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Correction

Correction: Rasheduzzaman, M., et al. Reverse QMRA as a Decision Support Tool: Setting Acceptable Concentration Limits for *Pseudomonas aeruginosa* and *Naegleria fowleri*. *Water* 2019, *11*, 1850

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The authors regret to report that the paper "Reverse QMRA as a Decision Support Tool: Setting Acceptable Concentration Limits for *Pseudomonas aeruginosa* and *Naegleria fowleri*" contains some erroneous computations.

An error in the supplementary Table S2 occurred due to confusion between the 'natural log' versus 'base 10' conversion. The errors do not influence the larger message of the study but do result in lower target concentrations for *N. fowleri*.

The authors wish to make the following corrections to this paper [1]:

In the 'Abstract' Section:

1. Thirteenth sentence (lines 13–15)

   For *N. fowleri*, based on the DALY approach, critical concentrations were 0.000030 *N. fowleri*/L for swimming and 0.00000060 *N. fowleri*/L for neti pot™ use scenario.
2. Seventeenth sentence (lines 17–18)

   For *N. fowleri*, the 10^{-4} annual risk target approach resulted in 0.022 *N. fowleri*/L and the DALY approach resulted in 0.00000064 *N. fowleri*/L for the neti pot™ scenario.

In the 'Materials and Methods' Section:

1. 2.1 *Risk Characterization*, Equation (2) descriptions

   where, DW is the disability weight, L_L is the average duration of the case until death (years) and L_D is years lived with infection/illness for non-fatal cases.
2. Table 3

Table 3. Monte Carlo input parameters for *P. aeruginosa* and *N. fowleri*.

Parameter	Unit	Value	Distribution	Source
		P. aeruginosa		
alpha		2.5% = 0.115; 5% = 0.124; 95% = 0.386	Gamma	[49]
N_{50}		2.5% = 4730; 5% = 6010; 95% = 70,500	Gamma	[49]
Contact (Drop*)	mL/use	Likeliest = 0.05; Min = 0.01; Max = 0.15	Triangular	Assumption
Contact (E.M.$^{\Phi}$)	mL/use	Likeliest = 0.062; Min = 0.052; Max = 0.07	Triangular	Measured by this study
		N. fowleri		
alpha		2.5% = 0.84; 5% = 0.93; 95% = 72	Gamma	Fit by this study
N_{50}		2.5% = 82; 5% = 92; 95% = 254	Gamma	
Contact (Swimming)	mL/use	Likeliest = 1; Min = 0.1; Max = 10	Triangular	Assumption
Contact (Neti Pot™)	mL/use	Likeliest = 180; Min = 120; Max = 240	Triangular	[48]

Notes: Drop* represents the contact rate based on the drop scenarios; E.M.$^{\Phi}$ represents the contact rate based on the experimental measurements of water volume in contact lenses.

In the 'Results' Section:

1. 3.1 *Dose-Response Model*, first paragraph (lines 1–3)

   The details of the goodness of fit (i.e., deviance and combined AIC values) for various dose–response models for N. fowleri are shown in Table 4.
2. Table 4

   Third column heading "MLE Estimate" should be changed to "Deviance".
3. 3.1 *Dose–Response Model,* second paragraph (lines 2–5)

   The maximum likelihood estimates for beta-Poisson model parameters alpha (α) and N_{50} were found to be 1.59 and 156, respectively, from 10,000 bootstrap iterations. The 95% confidence interval for alpha (α) was (0.93, 72) and the 95% confidence interval for N_{50} was (92, 254).
4. 3.2 *Risk Characterization*, first paragraph (lines 4–6)

   For *P. aeruginosa*, the risk of illness per event calculated based on DALY was 2.81×10^{-9}, which was two orders of magnitude lower than the per event risk of illness based on the annual risk metric (2.74×10^{-7}).
5. Table 5
6. 3.2 *Risk Characterization*, second paragraph (lines 1–5)

   For *N. fowleri*, the risk of death for neti pot™ uses per event calculated based on DALYs was 4.77×10^{-10}, which was five orders of magnitude lower than the per event risk of death calculated based on annual risk metric (1.67×10^{-5}). Similarly, for *N. fowleri* exposure during swimming, DALY and annual risk based per event risks followed the same pattern as neti pot™ exposure, i.e., a five orders of magnitude difference in the risk of death.
7. 3.3 *Concentrations*, second paragraph (lines 2–4)

   The highest critical concentration for *N. fowleri* was obtained for the swimming scenario using the annual risk metric (mean concertation 1.4 *N. fowleri*/L with a 95% confidence interval of (0.29, 4.0)).
8. 3.3 *Concentrations*, third paragraph (lines 1–3)

Similarly, the concentration for the neti pot™ scenario was found to be 0.021 *N. fowleri*/L with a 95% confidence interval of (0.010, 0.034) for the annual risk approach. Based on the DALY approach, limits of concentrations were 0.000030 *N. fowleri*/L for swimming and 0.00000060 *N. fowleri*/L for neti pot™ use scenario.

9. Table 6
10. 3.3 *Concentrations*, fourth paragraph (lines 2–4)

Considering the hot water scenario, the annual risk approach resulted in 0.022 *N. fowleri*/L, and the DALY approach resulted in 0.00000064 *N. fowleri*/L for the neti pot™ scenario (Scenario 5).

Table 5. Risk of illness/death based on DALYs and annual risk approach.

Approach	Risk of Illness/Death	*P. aeruginosa*	*N. fowleri*	
			Neti Pot™	**Swimming**
DALYs	Annual	1.03×10^{-6}	2.86×10^{-9}	2.45×10^{-9}
	Per Event	2.81×10^{-9}	4.77×10^{-10}	3.50×10^{-10}
Annual Risk	Annual	1.00×10^{-4}	1.00×10^{-4}	1.00×10^{-4}
	Per Event	2.74×10^{-7}	1.67×10^{-5}	1.43×10^{-5}

Table 6. Concentration of *P. aeruginosa* and *N. fowleri* before and after heat inactivation [1].

Risk Metric	*P. aeruginosa* Conc. (CFU/L) (95% CI)		*N. fowleri* Conc. (*N. fowleri*/L) (95% CI)		Heat Inactivation Conc.		
					P. aeruginosa (CFU/L)		*N. fowleri* (*N. fowleri*/L)
	Contact lens (Drop) (Scenario 1a)	Contact lens (E.M.) (Scenario 1b)	Neti Pot™ (Scenario 2)	Swimming (Scenario 3)	Drop (Scenario 4a)	E.M. (Scenario 4b)	Neti Pot™ (Scenario 5)
DALY	0.33 (0.02–1.8)	0.30 (0.02–0.99)	0.00000060 (0.00000030–0.0000010)	0.000030 (0.000010–0.00010)	0.60	0.55	0.00000064
Annual Risk	33 (2.0–118)	30 (2.3–100)	0.021 (0.010–0.034)	1.4 (0.29–4.0)	61	55	0.022

Notes: [1] EPA has generally applied the 1 in 10,000 risk target to the risk of infection to provide a margin of safety that accounts for secondary transmission. In this study, neither the dose–response model provided infection as an endpoint (endpoint of the *N. fowleri* model was death and endpoint of the *P. aeruginosa* model was illness). If one wished to provide the additional margin of safety associated with infection as an endpoint, one would need to estimate the probability of illness/infection based on sources such as Cheng et al. (1999) [54] and multiply the concentrations provided in this study by that probability.

In the 'Discussion' Section:

1. Fifth paragraph (lines 3–5)

In general, the tolerable critical concentrations of *N. fowleri* are much lower compared to those for *P. aeruginosa* except for the swimming scenario with the annual risk metric which is still more than an order of magnitude below the *P. aeruginosa* values.

2. Fifth paragraph (lines 9–14)

The tolerable mean critical concentration of *N. fowleri* for the swimming scenario with the annual risk metric has a mean concentration 1.4 CFU/L, with a range from 0.29 to 4.0 CFU/L. Given that the end response is death with a 100% percent mortality rate, it may be wise to pick a lower range of critical concentration (0.29 CFU/L) for developing standards, and the same can be applied for developing standards for other scenarios related to *N. fowleri*.

3. Fifth paragraph (lines 15–17)

Considering 50 cells of *N. fowleri* and 200 L as a volume of water sample to be filtered, the detection limit of *N. fowleri* would be 0.25 *N. fowleri*/L which is also aligned with our calculated boundary concentration of *N. fowleri* using the annual risk metric.

4. Sixth paragraph (lines 1–2)

Higher tolerable concentration standard can be set for using hot plumbing water for contact lenses exposure scenarios for *P. aeruginosa* but not for exposure scenarios for *N. fowleri*.

In the 'Acknowledgments' Section:

1. Please add this line after the last line of the current acknowledgments

The authors are grateful to Dr. Jade Mitchell and Kara Dean at Michigan State University for pointing out the errors in our dose–response parameters that prompted us to revise and correct the manuscript with updated results.

In the 'Supplementary Materials' Section:

1. Table S2

Table S2. Best fit parameters for the beta-Poisson model for *N. fowleri*, from 10,000 bootstrap iterations.

Parameter	MLE	Percentiles					
		0.5%	**2.5%**	**5%**	**95%**	**97.5%**	**99.5%**
Alpha	1.59	0.72	0.84	0.93	72	1175	12946
N_{50}	156	63	82	92	254	276	322

The authors would like to apologize for any inconvenience caused to the readers by these changes. The manuscript will be updated, and the original will remain online on the article webpage, with a reference to this Correction.

References

1. Rasheduzzaman, M.; Singh, R.; Haas, C.N.; Tolofari, D.; Yassaghi, H.; Hamilton, K.A.; Yang, Z.; Gurian, P.L. Reverse QMRA as a Decision Support Tool: Setting Acceptable Concentration Limits for *Pseudomonas aeruginosa* and *Naegleria fowleri*. *Water* **2019**, *11*, 1850. [CrossRef]