

Diabetes Information Technology & WebWatch

Who Is Downloading the Free AIDA v4.3a Interactive Educational Diabetes Computer Software? A 1-Year Survey of 3,864 Downloads

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ABSTRACT

AIDA is a free diabetes computer program that permits the interactive simulation of plasma insulin and blood glucose profiles for educational, demonstration, self-learning, and research purposes. To date over 70,000 copies of the software have been downloaded from the AIDA Website, www.2aida.org. This column documents a survey of downloaders of the latest release of the program (AIDA v4.3a). The Internet-based survey methodology was confirmed to be robust and reliable. Over a 1-year period (from March 2001 to February 2002) in total 3,864 responses were received. During the corresponding period some 8,578 actual downloads of the software were independently logged via the same route at the AIDA Website, giving a response rate for this survey of 45%. Responses were received from participants in 66 countries—over half of these ($n = 2,137$; 55.3%) were from the United States and the United Kingdom. There were 2,318 responses (60.0%) received from patients with diabetes and 443 (11.5%) from relatives of patients, with fewer responses from doctors, students, diabetes educators, nurses, pharmacists, and other end users. This study highlights considerable interest amongst patients and their relatives to learn more about balancing insulin and diet in diabetes, as well as possibly to get more involved in self-management of insulin dosages. More computer applications that can cater for this interest in diabetes patient self-care need to be developed and made available. The Internet provides an ideal medium for the distribution of such educational tools.

INTRODUCTION

INTEREST IN THE USE OF information technology in diabetes care is increasing.¹ The rationale underlying this interest is the hope that

computer systems may provide a way of improving the therapy offered to people with diabetes—permitting more patients to be managed more intensively, in line with the experience of the Diabetes Control and Complications

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The AIDA program referred to in this report is an independent, non-commercial development which is being made available free-of-charge via the Internet—at a dot org (.org) not-for-profit Website—as a non-commercial contribution to continuing diabetes education.

Trial (DCCT).² However, in addition to the landmark DCCT study² there have been other randomised controlled trials that have highlighted the potential benefits of a more flexible approach to diabetes care. The DAFNE (dose adjustment for normal eating) approach has been pioneered in Dusseldorf³ and since trialled in Bucharest⁴ and elsewhere,⁵ as well as more recently in the United Kingdom.⁶ This has shown that a structured training course designed to maintain glucose control while enabling dietary freedom—teaching diabetes self-management skills to patients with type 1 diabetes—can be effective in improving blood glucose control.^{3–6} The hypothesis underlying this approach is that comprehensive teaching may lead to attainment of the practical goals achieved in the DCCT. Furthermore, the DAFNE educational model, which focuses on teaching patients the skills to self-adjust insulin dosages for carbohydrate, seems also to be associated with an improved sense of self-efficacy and treatment satisfaction.⁷

The working hypothesis underlying the AIDA interactive educational diabetes simulation approach is that there are not enough diabetes educators to provide the sort of intensive insulin therapy offered in the DCCT, and even DAFNE-style structured teaching sessions can be workforce-intensive and time-consuming. Therefore perhaps computer-assisted learning tools may be able to help in the transfer of knowledge from health-care professionals to patients,⁸ particularly if there becomes a need to offer repeat education to people with diabetes over a period of time.

There are many different aspects to diabetes education; however, learning facts is only one of these.⁹ The ability to gain experience is also of great importance. It is well recognised that it is not ideal for patients to learn about diabetes control solely from real-life experiences because of the long time frames involved, aside from the possible very real dangers of hypo- or hyper-glycemia.¹⁰ For this reason, it has been suggested that an interactive simulation of a diabetic patient might offer one solution.¹¹ In the same way that aircraft pilots and air traffic controllers are trained on airplane and air traffic simulators, it should be possible for diabetic patients and health-care students to be trained

to make appropriate responses to everyday situations using a diabetes simulator.¹⁰

Given this, with AIDA we have been striving to learn as much as possible about what people think of the software, and how they are using it. An important step in doing this is to establish what type of users are actually downloading the program.

AIDA BACKGROUND

AIDA is a freeware computer program that permits the interactive simulation of plasma insulin and blood glucose profiles for demonstration, teaching, self-learning, and research purposes. It has been made available since March/April 1996, without charge, on the World Wide Web as a non-commercial contribution to continuing diabetes education. In the 7+ years since its original Internet launch over 350,000 visits have been logged at the AIDA Web pages at www.2aida.org, and over 70,000 copies of the program have been downloaded, *gratis*. Further copies have been made available, in the past, on diskette by the system developers and from the British Diabetic Association, London, UK.¹² The AIDA software and underlying model have been previously described in detail elsewhere in the literature.^{9,13,14} Figure 1 summarises the anatomical basis of the model.

Numerous physiological (minimal) models of the human glucoregulatory system have been described in the literature^{15–17}—but these are not really so useful to patients, their relatives, health-care professionals, or students without some sort of program to allow easy access to, and interaction with, the model. Also, although other interactive simulators of glucose–insulin interaction in diabetes have been described in the literature,^{11,18–24} to date these do not seem to have been distributed widely via the Internet, or been made particularly widely available. Furthermore, for a number of these^{19,21–23} it would seem that readers are wholly dependent on the authors' own descriptions of their prototypes, since no versions appear to be available for use by others. This is not the case with AIDA where all the AIDA simulators are freely available on the Internet.

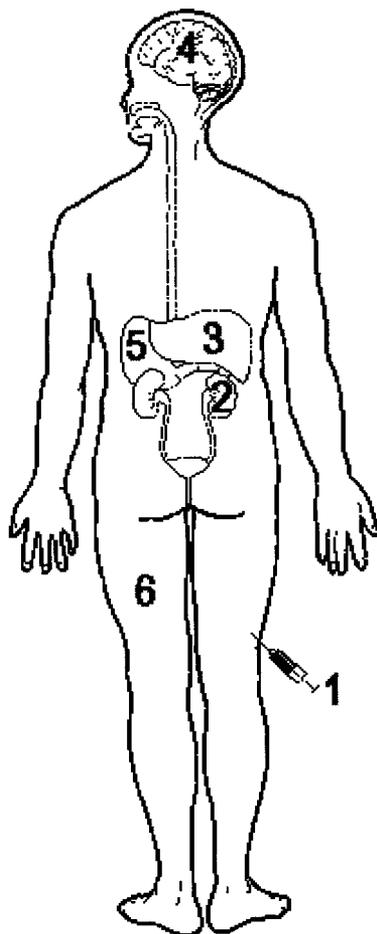


FIG. 1. Interactive representation of the AIDA model, accessible from within the AIDA v4.3a PC program. Modified from Lehmann et al.¹² Published by the British Diabetic Association, London, UK. In the software selecting the number key corresponding to the organ/function of interest displays the AIDA model functions for that particular organ system (1 = insulin, 2 = kidney, 3 = liver, 4 = brain, 5 = gut, and 6 = muscle).

The AIDA model assumes a patient completely lacking endogenous insulin secretion (i.e. an insulin-dependent diabetic patient). It contains a single extracellular glucose compartment into which glucose enters via both intestinal absorption and hepatic glucose production. Glucose enters the portal circulation via first-order absorption from the gut; the rate of gastric emptying which provides the glucose flux into the small intestine being controlled by a complex process maintaining a relatively constant glucose supply to the gut during carbohydrate absorption. Glucose is removed from the extracellular space by insulin-independent glucose utilisation in the central nervous system (CNS) and red blood cells (RBC) as well as by insulin-dependent glucose utilisation in the liver and periphery. Hepatic and peripheral handling of glucose in the model are dealt with separately; the net hepatic glucose balance (NHGB) being computed as the sum of gluconeogenesis, glycogen breakdown and glycogen synthesis data derived for different blood glucose and insulin levels from nomograms in the medical literature. Glucose excretion from the extracellular space takes place above the renal threshold of glucose (RTG) as a function of the creatinine clearance rate (CCR). The only insulin input into the model comes from the absorption site following subcutaneous injection; the pharmacokinetics of insulin absorption being derived from descriptions of that process in the literature. The model contains separate compartments for plasma and 'active' insulin, the latter being responsible for glycaemic control while insulin is removed from the former by hepatic degradation. Insulin affects the NHGB characterised by a liver sensitivity parameter, S_h , as well as enhancing peripheral glucose utilisation described by a peripheral sensitivity parameter, S_p .

METHODOLOGY

For the current work we have sought to confirm the feasibility of undertaking a large-scale survey about downloading of AIDA v4.3a via

the Internet. In the first instance we have initially focused on finding out the extent to which patients with diabetes, and their relatives, have been downloading the latest version of the AIDA software for personal use.

RATIONALE FOR THE SURVEY

A large number of downloads of the AIDA software have been logged on the Web. However, up to now, apart from user reviews/testimonials about the program^{8,25-27}—and *ad hoc* comments received by the system developers via electronic mail²⁸⁻³⁰—there has been relatively little formal assessment as to who has actually been downloading or making use of the simulator.

Two preliminary audits of downloads of older releases of AIDA (v4.0 and v4.3) have been trialled previously at the AIDA Website, with a smaller number of downloads,^{31,32} to demonstrate the overall feasibility of an Internet-based survey approach. However, with an increasing number of visitors to the AIDA Websites and with the launch in July 2001 of a new, updated release of the AIDA software (v4.3a) a decision was made to embark on a fresh survey of a larger number of downloads of the program.

STUDY METHODOLOGY

For a period of 1 year, between 5th March 2001 and 28th February 2002, people downloading the AIDA software were invited to anonymously answer six simple questions about themselves. The questions have been previously published elsewhere in this journal,³² together with the reply options that were made available for selection. The questions are also given in the Results section (below).

In addition to identifying the type of end users that were downloading the program, an additional purpose of the survey was to confirm what computer hardware and operating systems people were using, in order to facilitate the development and release of updates to the AIDA software. Depending on the speed of the Internet connection (modem, telephone line, or Ethernet link, ADSL/Broadband, *etc.*)—it can take around 5 min to download the AIDA program. While this download is taking place it is possible for visitors to be asked questions, and answer them, without interfering with the actual download process.

For the current study we took advantage of

this 5-min download “window of opportunity” to ask the six questions for which we were seeking answers. We also took advantage of the fact that Internet Common Gateway Interfaces (CGI-BINs) provide an easy way for people to offer responses via the Internet. The use of such CGI-BINs does not require the respondents to have an e-mail address, and importantly permits their answers to be submitted completely anonymously.

It was felt to be important to allow the responses to be given confidentially, as some Internet users are not keen to identify themselves on the Web. Therefore, by keeping the survey anonymous it was expected that the response rate could be increased, with the expectation being that this would reduce the likelihood of people being inhibited about actually answering the questions.

In previous smaller-scale, pilot audits run via the AIDA Website, responses submitted by end users were each individually delivered by e-mail to the main e-mail account for AIDA-related enquiries (www@2aida.org).^{31,32} Given the increasing numbers of survey responses, and to avoid thousands of e-mail notes being sent and received, a new approach was adopted for the current study.

On 5th March 2001 a new database system was set up on the AIDA Website servers. This enabled survey responses submitted by site visitors to be automatically appended to a standard ASCII-text format database at the AIDA Website. In this way the need for thousands of e-mails could be avoided. Figure 2 shows how this information is stored. Data are provided as free text as well as with each category of preset response automatically numerically coded by the HyperText Markup Language (HTML) Web page/CGI-BIN software. This automatic data coding assisted later analysis.^{31,32} The resulting ASCII text database files were downloaded from both the main AIDA Website (www.2aida.org), and from the former AIDA U.S. mirror site (us.2aida.org), and were imported into Microsoft Excel™ for summarising and analysis.

There are a number of software archives on the Web that offer visitors an opportunity to access the AIDA software directly from the AIDA Websites by linking directly to separate

4, Windows '98|2, Pentium II PC|just browsing the Web|221, United Kingdom|2, A relative of a patient|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|06:58:33|

7, Windows ME|1, Pentium III PC|from a fellow nurse here in California|222, United States|5, A nurse|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|06:59:52|

4, Windows '98|2, Pentium II PC|diabetes Website|221, United Kingdom|3, A student|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|07:00:27|

4, Windows '98|2, Pentium II PC|internet|222, United States|2, A relative of a patient|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|07:00:49|

4, Windows '98|2, Pentium II PC|from my father who heard about it from a friend|221, United Kingdom|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|08:20:02|

4, Windows '98|1, Pentium III PC||194, Spain|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|09:56:51|

6, Windows 2000|1, Pentium III PC|INTERNET SEARCH|222, United States|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|14:01:53|

6, Windows 2000|1, Pentium III PC||100, India|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|17:23:00|

4, Windows '98|1, Pentium III PC||222, United States|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|18:20:05|

5, Windows NT|2, Pentium II PC|a UK diabetes website|222, United States|2, A relative of a patient|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|18:37:09|

4, Windows '98|2, Pentium II PC||221, United Kingdom|1, A patient with diabetes|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|19:43:38|

6, Windows 2000|1, Pentium III PC||222, United States|4, A doctor|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|20:23:42|

4, Windows '98|2, Pentium II PC|friend|228, Venezuela|4, A doctor|1, AIDA v4.3 (32-bit Windows install procedure)|2001-03-05|20:42:58|

FIG. 2. Shows how the survey information for each individual response is stored on the Internet in an ASCII text file database at the AIDA Website. Gap lines have been inserted between each entry for clarity. The answers to five of the six questions have each been automatically, numerically coded by the HTML Web page and the CGI-BIN software. For example, first item, category 4 is the code for the Windows '98 operating system; and third item, category 2 is the code for a Pentium II PC. Sixth item, category 221 is the code for the United Kingdom; and eighth item, category 2 is the code for a relative of a patient. This coding system assists subsequent semi-automated data analysis. The comma and | dividers assist later importing of the data into Microsoft Excel for summarising and analysis. Each response is individually date- and time-stamped.

copies of the AIDA download installation files (Fig. 3). Such downloads, although counted and logged at the AIDA Website, do not allow visitors to have sight of the AIDA download Web page (www.2aida.org/download). As a result downloads via these separate freeware archive sites on the Web do not allow down-

loaders to be queried or audited. Therefore, where identified, downloads via these external sites have not been included in the current survey.

The questions selected for the current audit were intentionally chosen to be straightforward, and therefore hopefully easy for people

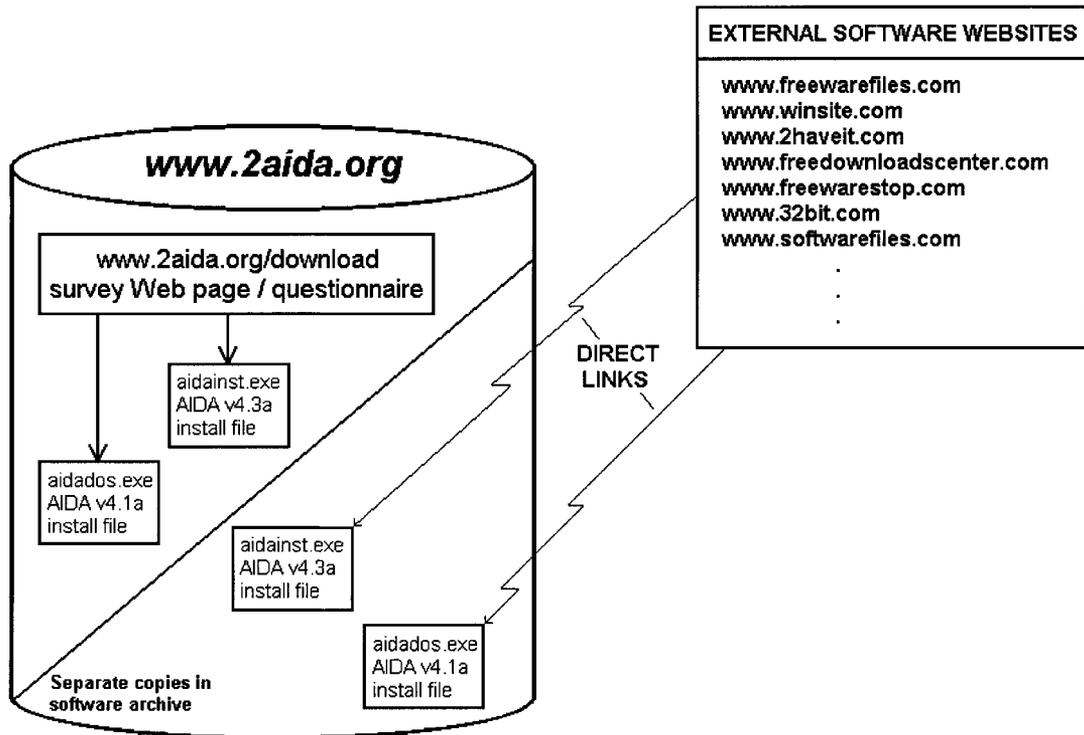


FIG. 3. Shows how two copies of both the AIDA download installation files [for AIDA v4.3a (aidainst.exe) and AIDA v4.1a (aidados.exe)] are stored on each AIDA Web server. One set of files is only accessible via the www.2aida.org/download Web page via which visitors have the opportunity to complete the download survey questionnaire/audit. The other set of files is accessible via a range of external software Websites. See Lehmann³² for a more complete list. Direct downloads via these external Websites bypass the www.2aida.org/download questions and therefore represent non-surveyable downloads in this study.

to answer. Also, it was arranged so that five out of the six questions could be answered simply by clicking on the entry and selecting the desired response using a pointing device (e.g., a computer mouse). Therefore typing was only required to answer one of the questions ("Where did you first hear about AIDA?"). Although the questions are simple, the power of such a survey comes from the large number of responses that can be received over a period of time.

RESULTS

During the 1-year period between 5th March 2001 and 28th February 2002 a total of 3,864 survey responses were received. During this time some 8,578 actual downloads of the software were independently logged via the www.2aida.org/download page at the Website, giving an estimated response rate to this survey of 45%.

Who are you?

In answer to this question, 2,318 responses (60.0%) were received from patients with diabetes, 443 (11.5%) from relatives of patients, 424 (11.0%) from doctors, 275 (7.1%) from students, 126 (3.3%) from diabetes educators, 64 (1.7%) from nurses, 55 (1.4%) from pharmacists, and 159 (4.1%) from other end users (who regarded themselves as none of the above).

Which country are you from?

Responses were received from end users in 66 countries, including (in alphabetical order): Algeria, Argentina, Aruba, Australia, Austria, Bahrain, Barbados, Belgium, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Canada, Chile, China, Columbia, Croatia (Hrvatska), Czech Republic, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Korea, Kuwait, Lithuania, Malaysia,

Malta, Mexico, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Puerto Rico, Romania, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan Region, Thailand, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, United States Minor Outlying Islands, Uruguay, Vatican City State (Holy See), Western Sahara, Yugoslavia, and Zimbabwe.

Over half the responses (55.3%) came from the United States and the United Kingdom: 1,691 (43.8%) and 446 (11.5%), respectively. Table 1 summarises the number of responses for the 20 commonest countries reported in the survey.

What computer and operating system are you using?

The vast majority of respondents (3,429; 88.7%) were using Pentium PCs to download AIDA, with just 86 (2.2%) using 80286/80386/80486 PCs, 50 (1.3%) using Apple Macintosh computers, and 299 (7.7%) using other

(unspecified) computers. Most of the respondents (3,761; 97.3%) were also using 32-bit Windows operating systems (Windows '95/'98/'NT/'ME or Windows '2000/beta) with just nine (0.2%) using the older Windows 3.1 or 3.11 operating systems, and the remaining 94 (2.4%) using DOS or other operating systems.

Where did you first hear about AIDA?

Table 2 summarises where respondents first heard about the software: 2,461 replies were received to this question [i.e., 1,403 respondents (36.3%) left this question blank]. This is perhaps understandable as users would need to type something in as free text, making this particular question slightly more involved to answer.

Of those who did provide a response, 29.1% ($n = 715$) reported discovering AIDA just by browsing or surfing the Web (category 1 in Table 2), 589 (23.9%) found AIDA via search engines (category 2), while 392 (15.9%) first heard about AIDA from a linked or referring Website (category 3). Categories 4–8 and 10–12, inclusive, in Table 2 can be regarded as “word of mouth” referrals. It is interesting to note that in total some 608 (24.7%) of the survey respondents first heard about AIDA in this way.

Which version of AIDA are you downloading?

While AIDA v4.3a—a release of the software with a Windows install procedure—was launched in July 2001, AIDA v4.0 and more recently AIDA v4.1a—using DOS install procedures—have continued to remain available from the AIDA Website for people with older computers.

During this survey period 3,799 respondents (98.3%) reported downloading copies of AIDA that made use of the 32-bit Windows install procedure, while just 65 respondents (1.7%) reported downloading the older 16-bit (DOS) install procedure versions. Of these, 1,299 respondents (33.6%) were downloading AIDA v4.3 (from March to July 2001) with 2,500 (64.7%) downloading AIDA v4.3a (from July 2001 onwards). Just 25 respondents (0.6%) downloaded the older AIDA v4.0 program (from March to July 2001), while 40 respondents (1.0%) downloaded AIDA v4.1a (from July 2001 onwards).

TABLE 1. SUMMARY OF THE NUMBER OF RESPONSES PER COUNTRY FOR THE 20 COMMONEST COUNTRIES REPORTED IN THE SURVEY

Country	Number of responses ^a	Percentage (of 3,864 total)
United States	1,691	43.8
United Kingdom	446	11.5
Canada	194	5.0
Australia	114	3.0
India	112	2.9
Germany	110	2.8
Netherlands	83	2.1
Spain	83	2.1
Italy	78	2.0
Brazil	73	1.9
Poland	53	1.4
Mexico	45	1.2
France	42	1.1
Greece	40	1.0
South Africa	40	1.0
Singapore	38	1.0
Argentina	31	0.8
Philippines	30	0.8
Denmark	28	0.7
Finland	28	0.7

^aShown are 3,359 responses (86.9%) from 20 countries. The remaining 505 responses (13.1%) from 46 other countries (<28 responses per country) are not shown.

TABLE 2. SUMMARY OF WHERE RESPONDENTS FIRST HEARD ABOUT THE AIDA DIABETES SIMULATION SOFTWARE

Category	Where did you first hear about AIDA?	Number	% of replies (n = 2,461)
1	Just browsing/surfing the Web	715	29.1
2	Found via a search engine	589	23.9
3	From a linked/referring Website	392	15.9
4	From a diabetes newsgroup/diabetes discussion list/chatroom/newsletter	219	8.9
5	From a friend/relative	123	5.0
6	From my doctor/nurse/hospital/clinic/a colleague	66	2.7
7	Through web search for diabetes software	61	2.5
8	From a book/journal/newspaper article	56	2.3
9	Through this Website (www.2aida.org)	40	1.6
10	By electronic mail	38	1.5
11	Through my school/college/university	35	1.4
12	Through my National Medical/Diabetes Association	31	1.3
13	From Diabetes Insight (a previously closely linked diabetes Website)	5	0.2
14	Other (none of the above)	91	3.7

This particular question was answered by 2,461 people. Categories 4–8 and 10–12, inclusive (shown in **bold**), are taken to represent “word of mouth” referrals—totalling $n = 608$ (24.7%) of replies.

DISCUSSION

Nearly three quarters of respondents (2,761; 71.5%) in the current study are people with diabetes or their relatives. We do not wish to overinterpret these findings, but it is illuminating that so many patients and relatives are turning to the Internet for diabetes-related information.

Clearly it can never be automatic or straightforward to extrapolate the results of a sample survey to a complete population. However, it does seem reasonable to assume that the results of this survey—certainly for the question regarding who has been downloading the software—are typical for the entire period that AIDA has been available on the Internet (there appears no obvious reason why this should not be the case). Therefore in the 6 years up to the end of February 2002 there were 34,489 downloads of the software independently logged at the AIDA Websites. As such, the current survey results suggest that nearly 25,000 of these downloads are likely to have been made by patients and/or their relatives, as opposed to approximately 6,000 downloads by health-care professionals (doctors, diabetes educators, nurses, and pharmacists—but not including students and “others”). Given the continued

downloading and usage of the software, these data do offer a useful indication as to the extent to which individuals with diabetes and their relatives are accessing AIDA.

Response rate

For a period of nearly 3 months, from 5th March to 31st May 2001, because of problems with direct links to download files at the AIDA Website (Fig. 3), it became difficult to reliably differentiate between surveyable and non-surveyable downloads. During this time, while the absolute number of downloads could be established, the exact number of downloads that originated from the surveyable www.2aida.org/download Web page, as compared with those that originated from other Websites, could not be so reliably determined. Therefore for the current analysis the total number of downloads from the www.2aida.org site had to be used as the denominator for calculating the response rate for this 3-month period.

Nevertheless, any *overestimation* of the proportion of surveyable (as compared with non-surveyable) downloads would only have served to *reduce* the apparent response rate for this study. As a result, the actual overall response rate may well have been higher than

45%, but this cannot be ascertained for certain because of a lack of separate, surveyable and non-surveyable download data for March to May 2001. This problem only affected determination of the response rate. A solution for the problem was implemented at the AIDA Websites on 1st June 2001, and thereafter the remainder of the survey period was not affected.

For the 9-month period—from the beginning of June 2001 to the end of February 2002—when such separate data were available, the actual survey response rate was 55.5%. For information—between 5th March 2001 and 28th February 2002—in addition to the indentifiable, surveyable downloads there were also at least 4,672 separate downloads of the AIDA software that were made directly from third-party Websites, bypassing the AIDA download/survey page.

Limitations

Clearly this survey has some limitations. Most obvious is the fact that, like many surveys/audits, it is based upon self-reported data, although the large number of responses received do go some way to offset this. However, a relatively major limitation of the current study is that while it offers an indication as to who has been downloading the software, we do not know how much these people have actually used AIDA. For instance, whether people download the install file and then do nothing with the program, or use it a great deal, cannot be established from a survey conducted, as this one has been, at the point of download. Further studies are in the process of being analysed to address this point.

However, there are other ways that we can also estimate usage. AIDA online is a Windows-based, mouse-controlled version of AIDA that can be accessed via the Internet completely free of charge at www.2aida.org/online.^{24,33} This facility permits interactive diabetes simulations to be run in a standard Web-browser window. During the period of the current survey over 30,000 interactive simulations were run at AIDA online, suggesting considerable on-going interest and usage. While no single indicator can offer a definitive view of continued use of the diabetes simula-

tor—we believe it is particularly informative when a series of variables, from different sources, and collected in different ways—all point in the same direction.

Furthermore, notwithstanding the larger numbers of respondents in the current survey, it is interesting how relatively consistent the findings remain over time, compared with the previous proof-of-concept (pilot) studies.^{31,32} For example, in the 1999/2000 survey of AIDA v4.0,³¹ 762 of 1,360 respondents (56.0%) were patients with diabetes, while 184 of 1,360 respondents (13.5%) were relatives of patients, with 177 of 1,360 respondents (13.0%) being doctors. By contrast, in the 2000/2001 audit of AIDA v4.3,³² 1,361 of 2,437 respondents (55.8%) were patients with diabetes, while 303 of 2,437 respondents (12.4%) were relatives of patients, with 294 of 2,437 respondents (12.1%) being doctors. These data are comparable with the current 2001/2002 survey of AIDA v4.3a, in which 2,318 of 3,864 respondents (60.0%) were patients with diabetes, while 443 of 3,864 respondents (11.5%) were relatives of patients, with 424 of 3,864 respondents (11.0%) being doctors (Table 3).

In this respect, it will be noted that the current study is larger than the two previous proof-of-concept (pilot) studies,^{31,32} combined. Given this, the current survey—with $n = 3,864$ responses—seems to have a sufficient sample size to provide a useful validation/confirmation of the findings from the earlier pilot studies.

Future work

There are clearly certain ways that studies such as the current audit might be enhanced. In future surveys it may be that a wider range of questions should be considered. For instance, it may be of interest to learn more about the age and gender of downloaders (e.g., is the software mainly of interest to young individuals, or are downloads being made by people from a wide range of ages?). Similarly, it would be interesting to know if patients who are downloading the software mainly have insulin-dependent (type 1) diabetes or non-insulin-dependent (type 2) diabetes. Further questions could also be asked, although there

TABLE 3. COMPARISON OF REPLIES TO THE QUESTION "WHICH OF THE FOLLOWING CATEGORIES BEST DESCRIBES YOU?" FROM PREVIOUS NON-OVERLAPPING PROOF-OF-CONCEPT (PILOT) AUDITS^{31,32} AND THE CURRENT N = 3,864 SURVEY

	Download survey (%)		
	AIDA v4.0 ³¹ November 1999–July 2000	AIDA v4.3 ³² July 2000–March 2001	AIDA v4.3a March 2001–February 2002
Sample size	n = 1,360	n = 2,437	n = 3,864
Patients with diabetes	56.0	55.8	60.0
Relatives of patient	13.5	12.4	11.5
Doctors	13.0	12.1	11.0
Students	6.5	5.3	7.1
Diabetes educators	4.2	6.4	3.3
Nurses	1.6	2.7	1.7
Pharmacists	1.1	2.5	1.4
"Others"/none of the above	4.0	2.8	4.1

To date—in total—7,661 respondents have been surveyed in this way from November 1999 to February 2002.

will always be a balance to achieve between the number of questions and the ease of completing the on-line questionnaire.

Another way that such a survey might be improved could be by linking it more closely to other data that has been collected. So, for instance, we have previously described in this journal some separate pilot studies analysing Website logstats³⁴ as well as asking Website visitors why they are downloading the AIDA software.^{35,36} Potentially more information might be secured, and a greater understanding obtained about the population that downloads the program, if data from these separate anonymous sources were collated and analysed together.

Other issues that warrant closer attenuation in future studies include incorporating checks to establish if more than one download has been performed by the same person [possibly from the same Internet (IP) address] and whether more than one questionnaire has been completed. Similarly, it might be helpful to incorporate some automated computer-based quality/reliability checks into the questions being asked, and the data being collected. However, notwithstanding such enhancements to the audit methodology, the overriding advantage of this Internet-based survey approach remains the large number of downloaders that can be surveyed, and the large number of responses obtained for analysis.

CONCLUSIONS

There may be a perception amongst some health-carers that computer programs, like AIDA, may be too complex or complicated for people with diabetes to use. Also, some health-care professionals may believe that patients are not really interested in getting so involved in their own diabetes care. However, surveys, such as the current one, do provide evidence that substantial numbers of patients are actively seeking out more information about how to better manage their diabetes. We find this encouraging, and will be embarking on further studies to learn more about how people are making use of, and actually benefiting from, the AIDA software. Furthermore, the results of such surveys should encourage the refinement of diabetes software programs, like AIDA, and the development of new applications.

That people seem to be finding AIDA of use and are benefiting from the program, we believe, can also be inferred from the large number of "word of mouth" referrals that lead to people first hearing about and downloading the software (Table 2). This suggests that those who have been informing them about the program have found it of interest and use, in the first place. This impression is supported by the wide range of comments about AIDA that have been posted to public diabetes lists and discussion groups, as well as received from

users directly by e-mail.²⁸⁻³⁰ Overall, this experience seems to reinforce the view that patients are actually interested in getting more involved in managing their own insulin dosages.^{37,38}

The diabetes health-care community needs to find ways to further help and support such interest in patient self-care.

FURTHER TOPICS

If you would like to suggest further topics or Websites for future "Diabetes Information Technology & WebWatch" columns, please e-mail information—with a brief description of the site/suggestion—to Dr. E.D. Lehmann: info-www@2aida.org (please write Diabetes WebWatch in the subject line). You can also fax information to: (503) 218-0828, quoting Diabetes Information Technology & WebWatch.

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