among literature that causes distress and additional surgery (Olaitan & Jiburum, 2008; Das *et al.* 2015; Khoshnami *et al.* 2017). This is supported by Le *et al.*'s (2011) exploration of QoL following work-related ocular chemical burns, using a 100-point visual function questionnaire. Binocular injuries scored significantly lower than monocular injuries, however all ocular involvement (irrespective of severity) negatively affect working capacity, mental health and ability to perform activities of daily living (ADLs). Although facial disfigurement may have influenced results, the unique mechanism of acid-throwing increases the risk of visual impairment and thus impairs ADLs and reintegration into society.

Psychological wounds

The retrospective nature of most studies prevented an in-depth analysis of psychological wounds, nevertheless, Mannan *et al.* (2006) found delayed presentation does not significantly influence psychological distress. They also found the burn injury itself and

the actual event (rather than injury severity) predict psychological outcome. However, a small sample of 44 participants and inclusion of outliers somewhat limits validity of findings. Conversely, Khoshnami *et al.* found extent and location of burns (particularly facial and ophthalmic burns) affect survivors' ability to cope.

More specifically, physical wounds and emotional trauma instigate psychological wounds. Patients fear perpetrators will retaliate, prompting isolation, anxiety, depression, post-traumatic stress disorders, anger, irritability and reluctance to seek litigation (Khoshnami *et al.* 2017; Mannan *et al.* 2006; Tan *et al.* 2015). Some feel changed and defined by the assault; initiating hopelessness and exhaustion. **Furthermore, interpersonal conflict and adjustment problems among survivors are exacerbated by poor engagement with psychological support and rehabilitative services** (Asaria *et al.* 2004; Islam *et al.* 2014; Kaunadasa *et al.* 2014; Lama *et al.* 2015; Tan *et al.* 2015). **Although** many survivors experience altered psychological functioning, a minority find hope. This is facilitated by communication, moving on from the event and seeking to rebuild lives by taking a proactive position within society, rather than becoming a passive patient that is defined by the assault (Khoshnami *et al.* 2017).

Social wounds

Society directly affects an individual's ability to move on from the assault. This review found lack of acceptance, discrimination, political failings and **stigmatization** leave survivors unable to regain the 'normality' of their previous life (Khoshnami *et al.* 2017; Tan *et al.* 2015). **This worsens psychological trauma and in some cases individuals commit suicide in an attempt to alleviate suffering** (Tahir *et al.* 2012; Waldron *et al.* 2014).

This is exacerbated by changes to the family role. Some survivors abandon parenting duties for fear that societal judgement will be detrimental to their children's development

(Khoshnami *et al.* 2017). As a result, they pass their household duties onto supportive spouses. Others are rejected by family and friends, prompting social isolation and reliance on acquaintances for survival (Islam *et al.* 2014; Lama *et al.* 2015). This is intensified in rural areas, where spread of news in close-knit communities precipitates **stigmatization** (Asaria *et al.* 2004; Khoshnami *et al.* 2017; Lama *et al.* 2015). Therefore, despite family support or abandonment, social identity is compromised due to deviation from perceived normality, comparison and **stigmatization** within society.

Various studies exploring QoL following head and neck cancer treatment support such findings, associating relationship difficulties and isolation with appearance-related distress. **Bonanno and Bitá's (2012) qualitative exploration found families experienced new social, emotional, financial, and physical responsibilities.** Furthermore, intrusion through unwanted attention (**stares, comments, and questions**), and sympathy (exaggerated or unnecessary actions) enacted stigma. Similarly, Deno *et al.* (2012) found social distress significantly exacerbates **emotional distress while** self-efficacy alleviates these problems in individuals with cancer-related disfigurement. Interestingly, both studies found support of friends and spouses give rise to complex positive and negative feelings in patients and may strengthen social contacts, **hinder reintegration, or cause greater** emotional distress. This reveals the importance of sensitive yet supportive family involvement during rehabilitation.

Finally, financial difficulties are a common issue. Patients are often required to fund treatment in developing countries which adversely affects mental health and treatment **outcomes since** necessary interventions cannot be undertaken (Lama *et al.* 2015; Olaitan & Jiburum, 2008). Recent establishment of non-governmental **organizations** (NGOs) has attempted to alleviate this problem by providing financial and psychological support (Yousaf & Purkayastha, 2016). While its effectiveness is questioned by patients in Khoshnami *et al.*'s (2017) study, research has appraised their unique role (Mannan *et al.* 2006). Nevertheless, its

impact on QoL has been minimally explored and apparent lack of coordination between medical and social services on discharge further hinders social reintegration.

Legal factors

Legal issues are a specific area of concern for survivors. Studies show patients frequently fail to seek legal support due to lack of initiative and low socioeconomic status (Karunadasa *et al.* 2010). Furthermore, those who seek litigation are faced with insufficient evidence, political failings and dissatisfaction with outcomes (Tan *et al.* 2015). Consequently, some patients desire revenge (Khoshnami *et al.* 2017). Tabriz, Dabbagh and Koenig (2016) explored the concept of Qisas in Islamic countries, whereby victims have a legal basis for retaliation. This requires medical input to inflict equally disfiguring punishments on the perpetrator. However, they concluded it unacceptable because it justifies the crime, disregards religious principles and is ethically and legally contrary to the medical principle of doing no harm. Another study exploring retaliatory behaviours among assaulted youths found revenge is intensified by peer rejection and environmental contexts (Copeland-Linder, Johnson, Haynie, Chung & Cheng, 2012). **Thus, the authors emphasize the need for medical professionals to discern plans for revenge, discuss violence history, and offer anticipatory guidance.** While this study was linked with youth violence, its relevance to vitriolage originates from pre-assault interpersonal violence and relationship difficulties found in this review.

Limitations

This review has several limitations. Reviewed studies were marked by relatively small sample sizes (mean: 58.4), giving scope for bias and reduced reliability (Chow, Shao, Wang & Lokhnygina, 2017). Some studies included a small number of self-harm and

accidental acid burns within their sample, however, as Waldron *et al.* (2014) found, several patients described the mechanism of injury as accidental for fear of further abuse from the perpetrator. Furthermore, most studies were affiliated with one hospital; potentially reducing individual **generalizability**. Despite this, retrieved studies originated from seven countries within four continents; signifying international relevance. Although **randomized** control trials are unlikely to be appropriate, use of validated QoL tools and further qualitative research would provide greater insight into this phenomenon and avoid retrospective review limitations of missing data and researcher bias (Gerrish & Lathlean, 2015). Nevertheless, this review provides a detailed, invaluable exploration into the impact of vitriolage on QoL and its implications for nurses.

Relevance to nursing practice

The Nursing and Midwifery Code (NMC, 2015) requires nurses to provide holistic, **individualized**, patient-centred care. This review can inform nurses to more effectively identify and address specific needs of those assaulted by acid, since it underlines the need for evidence-based interventions which promote QoL. In particular, they must advocate for patients from the point of admission to post discharge. By coordinating care, nurses have the potential to unite social and medical professions. This will enable selection of treatment and therapy options on an evidence-based, patient-specific basis (reducing the burden of treatment), while also assisting patients to more successfully reintegrate into society.

Additionally, **familiarization** with the psychosocial ramifications of disfigurement will enable nurses to predict potential reactions and responses to disfigurement, resulting in well-informed patient specific assessments and interventions (Newell, 2013). Not only will this improve survivors' psychosocial wellbeing, but it will prepare patients for discharge.

Furthermore, in accordance with patient wishes, there is scope for nurses to professionally and confidentially provide legal assistance by involving police and documenting precise circumstances of assault for potential legal evidence. This will help reduce survivors' burden of injury and support victims to move on from this traumatic event.

Finally, the conceptual model serves as a basis for developing global protocols with application to national and regional contexts to ensure integrated and effective care that addresses potential and existing biopsychosocial issues post vitriolage. Thus, nursing care will more effectively meet survivors' specific needs by providing support that is focussed on improving QoL. Although findings are unique to acid violence, the assault is associated with physical disfiguration and traumatic relationships. Therefore, nurses caring for individuals with other disfiguring conditions and assault injuries may find these findings to be valuable.

CONCLUSION

Acid assaults affect younger generations, with survivors experiencing lifelong consequences of permanent disfiguration. Although vitriolage is not exclusively an ethnic minority problem, male-dominance and power-related trends are strongly linked with the attack showing the importance of sociocultural contexts. Further research exploring vitriolage from relatives and perpetrators' perspectives, the effectiveness of NGOs on QoL and the impact of the media on stigmatization would greatly enhance understanding of this phenomenon to alleviate suffering experienced by survivors.

Conflict of interest:

The authors have no conflicts of interest to declare.

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