

Author & Year	Period	Location	Hospital/Database	Inclusion Criteria	Exclusion Criteria	NEC Case Definition	n of Infants Included in Study	Incidence of NEC
Atkinson et al., 1989	1983 - 1987	United States	Children's Hospital of Oklahoma	Newborns with documented NEC	incomplete birth and prenatal histories, congenital heart disease, gastrointestinal anomalies, congenital syndromes, exchange transfusion, or umbilical artery catheterization	standard clinical criteria for for GI dysfunction, radiological demonstration of pneumatosis intestinalis	135	0.33
Ahle et al., 2018	1987 - 2009	Sweden	National Patient Register (NPR), the Swedish Medical Birth Register (MBR), and the National Cause of Death Register (NCD)	All infants in database	missing personal identification number	WHO ICD-9 or 10 code for NEC	4376	0.16
Bexelius et al., 2018	1987-2009	Sweden	Swedish Patient Register	Infants with a diagnosis of NEC (n=720) were matched for gestational age and year of birth with reference individuals without NEC (n=3656)	Infants not meeting inclusion criteria	ICD-9 or ICD-10	4376	0.16
Thompson et al., 2011	1991 - 2007	United States	Yale New Haven Children's Hospital	Infants $\leq 36$ weeks of gestation	GI anomalies or rapidly worsening undiagnosed clinical condition	Bell's criteria for NEC $\geq$ stage 2	145	0.26
Okogbule-Wonodi et al., 2011	1993 - 2003 2007 - 2009	United States	NICUS at Parkland Memorial Hospital	Infants $< 33$ weeks of gestation, $< 1501$ g, and admitted to the NICU	confirmed diagnosis of congenital brain/neural tube defects or congenital viral infections	Bell's criteria for NEC $\geq$ stage 2 and confirmed by radiographic or pathologic findings	368	0.08
Luig et al., 2005	1994 - 1999	Australia	NICUS in New South Wales (NSW) or the Australian Capital Territory (ACT)	24-31 weeks and admitted to NICU	not clear	radiologically or surgically proven NEC before death or discharge from hospital	4649	0.04
Bertino et al., 2009	1994 - 2005	Italy	NICU at Turin University	VLBW infants $> 23$ weeks of gestation and admitted to the NICU	moved to another unit within the first week of life or had severe congenital anomalies	Bell's criteria for NEC $\geq$ stage 2	34	0.5
Bashiri et al., 2003	1995 - 1998	Israel	Soroka University Medical Center	VLBW infants $\leq 1500$ g	not clear	feeding intolerance, ileus, abdominal distention, vomiting, bloody stool, radiological demonstration of pneumatosis intestinalis and/ or surgical confirmation of NEC	211	0.08
Salhab et al., 2004	1995 - 1998	United States	Parkland Memorial Hospital	ELBW infants $< 1000$ g	congenital anomalies	Bell's criteria for NEC $\geq$ stage 2	68	0.25
Osmanağaoğlu et al., 2004	1995-2003	Turkey	Department of Obstetrics and Gynecology, School of Medicine, Karadeniz Technical University	This is a retrospective study that included 254 pregnant women with preterm rupture of membranes. The study group was divided according to the presence or absence of clinical chorio-amnionitis defined as the presence of two or more of the following criteria: maternal temperature $>38^{\circ}\text{C}$ on two or more occasions $\geq 1$ h apart, maternal tachycardia ( $\geq 120$ beats/min), uterine tenderness, foul smelling amni-otic fluid, maternal leukocytosis $\geq 20,000$ mm $^{-3}$ with bands and positive C reactive protein. Also the study population was divided according to the use of tocolysis	Exclusion criteria included multiple pregnancy, fetal congenital anomalies, diabetes mellitus and severe preeclampsia.	characteristic clinical symptoms with radiographic findings of pneumatosis cystoides intestinalis (grade 2) or pneumoperitoneum or portal air (grade 3)	254	0.19
Goldenberg et al., 2006	1996-2001	United States	This was a retrospective analysis of data from an observational study of 457 consecutive 23- to 32-week liveborn singleton deliveries	All data and variables present	Occasionally, data for a specific variable from a specific patient were not available. In these cases, the data for that patient were excluded from both the numerator and denominator when percentages were determined.	Diagnosed clinically, used Bell's criteria for NEC $\geq$ stage 2	615	0.31

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Son et al., 2016	1997-2004	United States	Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network.	In the current analysis, we included all women from the clinical trial who delivered viable singleton gestations and had data available on mode of delivery and diagnosis of NEC. Eligible women were divided into 2 comparison groups based on their mode of delivery: those who underwent vaginal delivery and those who underwent CD.	Women with fetuses who were antenatally diagnosed with congenital anomalies were excluded from the study.	Bell's criteria	2012	0.13
Rose & Patel, 2018	2000-2016	United States	PubMed search	To identify studies, we used the search term “necrotizing enterocolitis” or “necrotising enterocolitis” in PubMed with the search limited to systematic reviews. Additional randomized controlled trials (RCTs) and multicenter or regional/national observational studies specifically assessing risk factors for NEC were reviewed, including reference lists.	The presence of an indwelling umbilical arterial catheter has been an exclusion criterion for infants in feeding advancement studies, suggesting concern that these catheters may put infants at risk for NEC	Not clear	n/a	n/a
Drenckpohl et al., 2010	2002 - 2008	United States	NICU at Children’s Hospital of Illinois at OSF Saint Francis Medical Center	premature infants admitted to the NICU	not clear	Vermont Oxford Network (VON) definition of presence of radiograph showing hepatobiliary air or pneumoperitoneum in context of abdominal distension, pneumatosis intestinalis, bilious gastric aspirates, emesis, and/or bloody stool	324	0.24
Husseini et al., 2010	2002 - 2008	France	Monocentric NICU	All live births in the database	not clear	Bell's criteria for NEC $\geq$ stage 2	147	0.33
Duci et al., 2019	2002 - 2016	Italy	Database of a Single Center	All infants in database	cardiovascular diseases	Bell's criteria for NEC $\geq$ stage 1	270	0.5
Venkatesh et al., 2019	2002-2008	United States	The CSL included infants born at $\geq 23$ weeks gestation between 2002 and 2008 encompassing 12 clinical centers with 19 hospitals	We initially defined women with chorioamnionitis using ICD-9-CM and chart abstraction data as outlined above.	We excluded births due to either unknown antibiotic exposure or duration	ICD-9 codes	211641	0.002
Yee et al., 2012	2003 - 2008	Canada	25 NICUS in the Canadian Neonatal Network	Gestational age < 33 weeks and admitted to NICU	not clear	Bell's criteria for NEC $\geq$ stage 2	16669	0.05
Lee et al., 2017	2003 - 2014	South Korea	Seoul National University Bundang Hospital	All live and singleton births between 23 and 31 weeks gestation, admitted to the NICU, survived the first 15 days of birth, whose placentas went through histopathological examination, whose mothers had white blood cell counts taken, and the umbilical cord artery acid-base status was measured right after the infant was delivered	major congenital anomalies, twin or higher-order births, outborn infants, and isolated spontaneous intestinal perforation	Bell's criteria for NEC $\geq$ stage 2	354	0.07
Isiyama et al., 2015	2003-2011	Canada	Canadian Neonatal Network centers	preterm infants born at < 33 weeks gestational age admitted to neonatal intensive care units (NICUs) in the Canadian Neonatal Network (CNN)	We excluded infants with major congenital anomalies and those who were moribund (where a decision was made at birth not to provide resuscitative care) from the analysis or infants with missing data	Bell's criteria	29051	0.05
Downard et al., 2012	2004 - 2009	United States	Database of Single Institution NICU	All live births in the database admitted to the NICU	not clear	classified in database as having NEC and clinical or radiographic signs of NEC confirmed	219	0.33

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Henderson et al., 2007	2004-2005	United Kingdom	Royal Jubilee Maternity, Belfast; Princess Royal Maternity Hospital, Glasgow; Queen Mother's Hospital, Glasgow; Ninewells Hospital, Dundee; Royal Infirmary, Edinburgh; Forth Park Hospital, Kirkcaldy; Antrim Hospital, Antrim; Ayrshire Central Hospital, Irvine; Royal Victoria Infirmary, Newcastle; Royal Alexandra Hospital, Paisley	Cases were preterm infants (<37 completed weeks' gestation) with NEC diagnosed using modified Bell criteria or at laparotomy or autopsy examination	anything outside of inclusion criteria	Bell's criteria	124	0.43
Boo & Cheah, 2012	2007 - 2007	Malaysia	NICUS registered in the Malaysian National Neonatal Registry	VLBW infants, classified as 10th percentile or lower birth weight for gestational age	infants < 501g	Bell's criteria for NEC $\geq$ stage 2	3601	0.06
March et al., 2014	2008 - 2012	United States	Beth Israel Deaconess Medical Center	All live births in the database	suspected cases but not confirmed	ICD-9 code containing NEC, Vermont Oxford Network (VON) definition of presence of radiograph showing hepatobiliary air or pneumoperitoneum in context of abdominal distension, pneumatosis intestinalis, bilious gastric aspirates, emesis, and/or bloody stool, reviewers had to agree on diagnosis of NEC	109	0.26
Ding et al., 2024	2008 - 2022	China	Department of Neonatology at Children's Hospital of Chongqing Medical University (CHCMU)	Small for gestational age (SGA) infants admitted to the department of neonatology	incomplete medical information, discharged from hospital within 24 hours of hospitalization	Bell's criteria for NEC $\geq$ stage 2	286	0.5
Goldstein et al., 2020	2008 - 2027	United States	California Perinatal Quality Care Collaborative (CPQCC)	All infants in database	outborn infants, congenital anomalies, missing outcome, missing race/ethnicity data	Vermont Oxford Network (VON) definition of presence of radiograph showing hepatobiliary air or pneumoperitoneum in context of abdominal distension, pneumatosis intestinalis, bilious gastric aspirates, emesis, and/or bloody stool	23011	0.03
Perger et al., 2015	2008-2011	United States	Scott & White tertiary regional	Inclusion dates were selected due to availability of an integrated neonatal intensive care unit and hospital electronic medical record system starting in 2008.	Exclusion criteria included early non-viability of extremely low gestational age newborns that were not stillborn (n/444) and inaccessible infant medical records (n 1/4 41).	ICD-9 codes 777.5–777.53. All charts of NEC patients were manually reviewed	9993	0.02
Kovo et al., 2020	2008-2019	Israel	Edith Wolfson Medical Center	We included only patients that their placentas were sent to histopathological evaluation, according to our departmental protocol.	Excluded pregnancies complicated by neonatal chromosomal or structural anomalies, and known intrauterine viral infection, as well as cases of stillbirths.	from neonatal records, unclear	344	0.009
Hua et al., 2014	2009 - 2012	United States	Thomas Jefferson University	All live births in the database	not clear	Identified from existing NICU database	52	0.5

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Gitau et al., 2023	2009 - 2019	Kenya	Aga Khan university Hospital Nairobi (AKUHN)	VLBW infants < 1500g and ≤ 32 weeks gestation	missing charts or more than 10% of information for variables of interest, died within 72 hours of NICU admission, major congenital malformations, outborn, focal intestinal perforation or spontaneous intestinal perforation	Bell's criteria for NEC ≥ stage 2	200	0.08
Lu et al., 2016	2010-2015	China	The Chongqing Children's Hospital	All infants in database	any immunodeficiency disease, inherited metabolic disorder, gastrointestinal malformation,	ICD-9 and 10 codes, then proven Bell's criteria for NEC ≥ stage 2	585	0.33
Cetinkaya et al., 2017	2012 - 2013	Turkey	NICU at Kanuni Sultan Suleyman Training and Research Hospital	Infants ≤ 36 weeks gestation and admitted to NICU	refusal of parental consent, major congenital malformation, chromosomal anomalies, stage I NEC and/or spontaneous intestinal perforation	classified according to Bell's criteria	145	0.18
Cho et al., 2022	2013 - 2014	South Korea	NICUS in the Korean Neonatal Network (KNN)	VLBW infants	not clear	Bell's criteria for NEC ≥ stage 2	10353	0.07
Kim et al., 2024	2013 - 2020	South Korea	NICUS in the Korean Neonatal Network (KNN)	VLBW infants admitted to NICU	severe congenital anomalies, no data of NEC, died within seven days of gestation	Bell's criteria for NEC ≥ stage 2	5310	0.14
Irles et al., 2018	2015-2017	Mexico	NICU of a tertiary care hospital	NEC patients included those presenting bedside KUB radiographic findings described in stages IIA, IIB, and IIIA as follows: Ileus with dilated bowel loops and focal pneumatosis, or widespread pneumatosis, or portal venous gas with or without ascites, without free air. Patients with intestinal perforation related to NEC included those presenting radiographic findings described in stage IIIB as follows: Pneumoperitoneum.	incomplete clinical information as well as spontaneous or not associated with NEC intestinal perforation, as well as digestive tract malformations	Bell's criteria	27	0.85
Vallant et al., 2022	2015-2021	United Kingdom	BadgerNet, Clevermed	Babies born both in our institution or in referring units, and subsequently transferred to our institution, were included. Those who underwent surgery were only included as cases where NEC was confirmed histologically in a resection specimen. Controls were babies born <24 weeks gestational age, who throughout their admission did not receive a diagnosis of NEC. Matching of cases and controls was not undertaken due to the likely small number of babies included and the risk of matching for a potentially significant factor.	Babies who died within 24 hours of birth and babies who underwent a laparotomy for suspected NEC but were found to have an alternative diagnosis were excluded.	those with a documented diagnosis of NEC on their clinical record and treated as such with either a minimum of 5days of intravenous antibiotics in combination with gut rest or surgical intervention	56	0.55
Li et al., 2024	2019 - 2021	China	Neonatology Department of the Suzhou Municipal Hospital and Suzhou University Children's Hospital	infants < 32 weeks or birth weight < 1500 g	genetic metabolic disorders, chromosomal disorders and severe congenital malformations	Bell's criteria for NEC ≥ stage 2	234	0.23
Abebe et al., 2024	2023 - 2023	Ethiopia	NICUS in public hospitals of Hawasa and Dilla town	infants admitted to NICU	recovered from NEC but had other health issues, those with additional neonatal diseases, and those with major congenital anomalies, genetic disorders, absent or non-communicative mothers, or incomplete records were excluded from both cases and controls	physician diagnosis from modified Bell's criteria	443	0.25
Hallstrom et al., 2003	not clear	Finland	Tampere University Hospital	Infants < 33 weeks of gestation	not clear	classified according to Bell's criteria	152	0.25