# **A biocultural approach to understanding the presence of children from medieval hospitals in England: What can we learn from archaeological investigations?**

Esme Hookway1\* and Kirsty Squires1

1 School of Law, Policing and Forensics, Staffordshire University, Leek Road, Stoke-on-Trent, ST4 2DF, UK

\*Corresponding author [esme.hookway@research.staffs.ac.uk](mailto:esme.hookway@research.staffs.ac.uk)

## **Abstract**

The revival of monasticism in the eleventh century promoted greater seclusion of monks and the re-positioning of care offered to the community. The increasing social problems caused by leprosy also prompted the development of hospitals as independent foundations. These factors contributed to the establishment of over 1,000 hospitals in England during the medieval period (AD 1050-1550). Documentary evidence relating to the inhabitants of these sites is scarce, and there is little mention of non-adults. However, over the past twenty years, archaeological excavations and associated bioarchaeological studies at medieval hospital cemeteries across England have produced an increasing body of evidence for the use of such sites and have subsequently revealed new information about hospital inhabitants. Research has come to light that non-adults inhabited hospitals during life and were buried at these sites. This paper will provide an overview of current approaches to the study of non-adults buried in medieval hospital cemeteries from historical, archaeological and bioarchaeological perspectives. Consideration will be given to the theoretical and scientific advances in these areas, and the potential of osteological methods to enhance our knowledge of non-adults in hospital populations.

**Keywords:** Childhood, Medieval Hospital, Archaeology, Bioarchaeology, Literature

## **Introduction**

Following the Norman conquest of England in AD 1066, hospitals were created across England as independent establishments located outside of monastic institutions. Many hospitals, both in England and on the Continent, were founded by monasteries and were run by nuns or monks, assisted by lay brethren. Staff and hospital inmates lived by religious rules which could include participation in regular prayer, silence during meals and the renouncement of personal possessions. Some hospitals were secular foundations, established by local lords or wealthy laymen, who would determine the responsibilities and duties of the hospital (Watson 2006; Roffey 2012). The size, form and function of hospitals varied considerably but earlier hospitals in particular, were typically constructed with a chapel attached to the east of an infirmary hall, to enable inhabitants to see or hear Church services (Knowles and Hadcock 1953; Gilchrist 1995; Thomas *et al*. 1997; Huggon 2018). However, excavations at the leper hospital of St Mary Magdalen, Winchester, revealed a sperate infirmary and chapel buildings, and this may have been a more common layout of leper hospitals (Roffey 2012; Huggon 2018). As hospitals such as St Mary Spital, London, and St Bartholomew’s, Bristol (Avon), were remodelled over time, separate chapels were created, separating the various functions performed by hospitals (Huggon 2018). Most hospitals were thought to accommodate an average of twelve people, possibly reflecting the number of Jesus’ disciples, although larger institutions such as St Mary Spital, London, and St Leonard’s, York (North Yorkshire), would have accommodated up to 200 inmates (Orme and Webster 1995; Thomas *et al*. 1997). However, the potential number of inhabitants at any one time is debateable, as it is known that two or more people would have occupied the same bed concurrently (Thomas *et al.* 1997; Horden 2008; Smith *et al.* 2012).

Akin to the earlier medieval period, when the majority of the population became sick, they were cared for at home by family members (typically women within the household) or through pastoral care delivered by local clergy (Weston 1995; Tinti 2005). For the poor, homeless, travellers or those in general need, hospitals could provide a place of respite and care, although some had admission policies which excluded certain groups of people (as discussed below) (Sweetinburgh 2004). Different types of hospitals were founded in medieval England, variously described as general hospitals for the sick and poor, infirmaries, leper hospitals, hospices, alms houses and *maisons dieu* (Knowles and Hadcock 1953; Gilchrist 1995). Hospitals were diverse in terms of their income, the amount of land they held and the number of staff; each of these factors subsequently influenced the level of care they could provide. However, hospital functions changed through time as social and religious attitudes to the ‘deserving’ and ‘undeserving’ poor changed, and the governance and finances of individual institutions fluctuated. This can make the categorisation of hospitals problematic, however, broad descriptions of the types of hospital function are possible. For the local poor, pilgrims and other travellers general hospitals typically provided short term care comprising a bed, regular meals, a warm and clean environment, medicinal herbs and prayer (Gilchrist 1995; Sweetinburgh 2004). Leper hospitals were mainly founded during the twelfth and thirteenth centuries, when the disease was at its highest rate of prevalence (Gilchrist 1995). They were often constructed outside town walls and housed not only lepers, but other individuals who were thought to have contagious diseases and those needing long term accommodation (Orme and Webster 1995; Roffey 2012). Alms houses were a third type of medieval hospital which increased in number from the fourteenth century (Orme and Webster 1995). These establishments initially provided housing for the elderly, particularly retired officials or members of the Church, and people of status or with the economic means to purchase corrodies; from the fifteenth century they also provided long term housing for the poor (McIntosh 1986; Gilchrist 1995; Orme and Webster 1995).

The roles of hospitals in caring for non-adults differed considerably; some general hospitals are likely to have cared for sick children, whilst others such as St Leonard’s, York, and St Mary Spital and St Bartholomew’s in London, tended to healthy but abandoned or orphaned children (Orme and Webster 1995). Hospital admission policies rarely refer to children. However, documents indicate the hospitals of St John, Cambridge (Cambridgeshire), and St John, Oxford (Oxfordshire), were given funds specifically for the creation of maternity wards where pregnant women and infants could be cared for (Bridge 1999; Orme 2001). In the event of the death of a child’s mother, or the abandonment of a baby, some hospitals provided care and education for the child until the age of seven years old (Orme and Webster 1995). Children may have also accompanied their parents into leper hospitals or stayed in hospitals whilst on a pilgrimage (Connell *et al*. 2012). Lewis’ (2016) research on adolescents who travelled from rural to urban locations seeking apprenticeships and work placements in the tenth to sixteenth centuries concluded that they formed a particularly vulnerable group as they had no family to support them. These individuals would have been vulnerable to poverty and homelessness and may have sought refuge in hospitals. Some hospitals also housed poor adolescent scholars who were accommodated at the request of a patron and, in some cases, parents paid tuition fees for children to attend hospital schools (Rawcliffe 1984; Orme and Webster 1995).

Another important charitable function of many hospitals, conducted in accordance with the Christian Works of Mercy, was to bury the dead (Gilchrist 1995). However, legal restrictions on the rights of burial meant many hospitals did not possess their own burial grounds in the tenth and eleventh centuries, as the income generated from burials could impact the local parish church (Orme and Webster 1995). However, from the latter eleventh century, hospitals increasingly gained the right to bury the dead. Burials occurred not only within dedicated cemeteries adjacent to a hospital, but also within hospital chapels, as at St Bartholomew, Bristol (Price and Ponsford 1998), and in separate cemeteries located within the parish or belonging to the mother church (Gilchrist 1995). Most general hospitals were located in urban areas, where the demand for hospital provisions was at its highest (*ibid.*). Therefore, in addition to the burial of patient-inmates, hospitals such as St Mary Spital, London, also buried individuals from the local area during times of crisis, such as plague or famine, when the demand was high for both the space and timely conduct of burials (Thomas *et al*. 1997; Connell *et al*. 2012). Many hospitals also provided alms for the local poor and homeless and it is conceivable that hospitals may have buried these individuals in accordance with their charitable beliefs. Patrons, and canonical and lay staff were also buried in hospital chapels and grounds, often in separate areas to the inmates, for example, at St Mary Magdalene, Partney (Lincolnshire), ‘monk/priest’ burials were located to the south of a path, and lay burials were placed to the north of the path (Atkins and Popescu 2010).

A range of documentary evidence exists which provides an insight into hospitals, children and childhood during the medieval period. Children themselves rarely leave historical sources (Heywood 2018). However, as Kamp (2001) argues, adult attitudes towards children during the medieval period can be revealed through legal documentation, artwork, miracle stories, texts and illustrations. Of particular value are hospital foundation charters, which provide an insight into the founders’ wishes and social attitudes towards the poor, and those deemed worthy or not, of charitable support. Hospitals could be designated for a single sex, or have a mixed community of men, women and children (Orme and Webster 1995). The charter of St Giles, Norwich (Norfolk), stated that there were thirty beds for the infirm poor, though ‘no woman [was to] be received to sojourn or stay in the … hospital’ (Rawcliffe 1999, 245). In AD 1240, the hospital of St John, Oxford, constructed a chamber for women in childbirth, although six years later issued a rule excluding lewd pregnant women from the hospital (Bridge 1999). Bridge (1999) suggests this exclusion may have been implemented as lewd pregnant women would have distracted other inmates from their prayers and been a temptation to the brothers. Rawcliffe (2013, 333) also argues that ‘pilfering, rowdy behaviour and disturbances’ by vagrants would have caused anxiety to those tasked with caring for the poor and ill. Therefore, it is perhaps not surprising that individuals thought to be disruptive, morally corrupt or draining of a hospital’s finite resources would be refused admission. Although these records relate to pregnant women, the hospital regulations would have had significant implications not only for these women but also their unborn child. Children are rarely mentioned explicitly in hospital admission charters. However, records from St Leonard’s, York, state that in the mid twelfth and thirteenth centuries, three churches were granted to the hospital to assist with the care of infants and eighteen children (Cullum 1989). Furthermore, in 1287 the hospital’s records indicate the presence of both boys and girls inhabiting the hospital’s ‘Barnhous’ (*ibid.*).

Whilst documentary sources provide a glimpse into the lives of children in English medieval hospitals, there are large gaps in our knowledge of medieval hospitals, in particular, pertaining to children in these institutions. Over the past two decades, the exponential rise of archaeological investigations of medieval hospital sites can add to our growing knowledge of children who inhabited and used these institutions. Through the analysis of human remains and burial practices, it is possible to explore the different demographics of individuals buried in cemeteries associated with the various types of hospitals, and begin to explain potential health and social reasons for the presence of non-adults at hospital sites. The aim of this paper is therefore to provide an overview of our current understanding of non-adults that lived in, were cared for and treated, and ultimately buried, in these hospitals.

## **Current Knowledge: Archaeological**

Detailed records of the majority of births and deaths in England were not produced during the medieval period (Gordon 2018) Therefore, prior to *c.* AD 1550, archaeological evidence, including human remains recovered from archaeological contexts, are the primary sources of information for researching and understanding the lives and deaths of non-adults in the medieval period (Lewis and Gowland 2007).

### ***The Evolution of Medieval Hospital Cemetery Excavations***

In the nineteenth and early twentieth centuries, antiquaries encountered medieval cemeteries as a result of construction and their associated excavations. For example, from *c.* AD 1900 the excavation of the Priory hospital of St John the Baptist, Lechlade (Gloucestershire), led to the exhumation and identification of forty well-preserved ‘monks’ (Sturgeon n.d.). There were no minimum standards for archaeological practice and recording, therefore when excavations were recorded, the resulting archives were of varying levels of detail and quality. When human remains were uncovered, they were often briefly noted and, due to the limitations of osteological knowledge in the early twentieth century, the remains were frequently re-buried without any formal study (Smallcombe 1927).

Over the past fifty years, advances in archaeological practice and osteological techniques have produced greater levels of information from cemetery sites and human remains. Infant remains are often under-represented within archaeological contexts due to a number of factors including preservation bias and excavation error (Chamberlain 2006; McIntyre and Hadley 2010). Recent guidelines from Historic England (Mays *et al*. 2018) recommend that recovery strategies, such as wet sieving and sorting soil from the base of graves, should be in place when human remains are excavated to ensure that small bones are retrieved. During excavations at St John’s, Cambridge, from 2005-2012, all sediment in proximity to the skeletons was sieved through a 0.04 m mesh (Cessford 2015). Yet, despite the use of this method, no individuals under the age of five years were identified at this site, indicating that infant remains were not missed but were either not present at the hospital or buried elsewhere. Only 27-40% of the original burial population (estimated at *c*. 1000-1500 individuals) were recovered. It is thus possible that infants and children under five years of age were buried in a separate area of the cemetery.

An evaluation of the human remains from St Mary Spital, London, excavated from 1991-2007 by Museum of London Archaeology, highlighted that many of the small bones, such as phalanges and coccyges had low rates of recovery (Connell *et al*. 2012). This extensive excavation led to the exhumation of over 10,000 individuals and has greatly contributed to our understanding of the social structure within hospitals and the wider population of medieval London (Thomas *et al*. 1997). St Mary Spital is one of only three medieval hospital cemetery sites excavated to date, from which the remains of perinates (up to four weeks of age) have been documented. Here, sixty-eight (1%) neonates from the 5,387 individuals analysed were recorded. One (2%) neonate (0-1 month) was identified during excavations of the hospital of St Bartholomew’s, Newbury (Berkshire), (Clough and Witkin 2006) and three (1%) perinates (under thirty-eight weeks gestation) were recovered from the hospital of St James and St Mary Magdalene, Chichester (West Sussex) (Lewis 2008). The under-representation of some of the smaller human bones from St Mary Spital raises the possibility that neonate and infant remains could have been missed from this site and, potentially, from other hospital cemetery sites where wet sieving was not employed.

### ***Single Site Studies***

To date, burials at forty medieval hospital sites in England are known to have been excavated (Figure 1; Table 1). Within Anglo-Saxon archaeological cemetery contexts, children are often differentiated from adults through the use of age-related burial practices, such as spatial zoning or the inclusion (or exclusion) of specific grave goods (Baxter 2008). However, in Christian burials, grave goods are rarely deposited meaning this method of differentiation is not viable. Craig-Atkins (2014) has hypothesised that the clustering of infant burials under the eaves of early Christian churches could be related to the water run-off from the eaves symbolising a form of ‘eaves-drip’ baptism. Zoning appears to have been more prevalent in the later Anglo-Saxon period and, whilst occasional examples of burials of infants and children in close proximity to churches during the medieval period has been noted by McIntyre and Hadley (2010), this practice appears to be rare at hospital cemetery sites.

There is the possibility that spatial distribution patterns of non-adult burials have been missed as only two of the forty hospital cemetery sites are recorded as being fully excavated, namely St Leonard’s, Peterborough (Cambridgeshire) (McComish *et al*. 2017) and St James and St Mary Magdalene, Chichester, although it has been proposed that the latter cemetery also had a second cemetery (Magilton *et al*. 2008). Zoning of non-adults has been suggested at the hospital cemetery of St Peter’s, Bury St Edmunds (Suffolk) (Brooks 2012). Twelve individuals were identified following partial excavation of the site in 2003 and 2012 and, although specific ages could not be assigned, all were determined to be adults (Anderson 2003). The second excavation, situated in an adjacent property to the east, revealed the remains of five individuals, all of whom were under twelve years of age (*ibid*.). Brooks (2012) concluded that the concentration of non-adults suggests a division of burials in the cemetery by age. However, the reasons for zoning at this site are not yet understood and could potentially be enhanced by further excavation of the site.

INSERT FIGURE 1 HERE

Figure 1: Map of English medieval hospital cemetery sites excavated to date. Map produced by Esme Hookway.

INSERT TABLE 1 HERE

Table 1: List of hospital cemetery sites excavated to date. The minimum number of individuals excavated at each site, the numbers of sexed adults, and of non-adults is given. Each of these sites are illustrated in Figure 1.

Three additional partially excavated hospital sites where zoning may have occurred are Bawtry (South Yorkshire) (McIntyre and Hadley 2010), St Nicholas, Lewes (East Sussex) (Barber and Siburn 1998) and St James and St Mary Magdalene, Chichester (Magilton *et al*. 2008). A high proportion of children aged between five to nine years old (22%) and ten to fourteen years of age (11%) were identified at Bawtry. It has been hypothesised that the reason for these findings can be attributed to the location of the excavation trench, which was positioned in close proximity to the chapel of St Mary Magdalene, indicating a continuation of the ‘eaves-drip’ burials identified in earlier Christian Anglo-Saxon cemeteries (McIntyre and Hadley 2010). At St Nicholas, Lewes, 103 individuals were identified from the cemetery; these were located on an area of natural chalk and in the fill of a quarry. With the exception of one adolescent (1%), all of the non-adults (n = 17, 17%) were buried within the quarry area (Barber and Siburn 1998). However, the majority of adults (n = 67, 78%) were also buried here. The different location and greater effort required to create the chalk cut graves, suggests these were used for select individuals; therefore burial location appears to be based on social status rather than age (*ibid*.).

### ***Burial Practices***

The funerary rites afforded to those buried in hospital cemeteries usually adhered to Christian mortuary practices. Individuals were buried on an east-west alignment, laid in a supine position and buried without grave goods. There are some variations to this practice, for example at St John, Lutterworth (Leicestershire) (Priest and Chapman, 2002), and St Margaret’s, Gloucester (Gloucestershire), juveniles were buried inverted, with their head to the east. Almost 8,000 individuals have been identified from medieval hospital cemeteries, of these only eight, less than one percent of individuals, have been found with grave provisions (Richards *et al*. 1989; Cardwell 1996; Thomas *et al*. 1997; Atkins and Popescu 2010). Chalices and patens are the only grave goods that have been repeatedly encountered and are typically associated with adult male priestly burials. These items have been interpreted as objects belonging to priests who may have ministered at the hospitals, although their level of direct contact with inmates is not known (Richards *et al*. 1989; Cardwell 1996; Thomas *et al*. 1997; Atkins and Popescu 2010).

Females and non-adults are rarely found buried with any form of grave good. A glazed peg-tile fragment was recovered from the burial of a child (three years of age) from St James and St Mary Magdalene, Chichester, which the excavators stated may have been an accidental inclusion, or a favourite plaything belonging to the child (Magilton *et al*. 2008). At St Giles, Lincoln (Lincolnshire), a decorated metal armlet was discovered in the burial of a female adult, aged twenty-two to twenty-seven years of age. The individual had significant trauma to both feet, with the toes amputated, possibly due to leprosy (Allen Archaeology 2012). The armlet was too small for the adult female but would have fitted a juvenile and has been interpreted as a grave good, placed in the grave by a child of the deceased (*ibid*.).

Shroud pins and lace tags were identified at only four sites however preservation factors influence the survival of these items. For example, at St John the Baptist, Lichfield (Staffordshire), green staining in a grave suggested the use of shroud pins, though no physical objects were recovered (Goacher *et al*. 2016). Pins served a practical purpose, namely to secure shrouds. These were therefore not items deposited in the graves for religious or sentimental reasons. Nails and soil stains, indicating the use of coffins, have been identified at several sites, including St Nicholas, Lewes (Barber and Siburn 1998), St Mary Magdalene’s, Colchester (Essex) (Crossan 2004) and St Mary Spital, London (Thomas *et al*. 1997). Eleven of the forty-six (24%) graves excavated at St John the Baptist, Lichfield, provided evidence, in the form of iron nails, for the use of coffins (Goacher *et al*. 2016). Ten of these interments were adult burials with only one adolescent afforded a coffin burial, indicating a preferential use of coffins for adults. However, at St James and St Mary Magdalene, Chichester, where there was evidence for high levels of coffin use, non-adults appear to have been buried in coffins (81%) more frequently than adult males (60%) (Magilton 2008). As discussed in the ‘Understanding Demography’ section below, children and females were primarily identified from the later phase of the cemetery, after c. 1480, at a time when coffin use had become the norm (*ibid*.). Magilton (2008) notes that this pattern of preferential coffin burial for females and non-adults is seen in other cemeteries during the same period, although local burial customs may influence the use of coffins within different cemeteries.

## **Bioarchaeological Approaches**

Defining who was considered to be ‘a child’ in the medieval period is problematic. The United Nations Conventions on the Rights of the Child (UNCRC) currently define a child as a person under the age of eighteen years old ‘unless under the law applicable to the child, majority is attained earlier’ (UNICEF 1990, 4). This caveat which prioritises different national laws regarding age of majority, over the United Nations single definition, highlights one of the difficulties within the study of children and childhood in the past. It is now recognised that definitions of ‘a child’ vary across cultures and through time (Bluebond-Langner and Korbin 2007; Crawford *et al* 2018). The Ages of Man was a system employed during the medieval period to characterise age groups, prior to adulthood these categories were: *Infantia*, from birth to seven years of age; *Pueritia*, from seven to fourteen years of age; and *Adolescentia*, from fourteen to twenty-one years of age (Oosterwijk 2018). However, Bailey *et al*. (2008) have highlighted the often-conflicting ages established in medieval law as to when an individual could be deemed to have adult status. For example, a male was required to be twenty-one years of age before inheriting land held in military tenure, but only fifteen if the land was agricultural and held in socage tenure (*ibid*). For the purposes of this paper, individuals under eighteen years of age are considered as non-adults.

### ***Defining and Determining Age***

The term ‘childhood’ is similarly problematic as it is a culturally attributed term or category which changes through time and within different cultural settings (Crawford and Lewis 2008). During the medieval period individuals from the age of twelve years were commonly sent into service in both rural and urban households as maids and servants, or into trades as apprentices (Orme 2001). Leaving the family home and engaging in employment could be considered to be ‘adult’ activities. Conversely, in Lewis’ (2016) study of work and adolescents in medieval England, individuals up to the age of twenty-five years were included as this was the age that many apprentices would complete their apprenticeship and were consequently regarded as independent adults. As discussed in the following section of this paper, the high proportion of adolescents identified at St Mary Spital, London, are thought to have been migrants looking for work and apprenticeships in London.

The terminology and categorisation used to describe age varies in different archaeological reports, making demographic comparisons problematic (Table 2). McIntyre and Hadley (2010) used increments of five years (0-4, 5-9, 10-14 and 15-19 years) which they argue, reflects the precision with which age at death could be established from the skeletal remains from the hospital at Bawtry. Gilchrist and Sloane (2005) compiled data from seventy sites across England, Wales and Scotland, in their comprehensive study of medieval monastic cemeteries, and similarly used age increments of five years for non-adults, but on a slightly different scale (0-5, 6-10 and 11-15 years), with older adolescents included in a ‘young adult’ age bracket of 16-25 years. These age categories were also used during the analysis of human remains from St John’s, Cambridge, in order to make comparisons with other sites possible (Dodwell 2015).

INSERT TABLE 2 HERE

Table 2. The age ranges and terminology used to describe individuals under eighteen years of age at four medieval hospital cemetery sites.

Osteological techniques employed to estimate age are largely dictated by the completeness and preservation of skeletal remains. However, the importance of using multiple aging methods and understanding environmental effects on growth development is highlighted in the osteological analysis of non-adult remains from St Peter’s Hospital, Bury St Edmunds (Anderson 2012). Of the five individuals excavated at the site, two individuals were aged solely by long bone length, whilst the age of three were determined using both dental development and long bone diaphyseal lengths. In each case, the age established from dentition was six months to two years older than the age determined by long bone length. Anderson (2012) suggests the discrepancy in the age estimation is possibly due to restricted growth. Understanding changes in growth patterns, and factors which influence the development of an individual’s height over time, are crucial to determining age based on long bone measurement (Mays 2018). The non-adult remains from St Mary Spital, London, were also aged using multiple methods. The femora length of seventeen year olds averaged 0.35 m in the earliest period of cemetery use in the twelfth century, increasing to 0.42 m in the final period of use in the fifteenth century, possibly due to improvements in general health in London during this time (Redfern 2012).

### ***Understanding Demography***

Large-scale construction projects have enabled the extensive excavation of several hospital sites and their associated cemeteries, for example the hospitals of St Mary Spital, London (Connell *et al*. 2012), St James and St Mary Magdalene, Chichester (Magilton *et al*. 2008), St John’s, Cambridge (Cessford 2015), and St Mary Magdalene, Partney (Atkins and Popescu 2010). These excavations have produced information about the wider geographical areas the hospitals were located in and the potential relationships between the hospitals, their inmates and the local communities, enabling the hospitals and their inhabitants to be better understood.

The hospital of St James and St Mary Magdalene, Chichester, excavated in 1986-1987 and 1993, was the first large scale excavation of a medieval hospital cemetery in Britain, and the first work in Europe on a leper cemetery since the 1950s (Magilton *et al*. 2008). A minimum number of 384 individuals, including 105 (27%) non-adults, were excavated and analysed (Lee and Magilton 2008). The cemetery was divided into four zones by the excavators, based on the chronological expansion of the cemetery site (Magilton 2008). Areas A1 and A2 (total n = 126) dating from the twelfth to fourteenth centuries, were characterised by predominantly male burials (male = 102, 81%; female = 14, 11%; unsexed adult = 8, 6%; non-adult = 2, 2%). In contrast, Areas B1 and B2 (total n = 258), dating from the twelfth to sixteenth centuries, contained greater numbers of both women and children (male = 88, 34%; female = 67, 26%; unsexed adult = 5, 2%; non-adult = 98, 38%) (*ibid.*). This could relate to an undocumented change in use or policy of the hospital, increasingly permitting entry or burial of women with leprosy, and children towards the end of the hospitals life (*ibid.*). Many leper hospitals went out of use or changed their admission policies during the fifteenth century as leprosy declined (Roffey 2012). The burials of children were identified throughout Area B but were also clustered in two zones, one along the cemetery edge of Area B1 and another at the far north-eastern end of Area B2 (*ibid*.). Magilton (2008) states this pattern is not seen elsewhere in any excavated English cemetery from the period. From the records of other hospitals such as St Mary Spital, London, and St Leonard’s, York, it is possible to suggest that these children may have been foundlings, orphans of women who died at the hospital or the children of poor families housed temporarily within the hospital.

St Mary Magdalene hospital, Partney, was excavated as part of the Partney By-pass project. This large-scale excavation allowed archaeologists to assess the hospital’s importance within the wider social, religious and economic landscape (Atkins and Popescu 2010). Thirty-three inhumations were recorded, including five (15%) non-adults aged between six to sixteen years of age. Although ten of the adults (30%) could not be sexed, Anderson (2005) argues this demographic profile, with a higher proportion of adult males (n = 17, 52%), is reflective of a more monastic cemetery demography. The relatively small size of this hospital cemetery, the broad age range of individuals (from seven years of age through to ‘old age’), evidence for priestly burials and the absence of evidence for leprosy, led Coppack (2005, 61) to conclude that St Mary Magdalene was a general hospital, serving individuals travelling from the local coastal area and those who were ‘lightly sick’ who would quickly recover and leave the hospital.

A high proportion of adolescents (n = 8, 17%) were identified in the cemetery population from St John the Baptist, Lichfield. Goacher *et al*. (2016) do not propose explanations for this but do make a comparison with the demographic profile from St Mary Spital, London. A higher than expected proportion of adolescents (n = 544, 10%) at St Mary Spital may be the result of migration, as adolescents relocated to London in search of work (Redfern 2012). Lichfield was one of the wealthiest towns in Staffordshire; the development of a planned town expansion in the twelfth century may have attracted an increasing number of migrants. In contrast, the small numbers of women and children (female = 14, 18%; non-adult = 2, 3%) recovered from the cemetery at St Mary in the Horsefair, York (North Yorkshire), a hospital for aged and infirmed chaplains, have been interpreted as servants working in the hospital, as opposed to inmates (Richards *et al*. 1989). However, as discussed above, zoning of burials by age or sex is known and could explain the lower proportions of women and children at some sites where the cemetery was not fully excavated.

### ***Identifying Health and Disease***

Theoretical ‘life course’ approaches are used within archaeology to understand human beings and associated material culture, in a longitudinal framework which emphasises the inter-linkages between the various stages in life (Gilchrist 2012). Individuals are considered as a cumulative entity, the human life viewed as a continuum, embodying experiences from before birth to after death (*ibid*.). This approach can be used to interrogate the interrelated, inter-generational experiences of individuals as a means of recognising the life course at a community level (Agarwal 2016). Gowland (2015) has argued that to understand the individual life course, it is necessary to acknowledge the individual as embedded within a community whose physical environment, socio-economic status, diet and genetics have implications through successive generations. The Developmental Origins of Health and Disease (DOHaD) hypothesis proposes that the health status of the mother has direct consequences for the health of the child (Barker 1990). Subsequent research into the hypothesis has demonstrated the importance of comprehending the inter-generational impact of social status, living environments and health and mortality risks (Gowland 2018). As previously discussed, pregnant women in poverty may have been refused assistance at some hospitals, resulting in malnutrition and physical stressors which would have impacted the future wellbeing of the unborn child.

Cribra orbitalia, periosteal reaction and dental enamel hypoplasia (DEH) are frequently used to assess stress in archaeological populations (Dawson-Hobbis 2017). Each of these stress indicators can have multiple causes, and therefore their presence on skeletal remains needs to be interpreted with caution (Penny-Mason and Gowland 2014). Periostitis can be caused by both trauma and infection, and cribra orbitalia, although generally associated with iron deficiency anaemia, has also been associated with parasitic infection (Lewis 2007). DEH has been described as ‘a permanent temporal record of early life stressors from *in utero* to approximately twelve years of age’ (Armelagos *et al*. 2009, 261). Additional factors indicating general stress, include long bone growth, Harris lines and mortality rates within a population (Jones *et al*. 2012). A review of bioarchaeological studies exploring enamel defects, including enamel hypoplasia and enamel hypocalcification, concluded that individuals who exhibit signs of anaemia, infection and enamel hypoplasia, were at a greater risk of early mortality, compared to those without stress indicators (Armelagos *et al.* 2009). Understanding social, environmental and hereditary factors which contribute to poor health and the risk of early mortality are important when considering the causes for the high proportions of non-adults identified at certain hospital cemetery sites.

Roberts and Cox (2003) surveyed thirty-three medieval cemetery sites including parish, monastic and hospital cemeteries where cribra orbitalia has been identified. Cribra orbitalia occurred at a rate of 9% (n = 5,752) within the general English medieval population, whereas hospital populations had a much higher average rate of 26% (*ibid*.). At the hospital of St Giles, Brough (North Yorkshire), the rate of cribra orbitalia was 51% (Cardwell 1996), suggesting that a higher rate of individuals buried at hospital cemeteries had experienced episodes of malnutrition or gastrointestinal infection (Roberts and Cox 2003). From a study of twenty-eight medieval cemetery sites, Roberts and Cox (2003) found the average number of individuals with DEH was 35% (n = 3,758), with most parish and monastic sites having rates between 20-40%. At hospital sites, the rates are generally, but not necessarily, much higher. At both the hospitals of St John, Lichfield, and St John, Cambridge, the rate of DEH was 65% (Dodwell 2015; Loeffeimann and Holst 2016) and reached 78% at the hospital of St James and St Mary Magdalene, Chichester (Magilton 2008). The rates of cribra orbitalia and DEH identified in individuals from hospital sites, demonstrates that a higher proportion of people who were buried in hospital cemeteries suffered periods of disease, malnutrition or emotional stress during their lives compared to those buried in parish cemeteries (Roberts and Cox 2003).

***Trauma***

Identifying trauma on skeletal remains can be problematic due to skeletal preservation factors. This is further complicated with non-adult remains as children’s bones are more plastic than adult bones, requiring a greater force to produce a complete fracture, and children’s bones heal more quickly resulting in lower rates of deformity (Lewis 2014). Further difficulties exist in detecting well-healed fractures and with issues differentiating between perimortem fractures and postmortem damage (Grauer and Roberts 1996; Roberts 2000). When greenstick or torus fractures occur in non-adults, they can heal quickly and only leave traces on the skeleton for a short period of time after the trauma occurred (Verlinden and Lewis 2015). Therefore, the recognition of secondary complications of trauma, such as displacement of the epiphysis and subperiosteal new bone formation, are often required to identify an episode of trauma (*ibid*.). Lewis (2014) discusses the importance of understanding trauma from a life course perspective: infants are dependent on adults, therefore any trauma that occurs to an infant under two years of age, could be accidental or caused by abuse. However, as children grow older, they become increasingly independent. Children are at greater risk of accidental injury which could result in fractures as they develop their motor skills and whilst playing. During the medieval period juveniles and adolescents would have been at a greater risk of workplace injuries once they entered apprenticeships and employment (*ibid*.)

Medieval miracle stories describe some of the acute illnesses and injuries experienced by children for which saints were appealed to for intercessory help (Gordon 1991). These included near drownings and fractures sustained through misadventure, and concussions and lacerations caused by domestic or work-place accidents (*ibid*.). It is unlikely that acute illnesses or accidents would result in a child seeking a hospital place if they had family or a guardian to care for them (*ibid*.). Chronic illnesses and disabilities could result in a pilgrimage to a saint’s shrine by the child or their custodian which could involve hospital accommodation, for example at St Mary Spital, London, which was founded in part, to house pilgrims (Thomas *et al*. 1997). Although historical evidence exists for the treatment of fractures in medieval Europe, no similar evidence exists for England (Grauer and Roberts 1996). However, bioarchaeological studies have demonstrated that knowledge of injuries caused by trauma, and their treatment, existed in medieval England, even for the poorest sectors of urban society. Grauer and Roberts’ (1996) study of long bone fracture patterns in the cemetery population (n = 1,014) from St Helen-on-the-Walls, York (North Yorkshire), concluded that fractures were rare with a total of forty-one fractures observed in thirty individuals (3%). In most cases, immobilization treatment was available, and fractures healed without causing deformity (*ibid*.). Verlinden and Lewis’ (2015) study of physeal fractures in non-adults (n= 961) from medieval England identified twelve (1%) fractures. Similarly, the study concluded that many of these injuries, although possibly interpreted as dislocations at the time, did not result in deformity and were successfully treated.

Evidence for trauma in non-adults is rare from hospital cemetery populations, suggesting individuals buried at these sites were no more vulnerable to injury than the general population. Possible sharp-force trauma has been identified on two individuals at the hospital of St John the Baptist, Berkhamsted (Hertfordshire): a juvenile [382] with a circular puncture on the frontal bone of the cranium, and a juvenile/adolescent [249] with a cut on the mid-diaphysis of the left tibia (Maher 2014). A possible greenstick fracture was observed on a juvenile [1506] from the hospital of St Giles, Brough (Chundrun and Roberts 1996).

St Mary Spital, London, is one of the most extensively excavated and researched medieval cemetery sites in England and is an important source of bioarchaeological information which has increased our understanding of medieval populations inhabiting this area. The total cemetery population from St Mary Spital had a fracture rate of 21% (1,125/5,387) (Walker 2012). No individuals under six years of age showed evidence of bone fractures, though 2% (7/348) of those aged between six to eleven years exhibited skeletal fractures, which increased to 5% (25/544) in adolescents aged between twelve to seventeen years (*ibid.*). Oblique fractures (61%) and transverse fractures (21%) were the most common fracture types observed, indicating the majority of such trauma were caused by indirect non-torsional forces, such as falls (Grauer and Roberts 1996; Walker 2012). In a study of five medieval cemetery sites (AD 900-1600), Verlinden and Lewis (2015) also found that fractures were rare (1%) and likely to have been caused by accidents. Notably, seven of the twelve (58%) recorded long bone fractures were seen in individuals aged between twelve to seventeen years, and it was concluded that the risk of fracture increased from childhood into adolescence (*ibid*.).

Although most trauma at St Mary Spital was likely to have been accidental, a range of potential causes for particular trauma in non-adults are discussed (Redfern 2012). Two individuals aged between six to eleven years old, showed evidence of blunt force trauma to the skull, which Redfern (2012) argues is commonly caused by the relatively weak neck muscles of this age group leaving the individuals more prone to head injuries during play or from falls (*ibid*.). Two adolescents, also from St Mary Spital, had trauma indicative of non-accidental or inter-personal violence: one had a fracture to the left second rib and the other had suffered dental fractures and ante-mortem tooth loss of their mandibular incisors (*ibid.*). Two further individuals aged twelve to seventeen years, exhibited fracture injuries to the distal tibia. Complications indicated these were the result of falls from a significant height, which Verlinden and Lewis (2015) interpreted as possible accidental falls from scaffolding, suggesting these individuals may have been apprentices on a construction site. Another individual, aged twelve to seventeen years from St Mary Spital, had a fracture to an intermediate phalanx, which may have been caused by a work accident, while avulsion fractures were seen on the right humeral epicondyles in a further adolescent, which may also have been caused by work related, strenuous repetitive activities (*ibid.*). The analysis of trauma patterns in non-adults provides an insight into injuries which may have caused individuals to seek a hospital place temporarily until they could return to employment, and also their work, daily activities and social or family relationships.

## **Conclusion**

The aim of this paper was to provide an up-to-date review of the presence of non-adults identified from medieval hospital cemeteries. Historical documentation, archaeological investigations and osteological analyses suggests that certain groups of people, including young children, were excluded from some hospitals such as St John’s, Cambridge, or conversely, specifically catered for, for example at the ‘barnhous’ at St Leonard’s, York. Archaeological evidence of burial practices indicate that adults and non-adults were treated in the same manner and afforded similar burial rites. As appears to be common in medieval cemetery populations, indicators of trauma are low in hospital sites. This suggests individuals buried at hospital sites were at no greater risk of injury in their work or home environments than the majority of the population. However, a higher proportion of non-adults at hospital sites had experienced episodes of poor nutrition or possibly famine, compared to those in other medieval cemetery contexts. This suggests that many of the non-adults at hospital sites came from some of the poorest and most vulnerable sectors of society.

The reasons for non-adults entering and dying at medieval hospitals are many and varied, influenced by a range of social, economic, family and health factors. Orphaned or abandoned infants were taken in and raised until the age of seven years old at certain hospitals. Juveniles and adolescents, particularly those who travelled from home to find work or apprenticeships, who found themselves homeless and without family support may have used hospitals for temporary relief, and some adolescent scholars may have had lodgings within hospitals arranged for them by a patron. Children would have entered leper hospitals if they or their parents had the disease. It is also likely that these children, and others at general hospitals, would have worked in hospitals, aiding those in charge and carrying out daily chores. As a continuation of a hospital’s charitable convictions, non-residential children, who could not be buried in a parish cemetery, perhaps for reasons of poverty or sin, could also have been buried in hospital cemeteries, though these individuals are not distinguishable from hospital patient-inmates within these burial grounds. By exploring the range of historical, archaeological and osteological information available and considering theoretical approaches, such as the life course and DOHaD hypothesis, it is possible to gain a better insight into the lives and deaths of non-adults buried within hospital cemeteries.

The advances made in archaeological practices and osteological analyses over the past twenty years have enabled detailed analytical studies of human remains from medieval hospital cemeteries to be conducted. This is resulting in a greater body of knowledge about these individuals, creating a more nuanced understanding of the lives and deaths of non-adults at these sites. The use of DNA analysis on hospital cemetery populations is currently limited. However, this form of analysis has great potential to identify the sex of non-adults, ancestry and the presence of disease. Similarly, studies using isotope analysis to explore migration, diet and environmental stressors on individuals could vastly expand our knowledge and understanding of these populations. Over recent years osteological analysis has been conducted on the human remains from two additional hospital sites, Thornton Abbey, Lincolnshire (excavated by the Department of Archaeology, University of Sheffield), and St Leonards, Northumberland (excavated by the Northumberland Park Community Archaeology Project). The results of these studies have yet to be published but will undoubtedly add valuable evidence for the presence of children at hospital cemetery sites. As the importance of hospitals during the medieval period is increasingly recognised, it is anticipated that future archaeological work on hospital sites, will further advance our insights into the lives of non-adults who entered and died in medieval hospitals.

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