

# Qualifying and quantifying medical uncertainty in 10th-century Baghdad: Abu Bakr al-Razi

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## Introduction

Abu Bakr Muhammad ibn Zakariya' al-Razi (d. 925) was one of the most interesting and innovative clinicians of the medieval world.<sup>1</sup> He distinguished smallpox from measles, experimented on an ape to establish the toxicity of quicksilver (mercury) and used a control group to assess whether bloodletting was an effective treatment for 'brain fever'.<sup>2–5</sup> Al-Razi stated in one of his treatises:

My aim and objective is [to provide] things useful to people who practise and work, not for those engaged in research and theory<sup>5</sup> (pp. 112–13).

## Hospitals in 10th-century Baghdad

Al-Razi rose to become a hospital director both in Rayy (his home town, and now a suburb of Tehran) and Baghdad. This hospital environment proved important for his medical research. By the 10th century, hospitals in Baghdad had developed into quite sophisticated institutions. For instance, in the 920s and 930s, a powerful vizier by the name 'Ali ibn 'Isa endeavoured to improve public health, both by maintaining hospitals and sending doctors to areas where there was inadequate medical provision. The hospitals were Islamic charitable foundations with sometimes substantial endowments, so they benefited from both legal and financial security; but 'Ali ibn 'Isa specified that they should serve non-Muslims as well as Muslims.<sup>6</sup>

Moreover, the medicine practised in these hospitals was not based on religious beliefs, but on the humoral pathology inherited from the Greeks, as the writings of the hospital physician al-Kaskari demonstrate.<sup>7</sup> In this sense, the Islamic hospitals offered – somewhat paradoxically – a non-religious and non-sectarian service: physicians and other practitioners from various backgrounds catered for equally diverse patients in a non-confessional medical system. The development of the hospitals meant that elite

medicine moved to them, and some of the most highly regarded doctors looking after patients in the upper echelons of society worked and taught in them. In addition, given their large numbers of patients, hospitals provided an infrastructure for research.

## Hospital records

Following Hippocrates' example in recording cases, al-Razi stressed the fundamental importance of documenting the characteristics and treatment of hospital patients, and more than 2000 of these case-notes have survived.<sup>8</sup> In *Doubts about Galen (Al-Shukuk 'ala Jalinus)*, al-Razi referred to registers of hospital patients' names and notes as a basis for criticising the Greek physician Galen of Pergamum (c. 129–216):

How many things have I observed in the hospitals in Baghdad and Rayy, and in my own home. I shall explain the many meanings of these things. I recorded the names of those whose situation developed in accordance with these books [by Galen], and the names of those whose states developed exactly in the contrary fashion. The number of those whose state developed in a contrary fashion is not a small one<sup>5</sup> (pp. 105–6).

## Conceptualising patient groups

The hospital environment and record-keeping promoted the conceptualisation of groups of similar patients, for which al-Razi uses the word *jama'a*. One example concerns ophthalmological disorders:

I say: I am of the opinion that bloodletting at the corners of the eye and the vein of the forehead is useful against all chronic eye diseases such as inveterate pannus, trachoma (jarab), and red 'ulcerative blepharitis' (al-sulaq al-ahmar). In front of me, a group (jama'a) was phlebotomised who were suffering from pannus. It [the pannus] receded and they were able to rest.<sup>6</sup>

Another example relates to the treatment of epilepsy  
i. 142, lines 2–3:

I say: A sternutatory (sa‘ut) [a substance provoking sneezing] that is excellent for epilepsy; a group was cured by it (buri‘a ‘alaihi jama‘atun). Let the patient take a sternutatory made with sneezewort, white hellebore, cyclamen, and colocynth pith<sup>6</sup> (ii. 28, lines 4–9).

In both these examples, al-Razi remarks that a group of patients was positively affected by treatments that he had recommended.

### Quantifying treatment success

Elsewhere, in *Doubts about Galen*, al-Razi reports the proportions of groups of patients who were treated successfully.

One such quotation concerns a condition called ‘drum-like dropsy’, a type of dropsy in which the lower abdomen is so swollen that it sounds like a drum on percussion. Galen said that when certain intestinal pains are located around the navel or the small of the back, this sometimes resulted in drum-like dropsy. Al-Razi only partially agrees with Galen here, saying:

I have seen this more than once in the hospitals (bimaristanat) in Iraq, and in my home in Rayy. In some of them [the patients], drum-like dropsy followed, but in others strangury, and in yet others a pain in the hip. Since I noticed this many times, whilst neither purging nor warm drugs that expel wind were of any help for them, I applied myself to giving them enemas that provide heat and fatten the region of the kidneys. I made them sit in warm sand up to their chest. I made some of them constantly attend dry baths [i.e. hot rooms with little moisture]. Three were cured whilst one was affected by dropsy more quickly than those who were not treated (*Buri‘a minhum thalathatu nafarin wa-asra‘a l-istisqa‘u ila nafarin asra‘a mimman lam yu‘alaj*), but by a lighter [variety of dropsy]. I did not, however, see that anyone recovered from ‘drum-like’ dropsy<sup>9</sup> (p. 74, line 20–p. 75, line 6 with corrections based on a fresh examination of the manuscripts).

In other words, according to al-Razi, the type of pain described by Galen only sometimes resulted in drum-like dropsy. In any case, al-Razi wanted to prevent this dropsy from occurring and he devised a way of lessening the possibility. When commenting on the effectiveness of this method, al-Razi resorts to crude statistics – three were cured, whereas one contracted a lighter

variety of dropsy – which we must assume was not fatal, as drum-like dropsy was (it should be stressed that the text of the manuscripts is rather difficult here, and I give my current reading of the Arabic in brackets, revising my earlier interpretation<sup>6</sup>).

Another example concerns a more impressive numerator and denominator.

A careful intellectual ought not to desire in this method the utmost certainty, and ought not to rely on it [the method] and make absolute statements on prognoses or deduce the treatment and regimen in accordance with it [the method]. For there were approximately three hundred out of two thousand patients (*wa-qad kanu ‘ala thalathati mi‘atin min nahwi alfay maridin*) whose state developed in a contrary fashion. I therefore refrained from announcing what was happening except where the patient’s situation was clearly and strongly indicated, so that I could have no doubt about it. For a time I continued seeking through experience [tajriba] and reason [qiyas] a new regimen for acute diseases in which I could be sure to avoid any mistake which would affect the patient—my only fault being my inability to find a speedy cure—until I found it.<sup>9</sup> (p. 63, lines 14–18, with corrections) (al-Razi 10th century CE)

Al-Razi does not make clear for which condition he is seeking a new treatment, apart from the fact that it is acute. Only the hospital environment could provide such large numbers (‘2000’) and thus make it possible for al-Razi to seek out new cures, or, to put it in more modern terms, to conduct medical research.

Did al-Razi adhere to the theoretical concept of the patient group that became so important in Europe from the 17th century onwards?<sup>10,11</sup> There is at least one example of his use of a control group when trying to assess whether bloodletting is effective against brain fever.<sup>2–5</sup> Although al-Razi does not offer a theoretical discussion highlighting the concept of the group, it is clear that he regarded numerical observation as important, and he mentions how different patient groups are affected differently by certain treatments.

### Qualifying medical experience

Galen observed that one cannot rely on any and all experience: one needs to make sure that experience meets certain standards.<sup>12</sup> He also insisted that the individual nature of a patient – what ‘many physicians call idiosyncrasy cannot be grasped’.<sup>13</sup> Although al-Razi fervently believed in the importance of experience, he also used the first

Hippocratic aphorism to warn that ‘experience is dangerous’. As illustrated in the text referring to 2000 patients, however, al-Razi makes an epistemologically more astute point: the physician should be aware that complete certainty cannot be attained in medicine, perhaps especially when dealing with acute diseases. Two centuries after al-Razi, Abd al-Latif al-Baghdadi reminded his readers that medicine is the ‘knowledge of probabilities’, and that this requires conjecture according to the rules of the art of medicine.<sup>14,15</sup>

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