

WNND/AFP associated costs/losses in humans - 2% infection rate scenario		Rate/Data	Source	Reference(s)
General considerations				
Infection rate (%)		2%	Literature	Charrel RN, de Lamballerie X, Durand JP, Gallian P, Attoui H, Biagini P, De Micco P. Prevalence of antibody against West Nile virus in volunteer blood donors living in southeastern France. <i>Transfusion</i> 2001;41:1320-1
Morbidity rate WNND (%) (all patients being hospitalised)		0,70%	Literature	Mostashari F, Bunning ML, Kitsutani PT, et al. Epidemic West Nile encephalitis, New York, 1999: results of a household-based seroepidemiological survey. <i>Lancet</i> 2001;358:261-4.
Case-fatality rate (%) (Western Europe - Greece and Italy)		11%	Literature	EFSA-ECDC, 2014, EU summary report on zoonoses, zoonotic agents and food-borne outbreaks 2012 (EFSA Journal 12:3547)
Percentage of ≥ 65 years old hospitalised		64%	Literature	Berner et al (2005) <i>Archives of gerontology and geriatrics</i> 41:15-21 (http://www.sciencedirect.com/science/article/pii/S0167494304001876)
Mean length of work absenteeism for WNND (working days)		30		University Hospital, Liège, personal communication
Loss for the employer during 20 working days		One month gross salary		
Evolution of healthcare costs (%)		3,1% per year	2010-2012	http://www.plan.be/admin/uploaded/201005191119210.proj2010_fr.pdf http://www.nbb.be/doc/DQ/F/DQ3/HISTO/NFDC12.PDF
Mean age of deceased patients (years)		78	Literature	Murray KO, Ruktanonchai D, Hesalroad D, Fonken E, Nolan MS. West Nile virus, Texas, USA, 2012. <i>EID</i> 2013; 19:1836-8
			Literature	Zohrabian A, Hayes EB, Petersen LR. Cost-effectiveness of West Nile virus vaccination. <i>Emerg Infect Dis</i> 2006; 12: 375-80.
N patients deceased		96	estimation	
N patients hospitalised (N WNND cases)		869		
% of AFP		3%	Literature	Danis et al. (2011) Outbreak of West Nile Virus infection in Greece, 2010. <i>EID</i> 17:1968-1872
N patients AFP		26	estimation	
costs - ratio AFP/meningo-encephalitis		1,25	Literature	Staples et al. (2014) Initial and Long-term costs of patients hospitalized with West Nile Virus Disease, <i>Am. J. Trop. Med. Hyg.</i> , 2014, 90:402-409
Consultation of the general practitioner (N = 869 cases [WNND + AFP])				
Cost of one consultation of the GP		23,00 €	Literature	http://www.caami-hziv.fgov.be/downloads/tarieven/Tarieven-arsen-010112-F.pdf
Total costs for consultations of GP (869 patients)		19.987,00 €		
HOSPITALISATION (N = 869 patients affected by WNND + AFP)				
Serological diagnosis				
Cost of serological diagnostic test in humans		21,00 €		ITG Anvers, personal communication
Total costs of diagnosis for 869 hospitalised patients		18.249,00 €		
Hospital charges				
Length of hospital stay		9 days	Patient bill	University Hospital (case of encephalitis in 2004)
	Day 1: admission - intensive care unit	1 day	Patient bill	University Hospital (case of encephalitis in 2004)
	Days 2 to 4: intensive care unit	3 days	Patient bill	University Hospital (case of encephalitis in 2004)
	Days 5 to 9: Neurology unit	5 days	Patient bill	University Hospital (case of encephalitis in 2004)
Hospital stay				
Costs of hospital stay		338,00 €		
	Day 1: admission - intensive care unit	156,45 €	Patient bill	University Hospital (case of encephalitis in 2004)
	Days 2 to 9 (22,66 € per day)	181,28 €	Patient bill	University Hospital (case of encephalitis in 2004)
Patient share (Days 2 to 9) - 12,56 € per day		100,48 €	Patient bill	University Hospital (case of encephalitis in 2004)

Clinical lab fee (Days 2 to 9) - 18,91 € per day	151,28 €	Patient bill	University Hospital (case of encephalitis in 2004)
Dairy pharmaceutical fee (Days 2 to 9) - 0,62 € per day	4,96 €	Patient bill	University Hospital (case of encephalitis in 2004)

Total costs per patient for hospital stay + patient share + clinical lab + pharmaceutical fee	595,00 €
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Pharmaceutical expenses

Diprivan 1% (Propofol) - general anaesthetic drug	3,70 €	Patient bill	University Hospital (case of encephalitis in 2004)
Zovirax (Acyclovir - antiviral - herpesvirus) IV FI Lyoph Perf 1x250 mg	275,02 €	Patient bill	University Hospital (case of encephalitis in 2004)
Perfusalgan Perf 1 g 1x100 ml (<i>Paracetamol</i>)	16,32 €	Patient bill	University Hospital (case of encephalitis in 2004)
NACL 0,9% Perf 100 ml (12 perfs)	12,84 €	Patient bill	University Hospital (case of encephalitis in 2004)
NACL 0,9% Perf 50 ml (2 perfs)	2,42 €	Patient bill	University Hospital (case of encephalitis in 2004)
Glucose 5% perf 50 ml (21 perfs)	26,04 €	Patient bill	University Hospital (case of encephalitis in 2004)
Diphantoine (<i>Phenytoin</i> - antiepileptic) amp IV 250 mg	8,15 €	Patient bill	University Hospital (case of encephalitis in 2004)
Depakine chrono comp 500 mg (antiepileptic)	2,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Dormicum amp 5mg/5ml (<i>Midazolam</i>)	0,82 €	Patient bill	University Hospital (case of encephalitis in 2004)
Actrapid Penfill (<i>fast acting insulin</i>) cart 1 x 3 ml 300 U	5,55 €	Patient bill	University Hospital (case of encephalitis in 2004)
Claforan (<i>3rd generation cephalosporin</i>) FL IV 2 g + solv	248,22 €	Patient bill	University Hospital (case of encephalitis in 2004)
Pentrexyl Amp Inj 2 g (<i>Penicillin</i>)	44,31 €	Patient bill	University Hospital (case of encephalitis in 2004)
Clexane (<i>heparin</i> - antithrombotic) Ser Inj 40 mg/0,4 ml	6,74 €	Patient bill	University Hospital (case of encephalitis in 2004)
Clexane (<i>heparin</i> - antithrombotic) Ser Inj 80 mg/0,8ml	6,74 €	Patient bill	University Hospital (case of encephalitis in 2004)
Dotarem (for diagnosis by magnetic resonance imaging) FL IV 1x15 ml	62,74 €	Patient bill	University Hospital (case of encephalitis in 2004)
Etumine (<i>phenothiazin</i> - antipsychotic) amp 1x4 ml	0,81 €	Patient bill	University Hospital (case of encephalitis in 2004)
Corsodyl (<i>chlorhexidine digluconate</i>) sol 1 ml	6,44 €	Patient bill	University Hospital (case of encephalitis in 2004)
Miniplasco NACL 0,9% Amp 1 x 20 ml	9,99 €	Patient bill	University Hospital (case of encephalitis in 2004)
Miniplasco KCL 3 g 2 meq/ml 20 ml	1,82 €	Patient bill	University Hospital (case of encephalitis in 2004)
Isobétadine sol hydroalc 1 ml (125 ml flask)	4,10 €	Patient bill	University Hospital (case of encephalitis in 2004)

Total pharmaceutical expenses per patient	745,00 €
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Medical services

Admission

Monitoring of heart function, blood pressure, etc. (day 1)	122,37 €	Patient bill	University Hospital (case of encephalitis in 2004)
Continuous surveillance of heart function (days 2 to 5) - 107,08 € per day	321,24 €	Patient bill	University Hospital (case of encephalitis in 2004)
Extra-fees for monitoring by a specialised and accredited doctor	2,87 €	Patient bill	University Hospital (case of encephalitis in 2004)

Medical imaging

X-ray (admission)	65,64 €	Patient bill	University Hospital (case of encephalitis in 2004)
Hospitalised patient share for specialised medical and technical services	16,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Fees of consultancy for an accredited doctor specialised in X-ray diagnosis	15,28 €	Patient bill	University Hospital (case of encephalitis in 2004)
Magnetic resonance imaging of the head	119,41 €	Patient bill	University Hospital (case of encephalitis in 2004)
X-rays of thorax and its content (N = 3)	33,18 €	Patient bill	University Hospital (case of encephalitis in 2004)
Extra charges for x-rays performed in a hospitalised patient under surveillance (N = 3)	29,85 €	Patient bill	University Hospital (case of encephalitis in 2004)
Extra fees for urgent medical services performed during night/weekend/public holiday (N=2)	116,20 €	Patient bill	University Hospital (case of encephalitis in 2004)

Clinical laboratory (assays)

Total cholesterol (N = 1)	0,56 €	Patient bill	University Hospital (case of encephalitis in 2004)
LDL cholesterol (N = 1)	7,51 €	Patient bill	University Hospital (case of encephalitis in 2004)
HDL cholesterol (N = 1)	1,05 €	Patient bill	University Hospital (case of encephalitis in 2004)
Haemoglobin (electrophotometric method) (N = 11)	3,08 €	Patient bill	University Hospital (case of encephalitis in 2004)
Red blood cell count and/or haematocrit (maximum 1) (N = 3)	0,84 €	Patient bill	University Hospital (case of encephalitis in 2004)
White blood cell count (N = 4)	1,12 €	Patient bill	University Hospital (case of encephalitis in 2004)
Platelet count (N = 3)	0,84 €	Patient bill	University Hospital (case of encephalitis in 2004)
Differential leukocyte count (N = 4)	2,24 €	Patient bill	University Hospital (case of encephalitis in 2004)
Thromboplastin time (prothrombin time), including potential fibrinogen calculation (N = 3)	1,68 €	Patient bill	University Hospital (case of encephalitis in 2004)

Fibrinogen (N = 3)	1,68 €	Patient bill	University Hospital (case of encephalitis in 2004)
Activated partial thromboplastin time (N = 3)	2,10 €	Patient bill	University Hospital (case of encephalitis in 2004)
Triglycerides (N = 1)	0,70 €	Patient bill	University Hospital (case of encephalitis in 2004)
Lipases (N = 3)	2,61 €	Patient bill	University Hospital (case of encephalitis in 2004)
Amylases (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
Urea (N = 4)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Aspartate aminotransferases and Alanine aminotransferases (N = 4)	1,05 €	Patient bill	University Hospital (case of encephalitis in 2004)
Albumin (N = 3)	1,05 €	Patient bill	University Hospital (case of encephalitis in 2004)
Total bilirubin and its fractions (N = 4)	2,80 €	Patient bill	University Hospital (case of encephalitis in 2004)
Calcium (N = 4)	2,24 €	Patient bill	University Hospital (case of encephalitis in 2004)
Chloride ion (N = 12)	5,04 €	Patient bill	University Hospital (case of encephalitis in 2004)
Plasma or serum bicarbonates (N = 4)	1,68 €	Patient bill	University Hospital (case of encephalitis in 2004)
Magnesium (N = 3)	0,63 €	Patient bill	University Hospital (case of encephalitis in 2004)
Phosphates (N = 4)	1,96 €	Patient bill	University Hospital (case of encephalitis in 2004)
Potassium (N = 13)	7,28 €	Patient bill	University Hospital (case of encephalitis in 2004)
Total proteins (N = 4)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Protein electrophoresis, with curve and estimations (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
CRP (immunological assay) (N = 5)	4,35 €	Patient bill	University Hospital (case of encephalitis in 2004)
Sodium (N = 11)	5,39 €	Patient bill	University Hospital (case of encephalitis in 2004)
Creatin kinases (CK) (N = 4)	2,80 €	Patient bill	University Hospital (case of encephalitis in 2004)
Lactate dehydrogenases (LDH) (N = 1)	0,56 €	Patient bill	University Hospital (case of encephalitis in 2004)
Gammaglutaryltransferase (GGT) (N = 4)	2,24 €	Patient bill	University Hospital (case of encephalitis in 2004)
Alkaline phosphatase (N = 4)	2,24 €	Patient bill	University Hospital (case of encephalitis in 2004)
Creatin kinase isoenzymes (immunoassay) (N = 3)	5,25 €	Patient bill	University Hospital (case of encephalitis in 2004)
Troponin T isoform (immunoassay) (N = 3)	7,35 €	Patient bill	University Hospital (case of encephalitis in 2004)
Creatinin (N = 1)	0,49 €	Patient bill	University Hospital (case of encephalitis in 2004)
Creatinin clearance (N = 3)	4,20 €	Patient bill	University Hospital (case of encephalitis in 2004)
Angiotensin-converting enzyme (Kininase 2) (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Thyrotropic hormone (TSH) (N = 1)	1,75 €	Patient bill	University Hospital (case of encephalitis in 2004)
Free T4 (N = 1)	2,45 €	Patient bill	University Hospital (case of encephalitis in 2004)
Sodium - max 1 (N = 3)	1,68 €	Patient bill	University Hospital (case of encephalitis in 2004)
Antiepileptic drug (N = 5)	12,25 €	Patient bill	University Hospital (case of encephalitis in 2004)
Glucose (N = 10)	3,50 €	Patient bill	University Hospital (case of encephalitis in 2004)
Lactic acid (N = 7)	6,09 €	Patient bill	University Hospital (case of encephalitis in 2004)
Ionised calcium (N = 8)	16,80 €	Patient bill	University Hospital (case of encephalitis in 2004)
Vitamine B12 and folic acid (non-isotopic assay) (N = 1)	2,80 €	Patient bill	University Hospital (case of encephalitis in 2004)
Red blood cell folate (non-isotopic assay) (N = 1)	2,10 €	Patient bill	University Hospital (case of encephalitis in 2004)
Iron (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
Ferritin (non-isotopic assay) (N = 1)	1,75 €	Patient bill	University Hospital (case of encephalitis in 2004)
Transferrin (immunoassay)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
Blood pH, blood partial pressures of CO2 and O2 (including estimations of other parameters of acid-basis equilibrium) (N = 8)	14,00 €	Patient bill	University Hospital (case of encephalitis in 2004)
Microscopic examination of sediment (with or without simple stain) (N = 1)	0,49 €	Patient bill	University Hospital (case of encephalitis in 2004)
Microscopic examination of sediment after double stain (N = 1)	0,63 €	Patient bill	University Hospital (case of encephalitis in 2004)
Aerobic culture of urine with identification of isolated pathogens (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Search of antinuclear or anticytoplasmic antibodies (immunofluorescence assay) (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Rheumatoid factor (N = 1)	0,70 €	Patient bill	University Hospital (case of encephalitis in 2004)
Circulating immune complexes (N = 1)	6,30 €	Patient bill	University Hospital (case of encephalitis in 2004)
D-dimers (latex assays or equivalent method) (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Anti-cardiolipin antibodies (N = 1)	1,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Anti-neutrophil cytoplasmic antibody (N = 1)	2,10 €	Patient bill	University Hospital (case of encephalitis in 2004)
Lupus anticoagulant (N = 1)	2,45 €	Patient bill	University Hospital (case of encephalitis in 2004)
C3 (immunoassay) (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
C4 (immunoassay) (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)

IgG (immunoassay) (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
IgA (immunoassay) (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
IgM (immunoassay) (N = 1)	0,87 €	Patient bill	University Hospital (case of encephalitis in 2004)
Revealing of cryoglobulins (N = 1)	0,42 €	Patient bill	University Hospital (case of encephalitis in 2004)
Block fee (admission)	33,42 €	Patient bill	University Hospital (case of encephalitis in 2004)
Block fee for the accredited clinical laboratory specialist	27,01 €	Patient bill	University Hospital (case of encephalitis in 2004)
Medical and paramedical fees: non refundable laboratory analyses	7,51 €	Patient bill	University Hospital (case of encephalitis in 2004)

Neurology

Lumbar puncture (N = 1)	10,70 €	Patient bill	University Hospital (case of encephalitis in 2004)
Electroencephalogram (N = 4)	238,52 €	Patient bill	University Hospital (case of encephalitis in 2004)
General anaesthetic or spinal block or continuous/non-continuous epidural (N = 1)	40,43 €	Patient bill	University Hospital (case of encephalitis in 2004)
Monitoring by a doctor registered as specialist in neurology (from Day 1 to Day 5)	43,68 €	Patient bill	University Hospital (case of encephalitis in 2004)
Monitoring by a doctor registered as specialist in neurology (from Day 6 to Day 12)	18,90 €	Patient bill	University Hospital (case of encephalitis in 2004)

Miscellaneous

Pure-tone or speech audiometry performed in a sound proof chamber (N = 1)	23,40 €	Patient bill	University Hospital (case of encephalitis in 2004)
Measurement of the eardrum, middle ear and ossicular chain impedance, with protocol and tympanogram, including the eventual acoustic reflex (N = 1)	12,76 €	Patient bill	University Hospital (case of encephalitis in 2004)
Fee for examination by a specialised doctor of a patient hospitalised on demand of another recognized specialist (N = 1)	3,51 €	Patient bill	University Hospital (case of encephalitis in 2004)
Block fee for hospital medical permanence, after admission in an intensive care unit	35,70 €	Patient bill	University Hospital (case of encephalitis in 2004)

Total costs of medical services per patient	1.519,00 €
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Total costs for hospitalisation, per patient - 2004 data	2.859,00 €
hospital stay + patient share + clinical lab + pharmaceutical fee	595,00 €
pharmaceutical expenses per patient	745,00 €
medical services per patient	1.519,00 €

Total costs for hospitalisation, per patient - 2012 price indexing (WNND)	3.553,00 €
hospital stay + patient share + clinical lab + pharmaceutical fee	739,00 €
pharmaceutical expenses per patient	926,00 €
medical services per patient	1.888,00 €

3,1% annual price indexing http://www.plan.be/admin/uploaded/201005191119210.proj2010_fr.pdf
<http://www.nbb.be/doc/DQ/F/DQ3/HISTO/NFDC12.PDF>

Total costs for hospitalisation, per patient - 2012 price indexing (AFP)	4.441,00 €
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Total costs for hospitalisation of 843 patients (WNND)	2.995.179,00 €
Total costs for hospitalisation of 26 patients (AFP)	115.466,00 €
Total costs for hospitalisation of 869 patients (WNND+AFP)	3.110.645,00 €

cost for homecare - during recovery of a patient (outpatient costs) N = 773 patients

Duration of recovery at home (days)	30 scenario
cost per day for homecare (euro) - home health aides (nurse, housekeeper and caretaker)	78,00 €
<i>nurse (two visits a day - one hour a day)</i>	16,00 € 16,43 euros/heure http://www.inami.fgov.be/SiteCollectionDocuments/tarif_infirmiers_20120101.pdf
<i>caretaker (8 hours a day)</i>	62,00 € 7,81 euros/heure (http://www.fasd.be/cct/tarifgardemalade/tarifgardemalade.asp)
Total cost for the duration until recovery - home health aides	2.340,00 € calculation
<i>nurse (two visits a day - one hour a day)</i>	480,00 € calculation
<i>caretaker (8 hours a day)</i>	1.860,00 € calculation

Total costs for 773 patients hospitalised and surviving	1.808.820,00 € calculation
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underestimated because recovery longer for AFP cases

Compensations paid for the death of 96 patients (78 years old)

Compensation per person	9.800,00 €	Belgian insurance company - compensation for the death of a 78 year old person deceased in a road accident
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Total compensations for the death of 96 patients 940.800,00 €

Costs associated with work absenteeism for hospitalised patients (active persons, occupied, aged between 15 and 64 years old)

Men				
Average monthly gross salary - 2012 (20 working days)				
	Employee	3.668,00 €	2012 projections	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
	Worker	2.749,00 €	2012 projections	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
	Self-employed	3.700,00 €	2009 data	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
Average monthly gross salary - 2012 (30 working days)				
	Employee	5.502,00 €		
	Worker	4.124,00 €		
	Self-employed	5.550,00 €		

Losses for the employer (N = 46)		232.710,00 €
	Employee (N = 25)	137.550,00 €
	Worker (N = 15)	61.860,00 €
	Self-employed (N = 6)	33.300,00 €

Women

Average monthly gross salary - 2012 (20 working days)				
	Employee	3.372,00 €	2012 projections	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
	Worker	2.527,00 €	2012 projections	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
	Self-employed	3.413,00 €	2009 data	Statbel, Belgian FPS Economy, S.M.E.s, Self-employed and Energy
Average monthly gross salary - 2012 (30 working days)				
	Employee	5.058,00 €		
	Worker	3.791,00 €		
	Self-employed	5.120,00 €		

Losses for the employer (N = 35)		263.214,00 €
	Employee (N = 20)	166.914,00 €
	Worker (N = 12)	75.820,00 €
	Self-employed (N = 3)	20.480,00 €

Total losses associated with work absenteeism (hospitalised cases) 120 patients 495.924,00 €

SUMMARY OF COSTS ASSOCIATED WITH WNV EPIDEMICS IN HUMANS

Cost of consultations of the GP (N = 869)	19.987,00 €	
Cost of diagnosis for 869 hospitalised patients	18.249,00 €	
Cost of hospitalisation for 843 hospitalised patients WNND	2.995.179,00 €	
Cost of hospitalisation for 26 hospitalised patients AFP	115.466,00 €	
Cost of homecare (nurse, caretaker)	1.808.820,00 €	
Total compensations for the death of 96 patients	940.800,00 €	
Total losses associated with work absenteeism (120 hospitalised cases)	495.924,00 €	underestimated because recovery longer for AFP cases
TOTAL	6.394.425,00 €	